TUBERCULOSIS

An Interdisciplinary Perspective

Edited by

John D H Porter & John M Grange

Imperial College Press

1999

World Health Organization (1988) *Tuberculosis Control as an Integral Part of Primary Health Care.* 88/7778. Geneva: World Health Organization.
World Health Organization (1996) *World Health Report.* Geneva: World Health Organization.

CHAPTER 16

DEMYSTIFYING THE CONTROL OF TUBERCULOSIS IN RURAL BANGLADESH

A. M. R. Chowdhury, J. Patrick Vaughan, Sadia Chowdhury and Fazle H. Abed

Introduction

Tuberculosis remains a global public health problem. In many developed countries, tuberculosis was thought to have been virtually eradicated but is now staging a comeback, partly through its association with the Acquired Immuno Deficiency Syndrome (AIDS). In developing countries, however, tuberculosis remains a major public health problem despite the highly-effective treatment regimens available (Kochi, 1997). For instance, there are an estimated seven million new infections with tuberculosis each year in developing countries, and about two to three million deaths (Raviglione *et al.*, 1995; Wise, 1996). Despite the fact that tuberculosis disproportionately affects the poor and other neglected segments of the population, it has continued to have a low political priority (Murray *et al.*, 1990).

The assumption behind tuberculosis control programmes is that high rates of case detection and treatment will lead to a reduction in the incidence of new cases. However, the major challenge facing tuberculosis control programmes is how to screen the general population and detect a high proportion of the active cases, and then how to achieve successful compliance with effective treatment. In addition, tuberculosis is dreaded in countries like Bangladesh (Chowdhury and Kabir, 1988), and associated taboos and stigma, together with poor facilities and

unfriendly health care providers, discourages patients from reporting to health centres (Chowdhury *et al.*, 1991). Another compromising factor is the long period for treatment (six to 12 months). Recognising the scale of tuberculosis as a public health problem, BRAC, a non-governmental organisation, began a community-based tuberculosis control programme in 1984 in one *thana* (sub-district) using village-based community health workers and directly observed therapy, short course (DOTS). In view of encouraging results, BRAC extended the programme to additional *thanas* in 1992 (Chowdhury *et al.*, 1991; 1992). In this chapter, the salient features of the BRAC programme and the lessons learnt in the subsequent scaling up process are presented.

The Tuberculosis Problem in Bangladesh

A chest radiology survey in 1964–1965 detected 3.2 million cases of pulmonary tuberculosis in Bangladesh (Islam, 1981) and it was estimated that 390,000 of these cases, or 0.5% of the population, were sputum positive. A national survey carried out in 1987–1988 showed that 0.87% of the population aged 15 years and over were sputum positive (Director General Health Services, 1989). Men were infected twice as often as women and the problem was more acute in urban areas (see Table 1).

Table 1. Tuberculosis in adults 15 years and older as determined by the National Prevalence Survey on Tuberculosis in Bangladesh (1987–1988).

Population groups	% sputum positive
Total	0.87
Male	1.08
Female	0.60
Rural	0.80
Urban	1.61

Source: Ministry of Health and Family Welfare, Bangladesh.

In another survey carried out in 50 villages in the Manikganj district in 1984, 20% of the population aged 15 years and over had a history of chronic cough and examination of their sputum specimens revealed that 2.7% were positive for acid-fast bacilli and 3.1% had a positive culture for *M. tuberculosis*. Sixty three percent of smear-positive cases were also culture positive. Smear-positive rates in the community were estimated to be between 0.33% to 0.55% and culture-positive rates between 0.39% to 0.64%. Drug sensitivity tests indicated that 70% of the strains were sensitive to all 12 anti-tuberculosis drugs and the remainder were resistant to only one or two combinations of streptomycin, INH, thiacetazone and ethionamide (Islam *et al.*, 1986).

Tuberculosis Control Programmes in Bangladesh

Ishikawa (1985) identified three main types of tuberculosis control programmes in Bangladesh.

- Type A: Hospital- or clinic-based programmes, such as the government programmes, that had very limited or no links with the community;
- Type B: Hospital- or clinic-based programmes that had strong links with community health workers. These included most of the programmes run by non-governmental organisations; and
- Type C: Community-based programmes with little or no direct involvement with hospitals or clinics and where community health workers were the 'nucleus' of the programme activities. The BRAC programme described in this chapter falls into this category.

In addition to the above, many tuberculosis cases are treated by the large private and non-formal health providers and, in addition, anti-tuberculosis drugs are widely available for purchase from numerous small pharmacies. Most of these drugs are produced in Bangladesh and tests for quality control commissioned by the Leprosy Mission and

carried out in Denmark found that these drugs were within acceptable standards (Chowdhury *et al.*, 1997).

The Bangladesh National Tuberculosis Programme

The Bangladesh National Tuberculosis Programme, which is reasonably typical of many such programmes in developing countries, is clinic-based and uses 57 hospitals and clinics with over 1,000 beds, all of which are located in urban areas. If the estimated number of active tuberculosis cases is correct, there are about 500 cases for each available bed. The government of Bangladesh has adopted directly observed therapy, short course (DOTS), and is implementing the programme with the active assistance of several non-governmental organisations, including BRAC. The government has recently intensified its programme with financial assistance from the World Bank and the government of the Netherlands (Government of Bangladesh, 1996).

Although integration of tuberculosis control into the health services has been an accepted policy of the government since 1976, much more needs to be done in this regard. Although a large number of government health workers are posted in primary care facilities (approximately 15 per 20,000 population), few of them until recently were actively involved in tuberculosis activities, apart from BCG vaccination given through the EPI programme. Health staff are not well trained in tuberculosis control and in the supervision of treatment compliance in hospitals or community facilities. Finally, as elsewhere in developing countries, tuberculosis control remains a low political priority despite increasing interest in recent years by donor agencies.

A recent review of the Bangladesh National Tuberculosis Programme, based on interviews with policy makers and programme staff, together with an analysis of official records, revealed a marked improvement in the performance of the programme in recent years. Since the introduction of DOTS in 1993, over 150,000 people with the disease have been treated, with an estimated success rate of 80%. In 1996, a

total of 63,985 tuberculosis patients were registered by the National Tuberculosis Programme, which was about 21% of the estimated annual incidence (World Health Organization, 1997b). In addition, BCG vaccination coverage had improved from less than 2% in 1986 to about 80% in the 1990s for children under one year of age (Huq, 1991).

The Tuberculosis Control Programme of BRAC

BRAC is a large Bangladesh non-governmental organisation established in 1972. It is one of the largest and most influential development organisations in the world, with over 18,000 full-time staff and 35,000 part-time workers. BRAC operates in over 55,000 villages of Bangladesh and it has an annual budget of about US$100 million. The major focus of BRAC programmes are alleviation of poverty, empowerment of women, primary education and health. BRAC supports these programmes with separate training and research divisions (Lovell, 1992; Ahmed *et al.*, 1993; Chowdhury and Cash, 1996).

The core of BRAC poverty alleviation programmes at the village level are the women's groups, called village organisations, with membership from the poorest households. In each group, one woman is trained as a Shasthya Shebika (community health worker) who treats selected common illnesses in the village. She does not receive any salary but does receive a small mark-up on the sale of selected essential drugs. As a member of the village organisation she can also receive loans for her own income-generating activities. Each of the community health workers, who are mostly illiterate women with an average age of about 35 years, covers about 200 households, including members of her own village organisation.

These community health workers have been trained by BRAC in tuberculosis case-finding, treatment and follow up procedures. They communicate information about tuberculosis to the community, especially through village organisation meetings and posters, and detect cases of active pulmonary tuberculosis by following up individuals with chronic

cough of four weeks or more duration, from whom they then collect two early-morning sputum samples. These samples are examined microscopically for acid-fast bacilli in a local BRAC laboratory, in which technicians have been trained by the National Tuberculosis Programme. Sputum-positive patients are contacted by their own community health worker and asked to register for treatment. The national programme also assists in maintaining quality control of diagnostic procedures.

Patients willing to participate in treatment are asked to pay a deposit of 200 Taka (about US$5), equivalent in rural areas to about two to four days wages, and to sign a written agreement as an incentive to complete their course of treatment. At the end of treatment, 100 Taka is returned to the patient and the rest is given as compensation to the community health worker for her work. If the patient is too poor to pay the deposit, this is often paid by the village organisation or other community members. The community health worker also receives 25 Taka for each new or relapsed positive patient whom she identifies. If patients do not complete their treatment, the whole deposit in forfeited and the community health worker gets her share while the remainder is retained by BRAC.

The BRAC tuberculosis programme was piloted and implemented between 1984 and 1991 in one *thana* (sub-district) and covered a population of 220,000 people. Results from this pilot programme (phase one), in which a standard 12-month DOTS treatment regimen was used, suggested that about two-thirds of patients completed the full course of treatment. The relapse rate was estimated to be about 10% for patients who had completed treatment four or more years previously. Between 1984 and 1994, the treatment regimen consisted of 30 streptomycin injections, given on alternate days for two months, and daily isoniazid (300 mg) and thioacetazone (150 mg) administration for 12 months. Drugs were provided free-of-charge to BRAC by the National Tuberculosis Programme and at no cost to the patients. Sputum specimens were examined for acid-fast bacilli at 1, 3, 6, 9, 12 and 13 months after treatment had started and patients with complications, or positive sputum at the end of their treatment, were referred to specialist

clinics or hospitals. The second phase (1992–1994) expanded the BRAC programme to an additional nine *thanas*. In addition, from 1995 (the start of phase three) an eight-month regimen based on isoniazid, pyrazinamide, ethambutol and rifampicin daily for two months, followed by isoniazid and thiacetazone daily for a further six months, was used. Another eight *thanas* (making a total of 17) were also included in phase three.

Evaluation of the BRAC Programme

To evaluate the effectiveness of the programme, a cohort analysis of programme data for phases two and three was performed according to the outcome categories recommended by the World Health Organization (WHO) and the International Union Against Tuberculosis and Lung Disease. This analysis included assessment of the number of people with chronic cough who were identified as sputum positive for acid-fast bacilli, the proportion who accepted treatment and subsequent patient outcomes, including the proportion cured, died, failed treatment, defaulted and migrated. In order to assess the impact of the programme in the control of tuberculosis transmission, as measured by the prevalence of sputum smear-positive tuberculosis cases in the *thana* population, a cross-sectional household survey was carried out in 1995 in two programme *thanas*, one with low and the other with high tuberculosis detection rates. A third *thana*, socio-economically similar to the other two programme *thanas* but which had not had a BRAC programme, was selected for the comparison. Heads of households or their spouses in more than 3,000 randomly selected households in each *thana* were interviewed to identity individuals with a chronic cough of four weeks duration or longer. Each patient with a chronic cough was asked to give a sputum sample, which was examined for acid-fast bacilli by trained technicians using the Ziehl–Neelsen method in a local BRAC laboratory. Ninety-five percent of patients with chronic cough gave at least one sputum sample. For quality control, a random selection of the

slides were re-examined by technicians from the National Tuberculosis Control Programme, who found the quality of staining, smearing and microscopy to be well within acceptable standards. Before completion of the household survey, however, an initial analysis of the laboratory results showed that the proportion of patients who were smear positive was lower than had been expected. Since this might have been the result of poor case-detection and under-reporting of chronic cough, all survey households in the three *thanas* were revisited and new information was gathered by the same methods. The conclusion was that the survey methods appeared to be sound since this second round only resulted in one additional case of tuberculosis being detected.

This household survey also included the follow up of all tuberculosis patients who had been previously diagnosed and treated by BRAC in the two programme *thanas*. All previously treated patients were traced and three sputum specimens were collected and examined as above. In addition, tuberculosis patients under treatment, community members, community health workers and local BRAC staff were all interviewed, using both quantitative and qualitative methods, for their views about the quality of care provided in the BRAC tuberculosis programme.

Results of the Evaluation Study

Between 1992 and 1994 (phase two), 3,886 tuberculosis patients were identified in their villages by the BRAC community health workers. Ninety percent of these had accepted the offered treatment and 81% of these completed the full 12-month course. In 85% of those treated, the sputum became negative for acid-fast bacilli by the start of the third month. An outcome analysis of 3,497 patients in phase two who had started treatment between April 1992 and December 1994 is shown in Table 2. Although 81% were cured or completed the 12-month course, 9.6% had died, the drop-out or default rate was 3.1%, and the failure rate was 1.5%. The overall successful cure rate was, therefore, at least 80% for patients who started treatment and 73% (81% of 90%) for all the sputum-positive patients originally diagnosed.

Table 2. Treatment outcomes for acid-fast bacilli-positive patients treated with a 12-month regimen in 1992–1994 (phase two).

Outcome	Number of cases ($n = 3497$)
Cured/completed*	2833 (81.0)
Died	336 (9.6)
Failed treatment	51 (1.5)
Defaulted	109 (3.1)
Migrated/referred/transferred	168 (4.8)

*Cured-negative sputum at month 13; samples not available at month 13 for 402 patients who were, therefore, classified as completed. Source: Chowdhury *et al.* (1997).

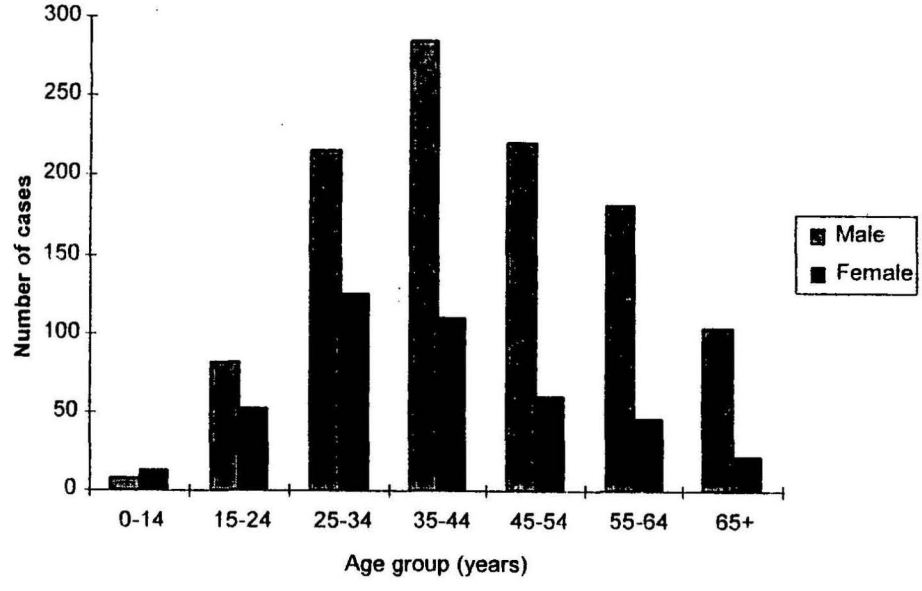

Fig. 1. The age-sex distribution of the smear positive patients for 1995.

Programme data were also analysed from phase three for all patients diagnosed and started on the eight-month regimen during 1995. A total of 1,741 patients (1,525 new cases and 216 patients previously treated) were confirmed to be sputum smear positive and all had accepted treatment. Figure 1 shows the age-sex distribution of the smear-positive

Table 3. Treatment outcomes for acid-fast bacilli-positive patients treated with eight-month regimen in 1995 (phase three).

Outcome	Number of cases (n = 1741)		
	New (n = 1525)	Retreatment (n = 216)	Total (n = 1741)
Cured	2301 (85.3)	195 (90.3)	1496 (85.9)
Completed	1 (0.1)	2 (0.9)	3 (0.3)
Died	226 (8.2)	3 (3.2)	133 (7.6)
Failure	43 (2.8)	8 (3.7)	51 (2.9)
Defaulted	36 (2.4)	4 (1.9)	40 (2.3)
Migrated/ referred/transferred	23 (1.2)	—	18 (1.0)

Source: Chowdhury *et al.* (1977).

patients for 1995, which clearly shows that the greatest male-female differential was in the 35–44 years age group. At the end of the eight-month regimen more than 85% of new cases and 90% of relapsed patients were smear negative and were deemed to be cured. However, 8% of patients had died and about 2% had defaulted (Table 3). A similar pattern existed for all new cases for 1996.

Another approach to evaluating the health impact of the BRAC tuberculosis programme was a large-scale household cross-sectional survey to compare the sputum smear positive prevalence rates in programme *thanas* with a comparison *thana*. This survey included 44,505 people in sampled households (Table 4). A total of 795 people with chronic cough were identified, half were from the comparison *thana* and half from the two programme *thanas*. Two-thirds of all the symptomatic patients were men. For those with a symptomatic cough in the two programme *thanas*, 2.5% and 2.7% of sputum samples were smear positive, compared with 3.4% in the non-programme comparison *thana*. The apparent success of the BRAC programme is shown by the fact that the prevalence rates of smear-positive tuberculosis among people aged 15 years and older in the programme *thanas* was half that in the

Table 4. Prevalence of acid-fast bacilli-positive cases detected by household survey in programme and comparison *thanas*.

Thana	Total population 15 years or more	Number with chronic cough	Number acid-fast bacilli smear positive	Prevalence rate (per 1000)
A (Programme)	7146	181 (2.5)	5 (2.1)	0.07
B (Programme)	8639	236 (2.7)	6 (2.3)	0.07
C (Comparison)	8720	373 (4.3)	13 (3.4)	0.15

Source: Chowdhury *et al.* (1997).

non-programme comparison *thana*. However, a problematic finding was that the total number of patients identified by this survey was smaller than had been expected. For instance, in the sample of 8,720 people in the comparison *thana*, the total number of smear-positive patients should have been between 29 and 48 if the prevalence rates of 0.33% and 0.55% found in 1984 were still applicable in 1995. Because of the possibility that faulty household survey techniques had led to an under recording of positive cases, all households were in fact revisited but this only resulted in the detection of one new case. Three quarters of the smear-positive patients were men and all except one were over the age of 35.

During the household survey all previously treated tuberculosis patients were followed up and 90% of 483 patients who completed their treatment between 1992 and 1994 were successfully contacted. Eighteen patients were still sputum positive at the time of survey, nine each in the two programme *thanas* and, of these, 17 were found to have more than one fast bacillus per high-power field. The overall relapse rate was 4.1%, but when this was disaggregated for the time since treatment had been completed, the rate was 7.8% for two years or more, 3.3% for 12–23 months, and 4.5% for less than 12 months.

The evaluation also included studies of the perceptions of the patients and providers. The patients and other members of the community spoke

highly of the care provided by BRAC through the community health workers. Even so, half of the interviewed patients complained of drug side effects such as loss of appetite, tingling sensations in their limbs, vomiting and skin rashes. They were satisfied, however, that the community health workers had provided prompt advice on how to deal with such side effects. Since the community health workers come from the same villages, patients had no problems in accessing them. The poorer patients did receive their drugs, which were supplied free of cost. The community health workers, on the other hand, did not encounter any problems in their work with tuberculosis patients. In their own words they "enjoyed the work" and tuberculosis control caused no disruption to their daily chores. About half of the tuberculosis patients mentioned that their family and villager neighbours had not shown any prejudices against them, while a quarter reported that they had been isolated from family members and the remaining quarter said the villagers both hated and were scared of them.

Discussion on the Evaluation Findings

Directly observed therapy, short course (DOTS) is now accepted as the treatment regimen of choice for tuberculosis in many developing and developed countries (Bayer *et al.*, 1995; World Health Organization, 1997a). However, although the WHO has described this approach as a 'breakthrough strategy' for combating the global tuberculosis epidemic, only about 10% of the world's tuberculosis patients have access to it. Of the 13 countries in which 75% of the world's tuberculosis patients live, until recently only five, including Bangladesh, have adopted DOTS for their national strategy (World Health Organization, 1997a). In addition, international health policies for combating tuberculosis have given priority to establishing government national programmes and have paid little attention to the importance of community-based approaches.

In countries such as Bangladesh, where the government health infrastructure is poorly developed, particularly in rural areas,

non-governmental organisations like BRAC have a major role in tuberculosis control. The innovative BRAC programme has been built up from the 'bottom-up' by relying on community health workers and local-level supervision. This combination has been shown to be highly successful in identifying villagers with possible tuberculosis and then encouraging them to accept and comply with DOTS treatment in their own villages. In the BRAC tuberculosis control programme, treatment compliance and cure rates have progressively improved from the pilot phase to phase two and again in phase three, when the eight-month regimen was introduced.

The evaluation of the BRAC programme strongly suggested that it has managed to progressively improve tuberculosis case-detection and cure rates in a rural population in Bangladesh. The findings on the different approaches to evaluating the impact of the programme on health has produced similar and consistent results. At least 90% of diagnosed patients had accepted the 12-month regimen and this had risen to almost 100% for the eight-month course, with cure rates of at least 80% and 85% respectively for the 12-month and eight-month course. Even with an acceptance rate of 95% and a cure rate of 85%, it is nevertheless important to emphasise that the overall success is 81% for all diagnosed cases ($0.95 \times 0.85 \times 100$) and that the mortality rate was 8–10% and that relapses occurred in 3–4% of all patients given treatment. Such programme indicators are consistent with those achieved in other programmes that have relied on professionally trained health workers (Weis *et al.*, 1994; Wilkinson 1994, 1997; World Health Organization, 1997a; Kochi, 1997).

The fundamental assumption in tuberculosis control is that if a large but, at present, unknown proportion of all pulmonary tuberculosis patients are treated, transmission will be reduced and the annual incidence will gradually decline over time. This evaluation produced some evidence that is consistent with this assumption. The cross-sectional household survey, carried out in 1995 in *thanas* where BRAC had started the tuberculosis control programme in 1991, showed that the prevalence of smear-positive tuberculosis in these programme *thanas*

was half that in the comparison *thana*, where only the normal government tuberculosis services were available. These rates, although lower than previous population estimates made in 1984, were based on sound epidemiological methods and the adequacy of the survey findings had been thoroughly checked by repeating the survey. The figures appear to be comparable, therefore, even if the survey had possibly underestimated the true prevalence. An alternative interpretation is that the true prevalence may have actually decreased during the previous two decades or so, possibly because of the wide availability of the BRAC services and cheap anti-tuberculosis drugs in Bangladesh which has had a progressive drug policy since 1982 (Reich, 1994; Chowdhury, 1996).

The evaluation findings also suggest that the BRAC programme was detecting about 50% of all the existing pulmonary tuberculosis patients in the total population. When this detection rate is combined with the treatment results from phase three, however, only about 40% of all existing cases are successfully treated, calculated as follows: acceptance of 0.95 × cure rate of 0.85 × overall detection rate of 0.50 = 0.40. It is not known whether or not this proportion is sufficient to reduce the transmission of tuberculosis.

The key to tuberculosis control is, therefore, in raising the overall detection rate for all active cases of pulmonary tuberculosis in the population. BRAC believes that this situation can be significantly improved by placing a greater emphasis on social mobilisation and the introduction of the shorter regimen. In addition, the National Tuberculosis Programme is working more closely with private providers, such as BRAC, that have an important role in tuberculosis control. A close working relationship between the government and BRAC programmes in the same *thanas* is likely to improve the credibility of community health workers by enhancing their performance.

The important factors that may have contributed to the success of the BRAC programme have already been commented on and can be summarised as follows (Grange and Zumla, 1997):

Learning from pilot projects. BRAC gives importance to a prolonged organisational learning phase, with pilot projects in a few *thanas* before expanding to a much larger programme. BRAC is a learning organisation which believes that monitoring and evaluation enables it to learn from its own experiences (Lovell, 1992). BRAC maintains an independent and active research evaluation division that is always closely involved in evaluating new 'pilot' initiatives before they are expanded. Even during scaling up, operations research and evaluation activities continue as an integral part of all of BRAC's programmes, thus providing BRAC with an opportunity to continue to be a learning organisation.

Involvement of community health workers. These health workers are the backbone of the BRAC programme. On a house-by-house basis they identify the patients with chronic cough, collect sputum specimens, provide treatment at the door-step and maintain follow up and tracing of contacts. They live in the community they serve and are well respected for their services. They also enjoy their work and receive monetary incentives for identifying patients and ensuring that treatment is completed successfully. Since community health workers are women they are also well placed to assist female patients. Unfortunately, the government's national programme does not have similar community health workers involved in tuberculosis control.

Patient's bond money. The bond money that a patient pays to BRAC for their treatment is probably the single most crucial factor in achieving the high treatment completion rate. The bond acts as incentive to both the patient and their community for the regular intake of drugs. In a previous mass programme for oral rehydration therapy (ORT), BRAC also successfully used an incentive salary system for front-line programme workers (Chowdhury and Cash, 1996).

Treatment at the door-step. Since tuberculosis is a dreaded illness and cultural taboos lead to patients being stigmatised, there is a low attendance at government health facilities (Chowdhury and Kabir, 1988).

In addition, health workers are seen as unfriendly and their behaviour also dissuades patients from seeking health care. In contrast, BRAC health workers actively seek out possible cases of tuberculosis and provide counseling and treatment services at the patient's door-step.

Provision of free drugs. The national programme supplies free anti-tuberculosis drugs to BRAC and these are passed on free to the patients by the community health workers. The government tuberculosis programme also provides free drugs but frequent drug shortages and embezzlement have led to a lack of confidence in the government services.

Programme management. BRAC is a non-governmental organisation that is well known for its innovative approaches to social development and its ability to manage its programmes both effectively and efficiently. BRAC also places much emphasis on team work, in service training and staff supervision. Although BRAC has evolved into one of the world's largest non-governmental organisations, it has a firm belief in the practices of good management.

Availability of external technical assistance and financial resources. BRAC has developed good collaborative relationships with many external agencies. For instance, much needed technical support has come from the Research Institute for Tuberculosis in Tokyo, Japan, and the National Anti-Tuberculosis Association of Bangladesh (NATAB). Financial support has come from UNICEF, Swedish SIDA, Swiss Development Cooperation, and the United Kingdom's Department for International Development. In addition, the Government of Bangladesh has extended its full cooperation to BRAC, including technical support, free drug supplies and quality control of the diagnostic laboratories for sputum testing. As a partner to the Government of Bangladesh, BRAC now runs its tuberculosis control programme in 39 *thanas* and will add a further 11 in 1998.

Acknowledgement

We thank N. Ishikawa and colleagues at the Research Institute of Tul culosis in Tokyo, Japan, for their long-standing support. The BRAC berculosis Programme is supported by the Government of Banglad the National Tuberculosis Association of Bangladesh, the Departm for International Development of the United Kingdom, SIDA, Swiss velopment Cooperation, and UNICEF. Other BRAC research contri tors include Kaoser Afsana, Jalaluddin Ahmed, Aminul Alam, Akra Islam, S. N. Mahmud and B. Roy.

References

Ahmed, M., *et al.* (1993) *Primary Education for All: Learning from the BRAC perience.* Washington DC: Academy for Educational Development.

Bayer, R. and Wilkinson, D. (1995) Directly observed therapy for tuberculosis: tory of an idea. *Lancet* **345**, 1545–1548.

Chowdhury, A. M. R. and Kabir, Z. N. (1988) *Perceptions About the Six Immunis Diseases and Vaccinations in Two Areas of Rural Bangladesh.* Dhaka: BR (unpublished document).

Chowdhury, A. M. R. (1990) *A Tale of Two Wings: Health and Family Plann Programmes in an Upazila in Northern Bangladesh.* Dhaka: BRAC.

Chowdhury, A. M. R., *et al.* (1991) Controlling a forgotten disease : Using volunt health workers for tuberculosis control in rural Bangladesh. IUATLD *News ter*, December.

Chowdhury, A. M. R., Mahmood, M. and Abed, F. H. (1991) Impact of rural cre for the rural poor: The case of BRAC in Bangladesh. *Small Enterprise De opment* **2**, 4–13.

Chowdhury, A. M. R., Alam, A., Chowdhury, S. A. and Ahmed, J. (1992) Tuber losis control in Bangladesh. *Lancet* **339**, 1181–1182.

Chowdhury, A. M. R. and Cash, R. A. (1996) *A Simple Solution: Teaching Milli to Treat Diarrhoea at Home.* Dhaka: University Press Ltd.

Chowdhury, A. M. R., Chowdhury, S. A., Islam, M. N., Islam, A. and Vaugh J. P. (1997) Control of tuberculosis through community health workers Bangladesh. *Lancet* **350**, 160–172.

Chowdhury, Z. (1996) *The Politics of Essential Drugs.* Dhaka: University Press L

Connolly, M. A. and Raviglione, M. C. (1996) *Assessment of Tuberculosis: Mana ment in Community Case Projects in India.* Geneva: World Health Organi tion.

Director General of Health Service (DGHS) (1989) *Report on the National Prevalence Survey on Tuberculosis in Bangladesh 1987–88*. Dhaka: Mininstry of Health and Family Welfare.

Government of Bangladesh. (1996) *National Guidelines for Tuberculosis Control*. Dhaka: Ministry of Health and Family Welfare.

Grange, J. M. and Zumla, A. (1997) Making DOTS succeed. *Lancet* **350**, p. 157.

Huq, M., ed. (1991) *The Near Miracle*. Dhaka: University Press Ltd.

Ishikawa, N. (1985) Promotion of the community based tuberculosis programme in Bangladesh. *Proceeding of the XIV Eastern Regional Tuberculosis Conference, Kathmandu*.

Ishikawa, N. (1995) DOTS as a way to secure the cure. *Newsletter from Kiyose, Tokyo*, No. 9, (September).

Islam, I. (1981) National tuberculosis control programme in Bangladesh. *Proceedings of the XIIth Eastern Regional IUATLD Conference, Dhaka*. Paris: IUATLD

Islam, M. S., Koseki, Y. and Ishikawa, N. (1986) Epidemiological study of tuberculosis in a rural area in Bangladesh. *Proceedings of the World Conference of IUATLD, Singapore*. Paris: IUATLD

Kochi, A. (1997) Tuberculosis control — Is DOTS the health break through of the 1990s? *World Health Forum* **18**, 225–247.

Lovell, C. H. (1992) *Breaking the Cycle of Poverty*. Hartford: Kumarian Press.

Murray, C. J. L., Styblo, K. and Rouillon, A. (1990) Tuberculosis in developing countries: Burden, intervention and cost. *Bull. Wld. Hlth. Org.* **64**, 2–20.

Raviglione, M. C., Snider, D. E. and Kochi, A. (1995) Global epidemiology of tuberculosis; morbidity and mortality of a world wide epidemic. *J. Am. Med. Assoc.* **273**, 220–226.

Reich, M. (1994) Bangladesh pharmaceutical policy and politics. *Hlth. Pol. Plann.* **9**, 130–139.

Wilkinson, D. (1994) High compliance tuberculosis treatment programme in a rural community. *Lancet* **343**, 647–648.

Wilkinson, D. (1997) Managing tuberculosis case-loads in African countries. *Lancet* **349**, p. 882.

Weis, S. E. *et al.* (1994) The effect of directly observed therapy on the rates of drug resistance and relapse in tuberculosis. *N. Engl. J. Med.* **330**, 1179–1184.

Wise, R. (1996) Global paradox. *Lancet.* **343**, p. 282.

World Health Organization (1997a) *Report on the Tuberculosis Epidemic 1997*. Geneva: World Health Organization.

World Health Organization (1997b) *Review of the National Tuberculosis Control Programme of Bangladesh*. Dhaka: World Health Organization.

Porter
Grange

TUBERCULOSIS

An Interdisciplinary Perspective

The fact that the World Health Organization has declared a global emergency" indicates the serious inadequacy of the [illegible] methods at our disposal are used. Several books on [illegible] published in recent years, but none have taken a deep and "holistic" aspects of global tuberculosis control. [illegible] agencies are increasingly aware of the importance of [illegible] other than the design and efficacy of therapeutic drugs. [illegible] book fills that gap. Although it deals specifically with [illegible] outlined and discussed are relevant to many other areas, [illegible] including the ever-growing problem of HIV/AIDS.

The book is aimed principally at those involved in the [illegible] and management of disease control programmes at national and local levels, and also at a more general readership of [illegible] health officers, community workers, and others interested in the human dimension of disease control.

ISBN 1-86094-143-8

Imperial College Press

P123 hc

ICP