



## CASES IN GLOBAL HEALTH DELIVERY

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# BRAC's Tuberculosis Program: Pioneering DOTS Treatment for TB in Rural Bangladesh

As Akramul (Akram) Islam watched Faruque Ahmed, the director of BRAC's health program, accept the 2007 *Stop TB* Partnership Kochon Prize at the annual conference of the International Union against Tuberculosis and Lung Disease in Cape Town, he thought about the recent meeting BRAC had on expanding its programs outside of Bangladesh. Akram had been involved in piloting the BRAC tuberculosis (TB) program in the mid-1980s and helped coordinate its growth from a pilot treating 200 patients to a nationwide program covering over 87,000 TB patients in Bangladesh.

Though BRAC had begun as an organization working to make a sustainable improvement in the lives of millions of refugees returning to East Pakistan (modern-day Bangladesh) after the War of Independence through development projects, BRAC realized TB was a significant problem for Bangladeshis. In addition to its many other development programs, BRAC began implementing a TB treatment program that relied on village health volunteers and unique incentives. For over a decade BRAC participated in a partnership with the National Tuberculosis Program (NTP) and other non-governmental organizations (NGOs) to increase TB services nationwide, and in 2004 with the support of the Global Fund to Fight AIDS, TB, and Malaria (Global Fund), BRAC was able to strengthen and expand its TB programs significantly.

The governments of several other countries, including Afghanistan and Tanzania, had approached BRAC about implementing its microfinance and health programs in their countries. The implementation model that BRAC utilized was the product of decades of experimentation and experience; no one knew how quickly the program could be scaled up in other countries or how effective it would be in other contexts. Akram believed that the award-winning TB program was one component that could be replicated successfully. BRAC had already tried to do this in 23 provinces in Afghanistan. However, Akram was still considering how to adapt the program to the African context and reflecting on what components would need to be modified.

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*Maria May, Joseph Rhatigan, and Richard Cash prepared this case for the purposes of classroom discussion rather than to illustrate either effective or ineffective health care delivery practice.*

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## Overview of Bangladesh

The People's Republic of Bangladesh had a landmass of 144,000 square kilometers and was bordered by India, Burma (Myanmar), and the Indian Ocean (see **Exhibit 1** for map). Most of the country was located on the deltas of the Ganges, Jamuna, and the Meghna Rivers.<sup>1</sup> The country was extremely low-lying and flat; very little land was elevated more than 10 feet above sea level.<sup>2</sup> During the seasonal monsoons, approximately a third of the country flooded.<sup>1</sup>

The GDP of Bangladesh in 2007 was growing at a rate of 6% annually.<sup>1</sup> Agriculture was the major industry, engaging approximately 63% of the labor force and accounting for 20% of the total GDP. The cultivation of rice accounted for almost 80% of all land used for agriculture and 97% of total grain production.<sup>3</sup> Most of Bangladesh's food production was used to support its population. Bangladesh had an unemployment rate of 5% (defined as no hours of formal or informal work per week), and underemployment rate of 42% (defined as those in the labor force working fewer than 35 hours a week).<sup>4</sup>

In 2007 Bangladesh had six main administrative divisions divided into a total of 64 *zilla* (districts) that were further divided into 460 *upazilas* (sub-districts). Each *upazila* had a population of approximately 270,000. All division and district headquarters and most *upazila* headquarters were located in urban areas. Below the *upazila* level, there were 4,451 rural, micro-area unions and about 80,000 villages.

There were about 240,000 kilometers of roadways in Bangladesh, of which over 90% were unpaved, many of which became impassable during the rainy season.<sup>1</sup> In addition, there were about 8,400 kilometers of waterways, though 3,000 kilometers disappeared during the dry season.<sup>1</sup> There were between two and seven motor vehicles per 1,000 population,<sup>5</sup> and approximately 40% of the rural population lived within 2 kilometers of a road that was passable throughout the year.<sup>5</sup>

## Demographics

In the late 1990s, as farming became less economically viable, internal migration to urban areas became more common, and the urban growth rate exceeded 6%.<sup>6</sup> Bangladesh's capital city, Dhaka, was home to over 10 million people, including 5 million people living below the poverty line.<sup>6</sup> Bangladesh had one of the highest population densities in the world; in 2001 there were almost 1,000 people per square kilometer.<sup>7</sup> The population continued to grow, but the fertility rate dropped from 6.2 in the 1970s to 3.1 in 2007.<sup>8</sup>

Despite the high average population density, most Bangladeshis lived in rural villages with a population of 250 to 300 people. Subsistence farming, with some small-scale commercial ventures, such as selling dairy or poultry products, supported most households. Few villagers owned motorized vehicles. Bicycles and rickshaws were the main forms of transportation. When women married, they tended to move to their husband's village and live with his family. Often the male head of the household sought work outside of the village and the woman and children remained in the village.

In recent years more women had entered the labor force, though traditionally women had little access to the formal labor market.<sup>9</sup> Women also had reduced access to health care, which sometimes led to delayed diagnosis and treatment.<sup>9</sup> In addition, women who suffered from a serious illness often worried about divorce or abandonment and tried to conceal it from others.

Basic Socioeconomic and Demographic Indicators <sup>i</sup>

INDICATOR		YEAR
UN Human Development Index ranking	146 out of 182	2007
Population (thousands)	153,122	2005
Urban population (%)	25.7	2005
Drinking water coverage (%)	80	2006
Poverty rate (% living under USD 1.25 per day)	50	2005
Gini index	31	2005
GDP per capita in PPP (constant 2005 international dollar)	1178	2007
GDP per capita in constant 2000 USD	441	2007
Literacy (total, female, male)	53.5, 48, 58.7	2007

## Health in Bangladesh

Since independence, life expectancy had increased by 20 years, and mortality rates among infants and children had fallen markedly.<sup>8</sup> Ischemic heart disease, lower respiratory infections, and TB were the main causes of adult deaths in Bangladesh.<sup>10</sup> The main causes of under-five mortality were neonatal causes (45%) and diarrheal diseases (20%).

Malaria was prevalent in 13 districts. The official incidence estimate was 63,516 cases in 2002, though the surveillance infrastructure was weak, and this number was considered to be a gross underestimate of the actual occurrence.<sup>6</sup> There were 340,000 TB cases and 75,000 TB deaths annually.<sup>6,10</sup> By 2007 there were 13,000 documented cases of HIV, primarily in urban areas.<sup>11</sup> The estimated HIV prevalence in 2007 was less than 0.1%.<sup>1</sup>

Health System and Epidemiologic Indicators <sup>ii</sup>

INDICATOR		YEAR
Average life expectancy at birth (total, female, male)	63, 63, 63	2006
Maternal mortality ratio (per 100,000 live births)	570	2005
Under five mortality rate (per 1,000 live births)	54	2008
Infant mortality rate (per 1,000 live births)	43	2008
Vaccination rates (% of DTP3 coverage)	95	2007
Undernourished (%)	26	2005
Adult (15-49 years) HIV prevalence (per 100,000)	<100	2005
HIV antiretroviral therapy coverage (%)	7	2007
Tuberculosis prevalence (per 100,000)	391	2006
DOTS coverage (%)	100	2007
Malaria cases (per 1,000)	19	2006

<sup>i</sup> This data was comprised from the following sources: UN, UNICEF, World Bank, UNESCO.

<sup>ii</sup> This data was comprised from the following sources: WHO, UNICEF, UN.

INDICATOR		YEAR
Government expenditure on health as a % of total government expenditure	7.2	2007
Government expenditure on health per capita (international dollar, USD)	14, 5	2007
Total health expenditure per capita (international dollar, USD)	42,15	2007
Physician density (per 10,000)	3	2005
Nursing and midwifery density (per 10,000)	3	2005
Number of hospital beds (per 10,000)	4	2005

## Health System

The government inherited its basic health system structure from pre-Independence days. It had four tiers, operating at the village, union, *upazila*, and district level. In 1999 there was at least one informal health care provider called a village doctor for every 2,000 people.<sup>12</sup> There were 1,362 union sub centers, 3,315 health and family welfare centers also operating at a union level, 460 *upazila* health complexes, 59 district hospitals, and 7 specialized hospitals.<sup>13</sup>

In the villages, traditional healers and non-graduate allopath practitioners delivered care for common illnesses.<sup>14</sup> They often had private practices and also did house visits.<sup>13</sup> In some villages “quacks,” individuals who had received on-the-job pharmaceutical training, provided medical services without supervision or regulation.

Union-level health and family welfare centers provided preventive, curative, and promotive health services, specializing in child health and family planning services.<sup>13</sup> They and general union sub centers had the capacity to treat minor illnesses and conduct minor surgical procedures.<sup>13</sup> The union sub centers also provided basic out-patient curative services.<sup>13</sup> A paramedic who received four years of clinical training and a female reproductive health worker who had undergone 18 months of training staffed these centers.<sup>15</sup> In some facilities, there was a position for a physician, but these positions were mainly vacant.<sup>14</sup> Facilities provided these services free of charge.<sup>14</sup>

*Upazila* health complexes offered a range of primary health care services, including in-patient, out-patient, and emergency services, and each had 31 beds. Several physicians, mostly general practitioners, staffed *upazila* health complexes.<sup>16</sup> About 80% of government-employed doctors had a private practice as well, often run out of the nearby *upazila* headquarters. Some practitioners, including some traditional healers, practiced exclusively on a private, fee-for-service basis.<sup>15</sup>

The lower-level facilities referred patients to district hospitals where there were some specialists, but the seven division headquarters provided most specialty and tertiary care.<sup>15</sup> In urban areas virtually all health centers had running water and concealed drainage. Outside of Dhaka, none had telephone service.<sup>17</sup> About 25% of facilities had microscopes, and half had steam sterilizers.<sup>16</sup> One study looking at quality of care for diarrhea, acute respiratory infections, and fever found practitioners adhered to national guidelines 63%, 53%, and 17% of the time, respectively.<sup>16</sup>

Services at government hospitals were said to be free or to require only a nominal fee for all citizens but had long lines and often experienced stockouts.<sup>18</sup> Quality of services at public facilities was often perceived as inferior to private facilities. One study found that only 10% of sick persons in rural Bangladesh sought care from formal medical providers.<sup>19</sup> While 50% of sick persons sought care from an informal medical provider, almost 30% did not seek any care.<sup>20</sup>

In the late 1990s there were approximately 800 NGOs working in the health sector in Bangladesh<sup>21</sup> primarily targeting health and nutrition, water and sanitation, maternal and child health, and family planning.<sup>17</sup> While several NGOs had created modest health insurance plans, none had achieved significant penetration. Grameen and Gonoshasthya Kendra, two of the largest plans, had 200,000 and 165,000 members respectively.

In 1993 there were 333 private hospitals, virtually all of which were in urban areas.<sup>15</sup> Bangladesh had 15 government medical colleges and 33 private medical and dental schools.<sup>20</sup>

## **Tuberculosis in Bangladesh**

### ***Epidemiology***

A national study conducted in 1987-1988 estimated that national adults TB prevalence in Bangladesh was 870 per 100,000 population.<sup>22</sup> Men were almost twice as likely to have TB as women (prevalence of 1.08% and 0.6% respectively), and TB occurred more frequently in urban areas (1.61%) than rural (0.8%).<sup>23</sup>

By 1997 another community study estimated the prevalence of TB in Bangladesh had dropped to 508 per 100,000 (620,000 cases) and the incidence to 246 per 100,000 (300,000 cases).<sup>24</sup> Approximately 68,000 individuals died from TB in Bangladesh in 1997.<sup>23</sup> In 2005 the World Health Organization (WHO) estimated that the prevalence had decreased to 406 per 100,000 (576,000) while the incidence remained steady at 227 new cases per 100,000 (340,000 total).<sup>iii, 13</sup> Estimated mortality was 47 per 100,000 (75,000 total). In 2004 about 1.8% of new cases (97% of all cases were classified as new) and 14% of previously treated cases were classified as multidrug-resistant tuberculosis (MDR-TB).<sup>24</sup>

### ***The National TB Program: 1965-1994***

The state first initiated TB services in East Pakistan (modern-day Bangladesh) in 1965 with 44 TB clinics, 8 hospitals, and 5 TB hospitals providing mainly curative services and anti-TB medications at no cost.<sup>25</sup>

The World Bank began providing the government consecutive, five-year grants for health and population in 1975.<sup>26</sup> Of the total USD 600 million awarded by 1998, the government dedicated USD 17.6 million to strengthening and expanding TB and leprosy control services.<sup>25</sup> The WHO provided technical and administrative support for the Bank-funded programs. By 1991, 124 *upazila* health complexes were providing TB services.<sup>13</sup>

In 1991 the government began to reorganize its health program and initiated partnerships with NGOs to strengthen TB services. The National Tuberculosis Programme (NTP) was created within the Directorate General of Health Services and was integrated with the National Leprosy Elimination Program.<sup>25</sup> Simultaneously, the government hired 10 WHO consultants, eight of whom were Bangladeshi, to help improve TB program operations.<sup>25</sup> At the district level the NTP had 40 medical officers, 31 program organizers, and 44 TB consultants, along with almost 300 leprosy and TB control assistants from the *upazila*-level.<sup>25</sup> The WHO provided technical support in procuring microscopes, and the central office consultants procured all drugs to ensure competitive pricing. District-level consultants procured and stored drugs from the central office.

Perceiving private services to be of higher quality than government services, many TB patients preferred not to seek treatment at government facilities even when treatment was available at no cost. A

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<sup>iii</sup> All estimates of incidence and thus case detection rates are based on the National Prevalence Survey of 1987-1988.

member of the National TB Association (NATAB), a volunteer organization founded in 1948 to promote and mobilize TB awareness and control efforts, explained, "For a long time, there were 44 chest clinics where people could go to get free [TB] medicine.... When people went there, they got a few months of medicine, and then the clinic would run out. Many lost confidence in the system." In most rural areas, pharmacies and traditional healers were the only other options available.

Though no formal evaluation was conducted on the program's performance, a review for the World Bank in 1990 estimated that case detection in Bangladesh was less than 20% and the cure rate below 50%.<sup>19</sup> Academic and private facilities were not compelled to report their case detection and cure rates to the NTP.<sup>25</sup>

## BRAC

### *History*

Fazle Abed founded the Bangladesh Rural Advancement Committee (now formally called BRAC) in 1972 in response to the acute needs of the millions of refugees who returned to East Pakistan (modern-day Bangladesh) from India after the War of Independence. Abed was a Bangladeshi trained in accounting who worked in London until the conflict, when he felt morally compelled to return home and help with the rebuilding of the country.

Once the war ended, BRAC began to provide assistance to families working to rebuild their homes and livelihoods. BRAC's mission was to improve the quality of life for the poor by working with the community and focusing on increasing autonomy. Abed's and other early BRAC staff's initial attempts to engage entire villages often resulted in wealthy and powerful men gaining the most benefit. The BRAC team members had grown up in urban areas and found that they needed to do extensive research on the social hierarchies and power dynamics of villages before they were able to develop effective programs. BRAC began to focus on engaging poor women in different programs, deciding in the late-1970s to focus on increasing women's income. One early BRAC report wrote:

To identify and design viable economic projects which can ensure a reasonable return to each member of the cooperative is extremely difficult. But this identification and design is crucial to all else. Much can be done to involve women in health, family planning, education and other *social* development efforts, both as beneficiaries and as staff. However it is *economic* development activities [that are most important] for rural poor women.<sup>27</sup>

BRAC organized community groups of poor women called village organizations (VOs). It provided them with basic financial education, micro-finance, and support in using their funds to achieve viable income-generating activities. The VO program was developed on two tenets: members should contribute some of their own funds to their ventures, and BRAC should couple its loans with training, support, and advice. BRAC invested many hours in exploring the profitability and associated risk of new business ventures that were acceptable for women such as weaving, cattle rearing, and rice husking. BRAC strove to raise awareness about power and structural dynamics among its VO members and develop cohesion among poor women. Some VO members reported changes in their relationships with their husbands and families, receiving better treatment as their earnings rose.

Most VOs had 30-40 members. BRAC sought out the marginalized and landless but also strove to pick women that it thought had potential to succeed. The VO formed the backbone of BRAC's rural programs; as it expanded its work into new areas such as agriculture, health, and education, it relied on the VO for feedback and to serve as the foundation for the new activities.

At times Abed found that development could prove harder than he expected; for example, when BRAC first tried to introduce an “improved” breed of chicken, it was found to be much more susceptible to disease than the local variety.<sup>28</sup> In its efforts to ensure profit viability for its loan recipients, BRAC expanded into poultry raising, egg hatcheries, silk production, and eventually agricultural research and other domains.

From the beginning Abed wanted BRAC to be a learning organization. He emphasized the need to collect performance data, quickly hiring a staff researcher, Mustaque Chowdhury, and creating a research and evaluation division that would become one of the largest housed by any NGO in the world. In addition, Abed instilled a big-picture philosophy in the organization. “Small is beautiful, but large is necessary,” was a common mantra. Programs were considered successful only if they were scaleable; training, supervision, and incentive structures were all designed with replicability and large-scale rollout in mind. BRAC would pilot programs in a few *upazilas* and tinker with the design before eventually scaling up.

Throughout its history BRAC was ambitious in its grant applications and often successful in obtaining relatively large grants. Abed valued sustainability at the organizational level and tried to build cost recovery and revenue generation into BRAC's programs. His strategies ranged from asking villages to contribute to a teacher's salary at a BRAC school (which they believed would increase accountability for teachers, a common challenge for government schools) to opening a commercial BRAC bank in the 1990s and Aarong, a commercial store that sold handicrafts made by poor and marginalized women. In 2006 BRAC was about 70% self-sustaining.

BRAC had become aware in its early years that there were individuals whose needs were too great for the traditional approaches, such as community organizations and micro-finance, to reach. In 2002 it developed a portfolio of programs targeting the “ultra poor” which provided income-generating capital (such as livestock), health services, and cash transfers (to allow recipients to attend BRAC's functional education program instead of working or begging). While some felt that this contravened BRAC's philosophy, BRAC felt that cash and asset transfers would be necessary to reach the poorest of the poor.<sup>28</sup> BRAC did not expect to recuperate costs for these activities and thus continued to receive some donor funds to sustain these programs.

One of BRAC's first large-scale health interventions was a program launched in 1980 that taught mothers in rural villages how to make oral rehydration solution. Oral rehydration therapy recently had been recognized to be extremely effective in the treatment of diarrheal disease and had huge potential to decrease the number of childhood deaths. The program, which trained female health educators to teach mothers in their homes, used a performance-based payment system for the educators. This consisted of a follow-up visit by an evaluator who would ask the mother to repeat the “10 points” (or “7 points” in later versions of the program) of oral rehydration therapy that the educators had discussed. The evaluator would then have the mother prepare the solution, which consisted of water, salt, and sugar.<sup>29</sup> BRAC estimated that almost 13 million mothers learned to make oral rehydration therapy between 1979 and 1990.<sup>27</sup>

### ***Engaging in Health through Village Health Volunteers***

In 1978 BRAC began to train village health volunteers to provide basic diagnostic and curative services.<sup>30</sup> Modeled after China's Barefoot Doctors program, BRAC recruited and trained men to provide basic health education and dispense medications (sold to them at cost) for a small profit (see **Exhibit 2** for list of medications). Because of existing cultural norms, these health workers had little access to women and quickly began to spend the majority of their time selling medications.

BRAC considered working with traditional doctors and midwives who had the social legitimacy and community contact to provide health education in the communities, but most were primarily interested in

expanding the profitability of their services and were dogmatic about their own understandings of health and illness.

By the early 1980s BRAC began to draw on the VOs to identify individuals to serve as health volunteers, called *shasthya shebikas*. For six weeks male and female volunteers attended two days of classes and five days of shadowing paramedics. At the end of the training, the health workers were authorized to dispense medication for simple illnesses allowed to sell these for a 10% profit margin. They were instructed to refer all complex cases to the nearest clinic or health complex. Evaluations showed male volunteers were less reliable and less sensitive to the needs of clients than the female volunteers, and BRAC eventually chose to only train women as *shasthya shebikas* (*shebikas*). Each *shebika* served 250-300 households. She worked on a part-time basis, largely visiting households to provide basic health education and to sell medicines and health supplies as needed. Most *shebikas* had other means of financial support in addition to their work with BRAC.

*Shebikas* received a two-week, basic training and a monthly, one-day refresher course. The monthly trainings were interactive, using problem-based learning, and *shebikas* were encouraged to discuss challenges that they faced in their work with their peers and BRAC staff. *Shebikas* could replenish their medicine supply at the monthly meetings.<sup>31</sup> A program organizer (PO) and the *Shasthya Kormi*—a health worker who had a minimum of 10 years of schooling, had undergone four weeks of training, and was a paid employee of BRAC—visited *shebikas* twice a month.<sup>32</sup> Each PO worked with four *shasthya kormis*, and each *shasthya kormi* oversaw an average of 10 *shebikas*.<sup>31</sup>

### **Initiating BRAC's TB Program**

In the early 1980s through conversations with its *shebikas*, BRAC identified TB as a major impediment to women's economic participation and a leading cause of mortality among adults. Simultaneously, the government asked NATAB and BRAC to collaborate on a community TB prevalence survey in Sadar, an *upazila* in the district of Manikgonj about 60 kilometers (12 miles) west of Dhaka with a population of 220,000.<sup>33</sup> BRAC was asked to participate because of its familiarity within the community given its existing VO and *shebika* program. The team also sought the technical guidance of the Japan Anti-Tuberculosis Association's Research Institute of Tuberculosis that had been established in 1939 in an effort to combat its high prevalence of TB and which, by 1980, had conducted prevalence surveys and held trainings for TB specialists and doctors in developing countries. In 1982 it was designated a WHO collaborating center for TB research and training. Dr. Nobukatsu Ishikawa, whose interests centered on community-based TB treatment, came to Bangladesh in 1984 to assist with the research efforts in Manikgonj.

By the conclusion of the survey in 1989, about 3,000 sputum samples were collected; 280 tested positive for active TB, and 80% were from males.<sup>34</sup> According to one BRAC's program officers:

During the time of the study, they [the BRAC team] had identified some TB patients, and the issue arose of whether these patients should be treated or not. They were in the community and society but had never been noticed, but now that they had been noticed, they were eligible and had the right to treatment. The decision came that BRAC should provide these services.<sup>30</sup>

The BRAC team felt that for the rural population to access TB treatment there would have to be some sort of community-based delivery system. Ishikawa had designed a TB program that utilized community health volunteers, and he was seeking an opportunity to implement it. BRAC asked him to remain beyond the completion of the survey and to work with the organization to pilot his program. He agreed to stay and to direct the program. Members of the BRAC team, NATAB, and the government worked with Ishikawa to tailor the program to BRAC's *shasthya shebika* program and Bangladesh.



### ***Implementing the TB Program: 1984-1989***

From 1984 to 1989, Ishikawa's team – primarily Akramul Islam and Dr. Sakhawat Hossain, a pathology professor who was the Secretary General of NATAB – piloted a community-based TB program with *shebikas* in the *upazila* of Manikgonj. Together they trained 200 *shebikas* to identify and treat TB.<sup>35</sup> *Shebikas* learned to conduct house visits and inquire if anyone was experiencing a cough lasting longer than three weeks. If an individual affirmed that condition, the *shebika* would give him or her two containers for sputum and explain how to take a sample. She would then accompany the patient to a sputum collection and smearing site, which BRAC would set up in various locations throughout the month. There the BRAC staff would ask the patient to produce an additional sputum sample.

These samples were sent to a laboratory for diagnosis based on smear microscopy. During the pilot, BRAC relied on the sub-district government laboratory facilities, which were equipped with trained technicians and required no additional support from BRAC. However, the laboratories were soon overwhelmed by the influx of sputum smears. When necessary, BRAC sent staff to work on a part-time basis to reduce the burden on the government employees. Often, when BRAC approached the local laboratory facilities, the team found that the facility's staff members were reluctant to collaborate. As a result, BRAC established its own laboratory facilities in many of its offices. Akram said, "In the 1980s the [National] TB Program was not well known to many people working in the public sector, so they were reluctant to take on a new burden." Once BRAC established a laboratory, the NTP provided training for the staff on how to perform microscopy examinations. This was BRAC's primary strategy through 1988, when BRAC and the NTP were able to convince the district-level governments to actively support the partnership. At that point BRAC began to utilize the government facilities as much as possible but maintained its own labs in particularly high-burden areas.

After the lab technicians made a primary diagnosis, a physician confirmed the results. The PO relayed the results to the *shebika*. If the sputum test came back negative but the symptoms persisted, the *shebika* referred the patient to the *upazila* health complex or to the district TB clinic. For patients whose results tested positive, the *shebika* would begin to administer directly observed therapy (DOT). For the first two to three months, the patients would meet her every time they were supposed to take medication, and she would watch them swallow their pills. After that phase of intense treatment, the patients would visit the *shebika* once a week to pick up their medication and report on symptoms. The POs or *shebikas* referred patients with significant side effects or who were not responding to therapy to a BRAC physician for evaluation. If the problem proved too complex, the BRAC physician referred the patient to the *upazila* health complex or to district TB clinics.

During this period, the government provided medication free of charge. At times the government was unable to provide the drugs NATAB or BRAC would buy them. *Shebikas* received medications on a monthly basis and stored them in their homes. Between 1984 and 1989, 264 patients initiated 12-month DOT treatment; approximately 60% completed treatment, 8% dropped out, and the remainder was lost to follow up (including those who died, moved out of the district, or transferred out).<sup>19</sup> The average cost per case was USD 108.

### ***Adjusting and Expanding the Program: 1989-1994***

During the pilot, there were several challenges. Patients often ceased treatment once their symptoms decreased. Ishikawa and his team devised a bond system to remedy this issue. Patients would deposit USD 3 and sign a statement before initiating treatment promising to complete treatment or forfeit the bond. Of the USD 3, USD 0.50 went to paying the *shebika*, and USD 2.50 was returned to the patient when a patient was successfully cured. For a patient to be considered "cured," two conditions had to be met. The patient

must have successfully completed the treatment regimen and must have tested smear-negative at the completion of treatment. *Shebikas* were only paid for patients that were successfully cured. In cases where patients were too poor to put down a deposit, BRAC would ask the village to collectively put down a deposit for the patient. When this was not possible, BRAC would waive the deposit.

The pilot also left the team dissatisfied with the case detection rate. As an effort to increase the case-finding activities among the *shebikas*, BRAC raised the bond amount to USD 3.50, with *shebikas* receiving USD 0.50 for each confirmed case that they identified and USD 0.50 for cured cases. Some *shebikas* faced resistance in their villages for their efforts to engage in active case finding. Many, particularly women, tried to conceal TB, as it was often thought to be hereditary and affected a woman's prospects of marriage. Ishikawa recalled a conversation with a health worker during the first few years of the program. He asked her, "Did you have any pressure from the community? Any opposition?" and she responded:

Yes, a lot. Many village leaders and religious leaders asked me why was I moving around. Why am I talking to other men [besides my husband]? My husband was even hit. But, I sat together with the group [village organization] and discussed in the group; this is very important, the group formation, and we decided, "These people are always pulling us down and have never helped us, so we will help ourselves." After a few years, people see someone who was almost dying get better, though the number is not many, but even one or two, but these same leaders brought their relatives secretly and asked me to treat them.

In 1991 BRAC decided to expand its pilot to include 10 *upazilas* in an effort to evaluate the program's feasibility on a larger scale. The United Nations Children's Fund, the United Kingdom Department for International Development, and the Swedish International Development Cooperation Agency) provided funding for the scaled-up pilot.<sup>36</sup> In 1993 BRAC appointed Akram to oversee the scale-up efforts, and the program expanded to four more *upazilas*. Due to resistance from unfamiliar district-level officials, BRAC returned to its initial strategy of establishing its own laboratory facilities during this stage of the pilot, opening 10 labs between 1992 and 1994. In 1994 BRAC was satisfied that it had a successful program that could be expanded further. Dr. Mushtaque Chowdhury commented on the length of the pilot saying, "The reason you take four or five years [for each component of the pilot] is that the using of the community health workers was not done anywhere. We could not really compare our work with others. So we tried and tried and tried until we were very sure that it worked. Giving medicine to a *shebika* is not easy; so you have to be really sure that they can administer this."

## ***Partnership between BRAC and the NTP***

### **Memorandum of Understanding: 1994-2000**

In 1994 the Bangladeshi government began implementing directly observed treatment, short course (DOTS) nationally as the main treatment strategy for TB.<sup>25</sup> After internal discussions, BRAC decided that scaling up the program would require the support of the government given that TB required laboratory diagnostics and long-term treatment. Therefore, BRAC would have to convince the government to work with it. Akram recalled:

In 1994 we decided that this program could be extended provided that the *shasthya shebika* has been selected by the community, the BRAC VO members. Then they can be trained, and with the supervision of the program organizer, provide TB treatment. We felt that this was proved in the results from 1991-1994. Now that we understood this scenario very well, we approached the Ministry of Health and formed an agreement that we would scale up.

In 1994 Akram and his colleagues (Sadia Chowdhury, Jalaluddin Ahmed) held a meeting with the Health Secretary and the Director of TB and Leprosy Control Programmes in the Ministry of Health and Family Welfare to present the results of BRAC's pilot studies. They explained their vision of the BRAC

program working in conjunction with the government and leveraging the existing state hospitals, laboratories, and human resources to expand BRAC's coverage. The ministry officials felt that there was a danger of duplication and thus wanted BRAC only to operate its TB program in areas that the government designated.

In the memorandum of understanding, the NTP agreed to provide all of the drugs, reagents, diagnostic and other equipment, data collection and reporting formats, registers, and training materials, while BRAC would provide training and human resources.

From this time on, BRAC increasingly relied on government microscopic centers, citing a commitment to "build capacity and strengthen the public sector system."<sup>25</sup> The NTP asked BRAC to cover 60 *upazilas* (containing a population of 14.6 million) and in 1995 signed a memorandum of understanding with five other NGOs to provide care in an additional 126 *upazilas* (see **Exhibit 3** for more on BRAC TB Program expansion). These NGOs had traditionally treated leprosy in Bangladesh but had joined the TB movement as the number of leprosy cases dwindled. They provided clinic-based care within the *upazilas*, through *upazila* health complexes or their own facilities. To avoid duplication of efforts, the government allowed only one NGO to provide TB services within an *upazila*.

In total, the NTP's partner NGOs covered 186 *upazilas* in 1998.<sup>37</sup> Data from 1994-1998 showed the national average detection rate for new smear-positive pulmonary TB patients was below 30%, though some districts had achieved rates of around 40% (see **Exhibit 4** for case detection rates by BRAC and the NTP over time).<sup>25</sup> Treatment success rates were around 80% (see **Exhibit 5** for rates over time).<sup>25</sup>

### National TB Registry

The NTP wanted to collect information on all patients it or its partners treated. It developed a system that included a patient treatment card, a TB register, and a TB laboratory register, and it required NGOs to report their caseloads and outcomes on a quarterly basis. There were also standardized forms for requesting a sputum examination, drug sensitivity test, and drug requisition.

When a patient tested positive for TB, he or she was entered in the national TB registry. The *shebika* recorded the patient's information on a TB identity card, her BRAC registry, and the NTP registry. The patient maintained the TB treatment card and recorded his or her adherence on it with the guidance of the *shebika* overseeing the treatment adherence; the *shebika* maintained both the NTP-required forms and a separate record for BRAC, which was integrated into her other data about villagers' health status (e.g., pregnancy).

### Refining the *Shasthya Shebika* Program

Many of BRAC's programs expanded with the TB program, including its basic *shebika* program (see **Exhibit 6** for number of *shebikas* over time). In 1990 there were approximately 1,000 *shebikas* throughout the country. When BRAC expanded its TB program to areas that did not have *shebikas* or an established VO, Akram's team trained women similar to VO members to become *shasthya shebikas*. This led to a turnover rate of about 10-15% annually, however. Soon BRAC began to develop formal criteria for *shasthya shebikas*. BRAC had found that unmarried women usually moved to their husbands' villages after marriage and that women with young children did not have time to devote to health services. Community input in the selection process also proved important in *shebika* performance and retention. The following criteria emerged:

1. Member of the VO
2. Between the ages of 25 and 35
3. Married with no children under the age of two

4. Selected and approved by the VO
5. Schooling not required, but preferable, since *shebikas* keep written records of their activities<sup>31</sup>

During the late 1990s, a BRAC Research and Evaluation Department study measured a dropout rate of 3.2% due to generalized motivations: inappropriate selection, not enough income to sustain work, competing priorities with work at home, and adverse sentiments from the community.<sup>31</sup> *Shebikas*, on average, earned USD 3 per month working three hours per day, though income varied widely with the performance-based payment scheme.<sup>31</sup> The *shasthya kormis* who oversaw *shebikas* received a monthly salary of USD 14 and worked about four hours a day.<sup>31</sup>

### Expansion of NGO Coverage: 2000-2003

From 1998 through 2000, the NTP continued its policy of only providing treatment in *upazila* health complexes and worked with NGOs to expand coverage, achieving an NGO presence in 198 *upazilas*.<sup>37</sup> The government had 460 *upazila* health complexes with DOTS programs. In addition, there were 44 chest clinics that had capacity to diagnose smear negative and extra-pulmonary cases, provide DOTS treatment, and treat complications. Patients needing hospital admission for TB-related complications or MDR-TB could seek treatment at 12 public hospitals. The government had on average one microscopic center per *upazila* available for reading sputum sample smears, with 30% of centers having smear microscopy quality assurance programs.<sup>6</sup> With the exception of the hospitals with the capacity to treat the TB complications mentioned above, facilities were only equipped to diagnose smear-positive TB.<sup>11</sup>

After receiving support from BRAC to complete a PhD program in international public health in Japan, Akram returned to BRAC in 2000 as senior TB sector specialist. He approached the government and expressed interest in resuming responsibility for more *upazilas*, particularly low-performance ones, which were located mainly around the coastal belt. The government agreed to give BRAC responsibility of an additional 46 *upazilas*. The BRAC team identified a lack of human resources and geographic inaccessibility as the two main barriers to effective care. BRAC placed its own staff in the area to provide technical support and training and encouraged the government to fill its vacancies in those areas. By 2002 BRAC was providing a catchment area of approximately 30 million people with community-based TB services.

Meanwhile, the NTP worked with the WHO to assess the quality and availability of TB services in Bangladesh. The WHO estimated that while treatment success rates reached 84% and population coverage was nominally 95%, case detection rates for the overall program were only 32%.<sup>37</sup> The WHO concluded that the government's efforts had stagnated in recent years, and NGOs were the "major contributors to the TB control effort, providing DOTS to 55% of the population (40% from BRAC and [the] Damien Foundation alone)."<sup>38</sup> BRAC had an average case detection rate of 40% and a cure rate over 85%. However, about 200 *upazilas* did not have any NGO presence, and the study authors recommended that coverage should increase. As a consequence, in 2003 BRAC was asked to take responsibility for another 177 *upazilas*, a total of 283 *upazilas* in 42 districts.

While BRAC felt that it had the infrastructure and capacity to expand its coverage in 2003, it lacked the financial resources. The NTP's budget was USD 5.7 million and could not lend any financial support. After BRAC had exhausted its own resources, it asked donors for additional funding. Simultaneously, Akram's team applied for funding from other sources. The Fund for Innovative DOTS Expansion through Local Initiatives to Stop TB gave the team USD 240,500 for five districts (population 15.4 million) and the International Union Against TB and Lung Disease funded a study to compare the effectiveness of five different methods of rapid scale-up at the sub-district level,<sup>39</sup> BRAC applied for the latter because the

organization felt that additional understanding of why the government's program had not been effective in the previous eight years would be necessary to build its program effectively.<sup>25</sup>

### **The Global Fund, NTP, and BRAC: 2004-2007**

The NTP applied to the Global Fund in 2002, noting a current case detection rate of 34% and cure rate of 79% in its application.<sup>6</sup> In 2004 the Global Fund accepted a joint proposal by BRAC and the NTP for USD 42 million. Part of the proposal included a partnership with the 10 other NGOs providing care in rural Bangladesh (see **Exhibit 7** for NGO coverage of TB services). It allocated USD 27 million for the NGOs and operational research by the International Centre for Diarrheal Disease Research in Bangladesh. By the end of 2005, the number of microscopes increased from 96 to 630 (on average, one per 220,000 population). Eighty-five percent of rural microscopy labs now had external quality assurance.<sup>20</sup> Both BRAC's and the overall program's case detection rate and cure rate improved to 68% and 93%, and 44% and 90%, respectively.<sup>11, 40</sup>

In 2005 the NTP and BRAC submitted another proposal, hoping to expand the program to include the 18 additional NGOs working in urban areas. They also proposed to make their programs more comprehensive so that they might reach hard-to-reach and uncovered areas, along with prisons and workplaces. When the proposal was accepted, the partnership, including the added NGOs, received an additional USD 19.6 million.<sup>41</sup>

BRAC also began to expand into other activities, particularly in urban areas. It approached private practitioners to orient them to the national guidelines and set up referral systems for patients who were unable to afford private treatment for TB. In 2002 BRAC began to work with 14 medical colleges to provide DOTS treatment within their facilities. BRAC had also trained medical staff at large prison health facilities to do TB testing and treatment and provided monthly screenings in smaller prisons that lacked the capacity. Since garment districts had been identified as areas of high TB prevalence, BRAC approached the major industries in the export processing zones to integrate TB testing and DOTS treatments into their health services. In 2006 it began to work with individual factory owners as well to increase access to services for workers.

### **Results**

In 2004 the catchment area of BRAC's TB programs combined was about 81 million.<sup>38</sup> It had programs in 283 *upazilas* in 42 districts.<sup>38</sup> Over the course of the year, it had tested over 765,000 people for TB and found over 88,000 cases, including 2,000 sputum-positive relapses.<sup>38</sup> BRAC had also established 153 microscopic centers.<sup>38</sup> Its case detection rate was 80% while the national case detection rate was 71%, and its treatment success rate was 93%.<sup>38</sup> Though treatment success rates were comparable between genders, only 30% of identified cases were women.<sup>9</sup> There was not enough surveillance data to determine whether the gender ratio reflected the epidemiology of the disease or differences in access to treatment.<sup>6</sup> BRAC's TB program expenditures for 2007 were USD 7.2 million.<sup>39</sup>

With the Global Fund's contribution, the NTP's budget grew to almost USD 20 million in 2006, with a fifth of the money coming from the government. Ninety-five percent was earmarked for improving and expanding DOTS treatment, with the remainder going to engage all care providers (USD 0.7 million) and address TB/HIV, MDR-TB and other challenges (USD 50,000). The NTP had been able to establish 28 external quality assurance centers scattered across the country. It had also expanded its training programs to include management of TB for doctors, medical officers, and paramedics and was planning to increase capacity to diagnose and treat MDR-TB. The additional funds also allowed the NTP to expand the national lab capacity; three labs were capable of diagnosing MDR-TB, with plans to expand the capacity to an additional three labs by the end of 2008. All 34 chest clinics had their own laboratory facilities, and the

government was working to make sure that each *upazila* health complex had its own laboratory. In larger *upazilas*, union-level facilities would need laboratories as well because the demand for tests would overwhelm the *upazila* health complex. Akram estimated that over 80% of all TB tests were performed in public facilities in 2007, some of which were supported by NGOs. The NTP also planned to have over 1,000 patients with MDR-TB on treatment by the end of 2008.

With the Global Fund support, BRAC stopped using the patients' bond money to pay the *shasthya shebikas*, instead refunding the patients the full USD 3.50 upon successful completion of DOTS and paying the *shasthya shebikas* USD 2.50 from the grant money. NTP officials had felt for some time that the bond deposit could be construed as a payment for a treatment that they claimed to provide for free, and with the influx of new funds, the NTP requested that BRAC change its system to provide patients with a full refund of the bond.

### ***Challenges and Opportunities***

BRAC's other health and development programs had expanded significantly under Abed's leadership as well. The organization employed 57,000 staff and over 70,000 community health volunteers with a 2006 budget of USD 226.5 million (see **Exhibit 8** for income statement). In 2007 BRAC's pre-primary and primary education program enrolled over 1 million children and had 6 million graduates; its human rights and legal education program reached 3.4 million women, and its microfinance program had over 8 million members who saved a collective USD 218 million.

BRAC had expanded its microfinance and health programs into Afghanistan in 2002 and had rolled out the *shebika*-based TB program in 23 provinces. In 2006 BRAC established development programs in Uganda and Tanzania that would include access to TB, HIV, and malaria services and in 2007 launched a program in southern Sudan. BRAC was beginning to roll out microfinance services in Pakistan in 2007. Many countries, including Sierra Leone and Liberia, had approached BRAC about expanding to their countries as well.

BRAC's TB program had been the subject of several publications and the recipient of some prestigious awards. This led many TB program directors to ask Akram for support and advice. Akram wondered how to best leverage his experience and understanding of TB control in Bangladesh to inform programmatic decisions for TB and other diseases in such significantly different contexts as Uganda and Tanzania. What components of the program were directly transferable, and what would have to be modified?

**Appendix** *Abbreviations and Foreign Terms*

DOT	directly observed therapy
DOTS	directly observed therapy, short course
DTP3	Third dose of diphtheria toxoid, tetanus toxoid, and pertussis vaccine (used as a proxy for a fully immunized child)
MDR-TB	multidrug-resistant tuberculosis
NATAB	National TB Association of Bangladesh
NGO	non-government organization
NTP	National Tuberculosis Programme
PO	program organizer
PPP	purchasing power parity
<i>shasthya kormi</i>	Paid BRAC health worker with a minimum of 10 years of schooling who supervises <i>shasthya shebikas</i> and works under the supervision of a PO
<i>shasthya shebika</i>	BRAC health volunteer chosen by VO who works under the <i>shasthya kormi</i>
TB	tuberculosis
UN	United Nations
<i>upazilas</i>	460 sub-districts in Bangladesh
USD	United States dollars
VO	village organization
WHO	World Health Organization
zillas	64 administrative districts in Bangladesh

Exhibit 1 Map of Bangladesh



Map No. 3711 Rev. 2 UNITED NATIONS  
January 2004

Department of Peacekeeping Operations  
Cartographic Section

Source: United Nations. Bangladesh, Map No. 3711, Rev 2, January 2004.



**Exhibit 2** *Abbreviated List of Supplies Distributed by the Shasthya Shebikas*

<p>Curative medicines for:</p> <ul style="list-style-type: none"> <li>◆ Dysentery</li> <li>◆ Angular Stomatitis</li> <li>◆ Common cold and cough</li> <li>◆ Diarrhea</li> <li>◆ Gastric Ulcer</li> <li>◆ Peptic ulcer</li> <li>◆ Scabies</li> <li>◆ Fever</li> <li>◆ Ringworm</li> <li>◆ Intestinal worms</li> <li>◆ Anemia</li> </ul> <p>Oral rehydration salts  Iodized salt  Hygienic soap  Sanitary napkins  Delivery Kit  Pregnancy test strip  Oral contraceptives  Condoms  Reading glasses</p>
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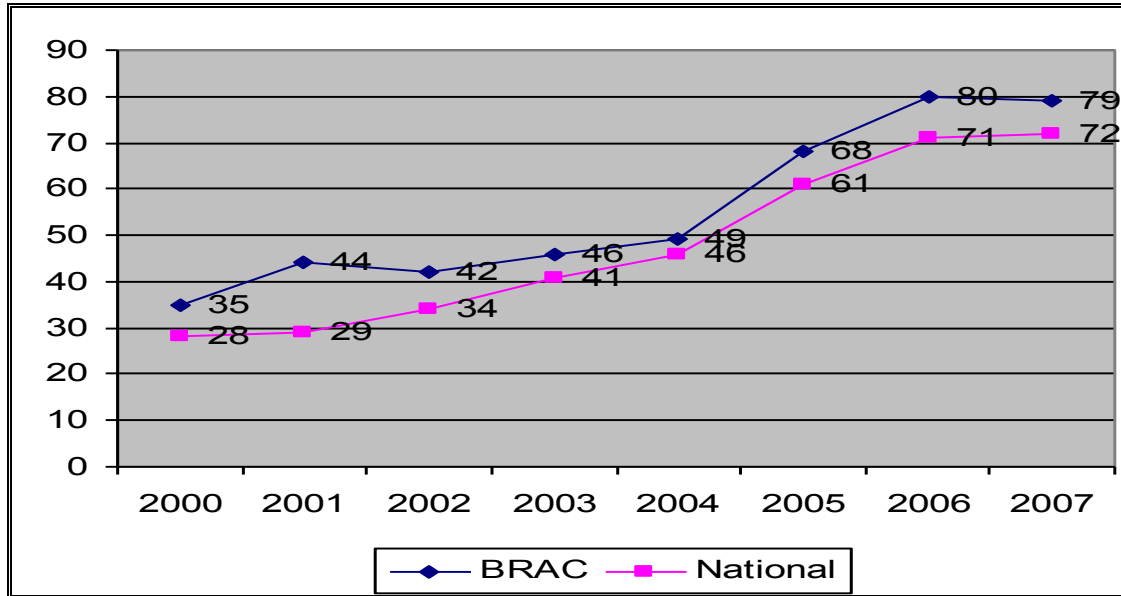
Source: compiled by case writer.

**Exhibit 3** *Timeline of BRAC TB Program Expansions*

Year	Area(s) Covered	Total Catchment Area Population (in millions)
1984	Manikganj	0.22
1992	10 upazilas	1.8
1998	60 upazilas	15
2002	106 upazilas	30
2004	283 upazilas	81

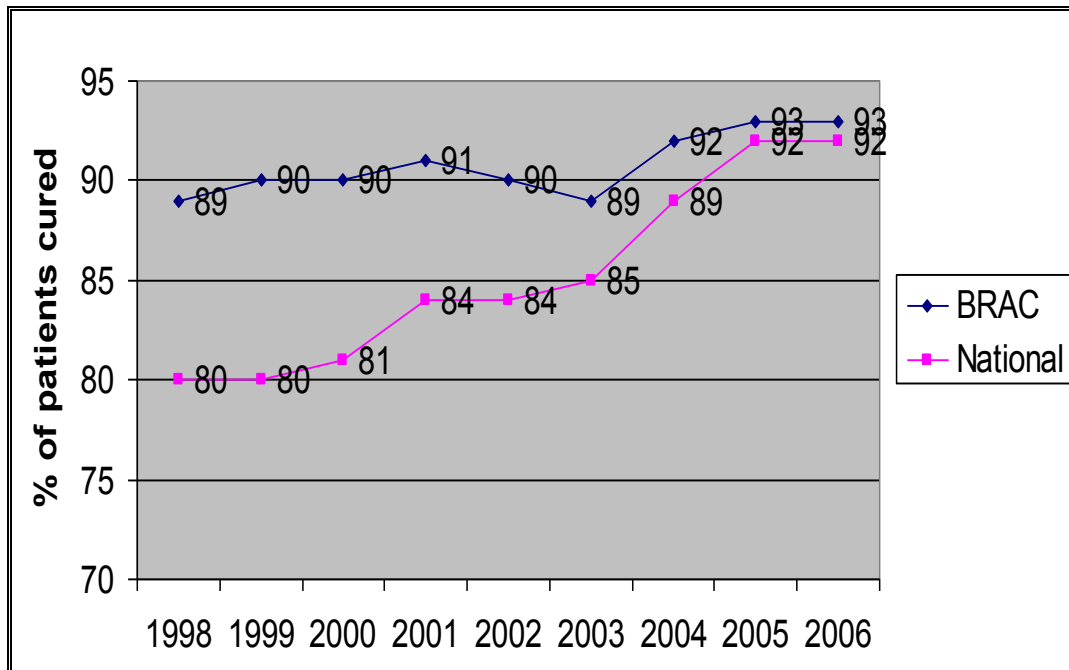
Source: From One to Many: Scaling Up Health Programs in Low-Income Countries. Edited by Richard A Cash, A Mushtaque R. Chowdhury, George B. Smith, and Faruque Ahmed (2010). Ch 13. Islam A and May MA. Decentralized Management in the Expansion of BRAC's Rural Tuberculosis Program (DOTS). Pgs. 207-214.

**Exhibit 4** Case Detection Rates for BRAC and the NTP Overall, 2000-2007

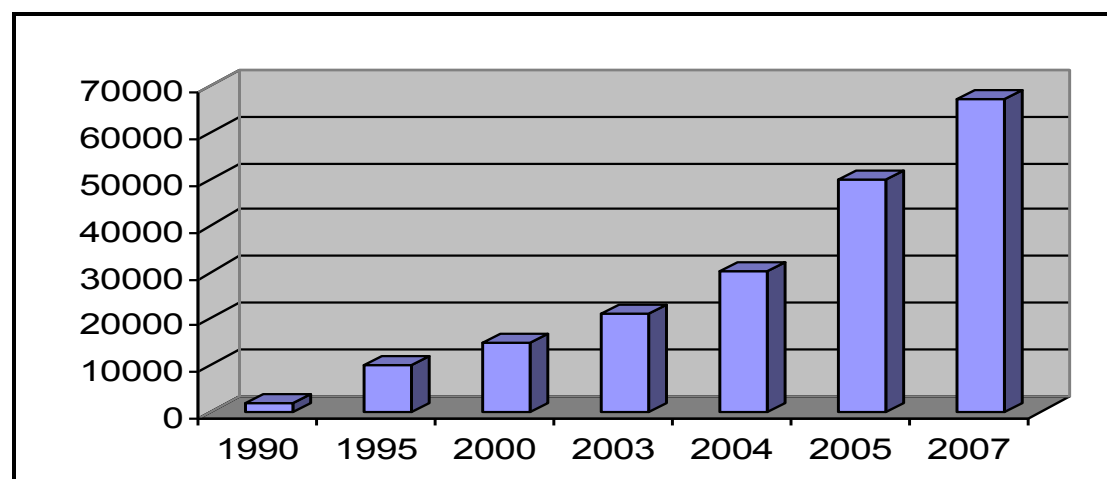


Source: BRAC. Presented at Scaling Up: An Essential Strategy to Attaining Good Health for All. December 3-6, 2008. Rajendrapur, Bangladesh.

**Exhibit 5** Treatment Success Rates for BRAC and the NTP Overall, 1998-2006



Source: BRAC. Presented at Scaling Up: An Essential Strategy to Attaining Good Health for All. December 3-6, 2008. Rajendrapur, Bangladesh.

**Exhibit 6** *Active Number of Shasthya Shebikas, 1990-2007*

Source: BRAC. Presented at Scaling Up: An Essential Strategy to Attaining Good Health for All. December 3-6, 2008. Rajendrapur, Bangladesh.

**Exhibit 7** *NGO Coverage of TB Services in Bangladesh, 2006*

NGO	AREA COVERAGE
BRAC	283 sub-districts, urban and periurban areas of Dhaka, Chittagong, Khulna, Sylhet, Barisal, 16 medical college hospitals, prisons, Chittagong EPZ, Chittagong and Khulna port authority hospitals
Damien Foundation	101 sub-districts, Rajshahi city corporation 4 medical colleges, Savar EPZ
The Leprosy Mission Bangladesh	10 sub-districts of Panchagarh and Thakurgaon.
Health Education and Economic Development Bangladesh	25 sub-districts of Sylhet, Moulvibazar & Habiganj.
Lutheran Aid to Medicine in Bangladesh	3 sub-districts
LEPRA Bangladesh	24 sub-districts of Natore, Sirajganj & Pabna
PIME Sisters	Khulna city
National Anti-TB Association of Bangladesh (NATAB)	64 districts (civil society involvement)
International Centre for Diarrheal Disease Research, Bangladesh	Operations research
Urban Primary Health Care Project and 10 partner NGOs	Dhaka city
NGO Service Delivery Program and 10 partner NGOs	Dhaka, Rajshahi, Khulna and Chittagong city.

Source: Bangladesh National Annual Report for the Global Fund to Fight AIDS, Tuberculosis, and Malaria. 2007.

**Exhibit 8** BRAC Statement of Income and Expenditure for 2006

<b>BRAC</b> (Registered in Bangladesh under the Societies Registration Act, 1860) <b>Statement of Income and Expenditure</b> for the year ended December 31, 2006				
	Notes	Unrestricted Taka	Temporarily Restricted Taka	Total 2006 Taka
<b>Income</b>				
Donor grants	20	53,984,433	5,448,935,273	5,502,919,706
Revenue from:				
- Income generating projects		3,082,947,156	-	3,082,947,156
- Program support enterprises		2,433,094,575	-	2,433,094,575
Service charge on loans to VO members		6,170,051,384	-	6,170,051,384
Investment income	21	586,163,438	7,197,297	593,360,735
Other income	22	146,109,017	25,238,101	171,347,118
Rental income from house property		112,825,098	-	112,825,098
<b>Total income</b>		<b>12,585,175,101</b>	<b>5,481,370,671</b>	<b>18,066,545,772</b>
<b>Expenditure</b>				
Income Generating Projects		2,495,234,305	-	2,495,234,305
Programme Support Enterprises		2,607,604,615	-	2,607,604,615
House property related expenses		62,382,669	-	62,382,669
Education Programme		76,892,762	2,338,562,135	2,415,454,897
Challenging the Frontiers of Poverty Reduction Programme		85,101,990	2,060,786,823	2,145,888,813
Nutrition Programme		-	233,668,365	233,668,365
Health and Population Programme		43,763,250	602,719,071	646,482,321
Micro Finance Programme		4,609,887,616	900,238	4,610,787,854
Relief and Rehabilitation		82,521,521	-	82,521,521
Poultry & Livestock Extension Programme		21,275,497	22,646	21,298,143
Fisheries Extension Programme		-	9,006,940	9,006,940
Agriculture & Sericulture Extension Programme		21,324,842	16,853,535	38,178,377
Livelihood Development Programme		8,230,616	115,855,237	124,085,853
Research, Monitoring and Evaluation		-	38,781,855	38,781,855
<b>Total expenses</b>		<b>10,114,219,683</b>	<b>5,417,156,845</b>	<b>15,531,376,528</b>
Surplus of income over expenditure before taxation		2,470,955,418	64,213,826	2,535,169,244
Taxation	23	(66,000,000)	-	(66,000,000)
<b>Net surplus for the year</b>		<b>2,404,955,418</b>	<b>64,213,826</b>	<b>2,469,169,244</b>

Source: BRAC Annual Report, 2006.

Notes: 1 USD = 69 Bangladeshi Taka (BDT) in 2006; 1 Bangladeshi Taka = 0.145 USD in 2006

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