

# Expansion of directly observed treatment, short-course in urban and public-private mix areas of Bangladesh

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**Abstract:** Success with tuberculosis (TB) control was relatively poor in urban centers and some of the difficult to reach areas (eg, workplaces and prisons) in Bangladesh prior to 2004. This may be due to the complexities that exist within urban health care systems and the unique health care-seeking behaviors of urban citizens. A variety of health care institutions and providers are providing health services in urban areas. To increase the case detection of TB suspects, a number of initiatives were undertaken by the National Tuberculosis Control Program. The total geographic area was divided among different nongovernmental organizations to implement TB care services. Medical academic institutions and hospitals, industrial workplaces, and prisons were involved to provide DOTS (directly observed treatment, short-course, as an internationally recommended strategy for TB control) services. As a result, an increased number of TB cases were identified and reported in the urban and public-private mix areas. The TB case detection rate in the six city corporation areas increased from 60% in 2005 to 74% in June 2007, with an 87% sputum conversion rate in 2006 and an 84.5% treatment success rate in 2005. However, decreased treatment success rates were observed in hospital settings and in prisons, which might be due to ineffective referrals provided upon discharge. It is crucial to engage all care providers to increase DOTS coverage and to control TB in urban and special settings.

**Keywords:** public health, tuberculosis, developing country, program, expansion, DOTS, public-private mix

## Introduction

Urban tuberculosis (TB) control has always been a challenge for national TB control programmes in many parts of the world, and Bangladesh is no exception.<sup>1-3</sup> Bangladesh ranks sixth among the 22 high-burden TB countries in the world.<sup>1,2</sup> The National TB Control Program adopted directly observed treatment, short-course (DOTS, an internationally-recommended strategy for TB control) at the beginning of 1993.<sup>3</sup> However, the program did not gain momentum until 2004.<sup>4,5</sup> To boost the activities of the National Tuberculosis Control Program, the entire country had been assigned by geographic area to several nongovernmental organizations (NGOs) during 2003 and 2004.<sup>3,6</sup> Gradually, after expansion and further strengthening of the government-NGO collaboration, the performance of the TB control program increased significantly throughout the entire country.<sup>7</sup> Nevertheless, performance continued to be poor in these urban areas compared with the trends observed in the rural areas.<sup>7</sup> Access and characteristics of health services, health-seeking behaviors of urban dwellers, and many other social factors contributed to these challenges.<sup>8,9</sup> To overcome the challenges

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and to reach the TB control objectives, several new control strategy initiatives were undertaken.<sup>10</sup>

## DOTS in city corporation areas

Utilization of health care services and health-seeking behaviors of TB patients varies significantly across the city corporation areas of Bangladesh.<sup>11</sup> Beginning in 2004, different areas (wards) of the six city corporations had been assigned to a number of collaborative partner NGOs to provide DOTS services through their existing urban health care facilities.<sup>6,7</sup> These NGOs cover an estimated population of 14.3 million through 299 directly observed treatment (DOT) centers in the city corporation areas, along with additional government health facilities.<sup>12</sup> Eighty-three of these treatment centers were additionally equipped with sputum microscopy facilities.

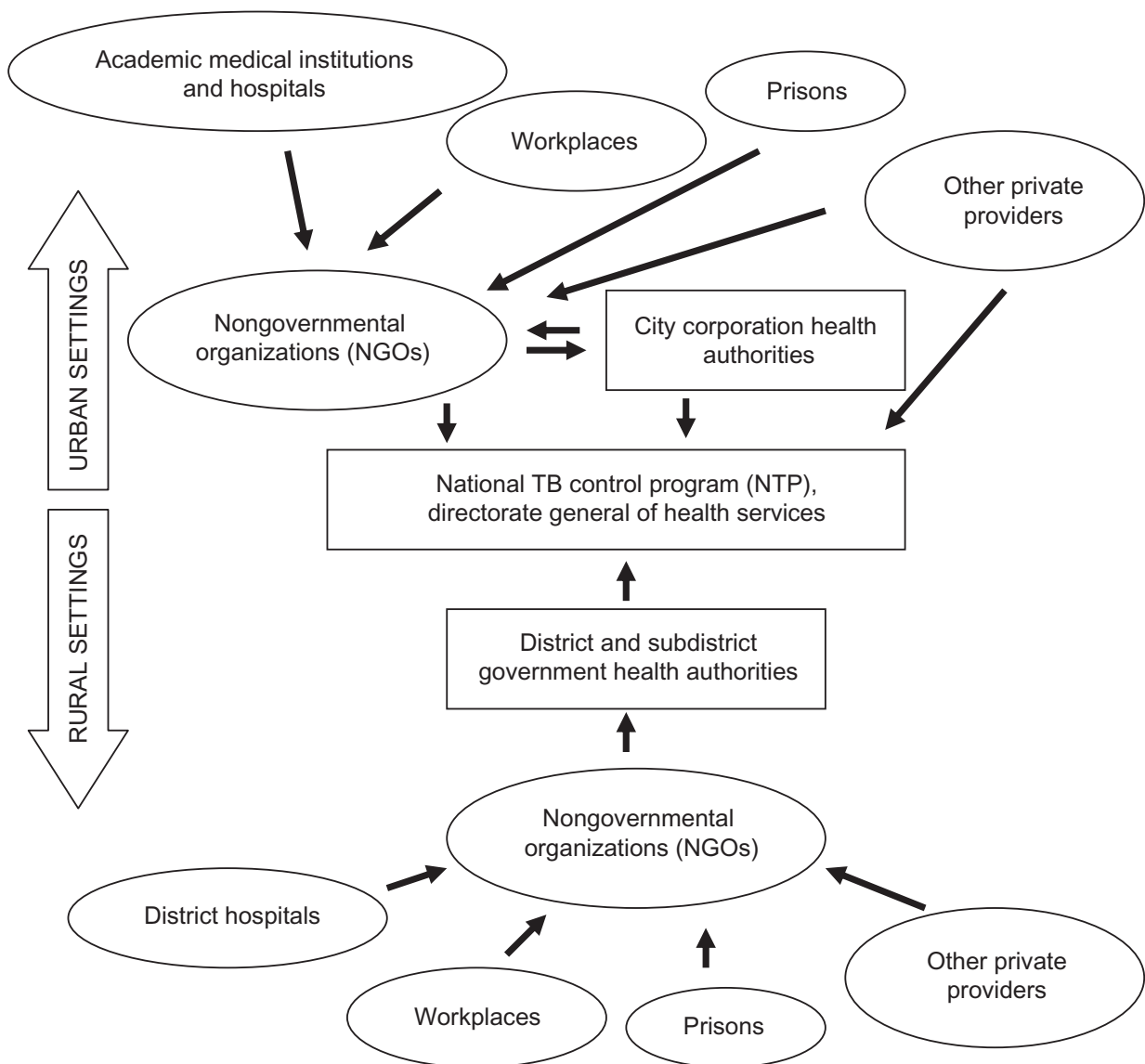
NGO health centers provide TB services as a part of their comprehensive primary health care service package, and are assigned by the respective city corporations for specific catchment areas and population coverage (100,000–300,000 residents).<sup>5</sup> Typically, these centers are staffed with 1–3 medical officer(s), 2–4 paramedics, 1–2 laboratory technician(s), and 2–3 support staff, depending on their customer volume and population coverage.<sup>13</sup> Before the initiation of DOTS services, these health centers were provided with the necessary logistic support free of cost from the National Tuberculosis Control Program after signing agreements. Some of the DOTS centers provide a full range of DOTS services, including sputum microscopy facilities, whereas other centers provide identification and screening of TB suspects, collection of sputum specimens, and provision of DOT, essentially functioning as referral centers without microscopy facilities.<sup>14</sup>

To strengthen TB control services in the city corporation areas, technical staff members were assigned to coordinate the activities of different NGOs. Most of these technical staff had a medical background in education with some public health experience or had TB control program experience. In addition, one monitoring officer was appointed for each of the NGO areas. As part of the public-private mix expansion plan, DOTS corners were opened in most of the medical college hospitals. To build and maintain quality services, regular training and refresher courses were conducted for technical staff from the National Tuberculosis Control Program. To engage private practitioners in the program, an area advocacy workshop was arranged in all city corporation areas. Community awareness campaigns were conducted in slums and underserved areas, and were funded by NGO

budgets as part of the Global Fund for AIDS, Tuberculosis and Malaria grants. Most of the DOTS centers had been brought under the supervision of the external quality assurance system during 2005 and 2006 to ensure the quality of sputum microscopy.<sup>15–17</sup>

TB cases are suspected and diagnosed according to the national guidelines for TB control.<sup>3,18</sup> As such, pulmonary TB is suspected in a patient who presents with a persistent cough for three weeks or more, with or without production of sputum, by physicians, public health staff, and/or community health volunteers. Alternatively, extrapulmonary TB cases are typically diagnosed and referred by physicians. Three sputum specimens are examined in patients suspected of having pulmonary TB. New smear-positive pulmonary TB cases are diagnosed when a suspected patient has at least two sputum specimens positive for acid fast bacillus, or with only one sputum specimen positive for acid fast bacillus and chest radiologic abnormalities consistent with active TB or one sputum specimen positive for acid fast bacillus and a culture positive for *Mycobacterium tuberculosis*.<sup>3,18</sup> Multi-drug resistant TB cases are managed under the multidrug resistance pilot project.<sup>2</sup> Diagnosed cases are treated with fixed-dose combination therapy under direct supervision (DOTS) for six to eight months.<sup>3,18</sup> All registered cases are followed to assess improvement at the end of their intensive phase of treatment, as well as upon completion of treatment.<sup>3,18</sup> Partner NGOs and public-private mix partners send their reports via local government health authorities on a quarterly basis to the National Tuberculosis Control Program (Figure 1).<sup>3</sup>

A total of 20,147 TB patients were registered in city corporation areas during 2006. The case detection rate for new smear-positive TB reached 66.8% (calculated on an estimated incidence of 103/100,000 population, WHO report), with a sputum conversion rate of 87% in 2006.<sup>19,20</sup> The treatment success rate increased from 78% in 2004 to 84.5% in 2005.<sup>20</sup> Trends as of June 2007 are shown in Figure 2 and Table 1. These results suggest that case detection in urban areas has increased considerably compared with the average case detection rate across the entire country (66% for new smear positive cases in 2006).<sup>16</sup> This might be due to a nationwide expansion of the TB control program via diverse health care providers.<sup>21</sup> Similar trends were also reported in other neighboring countries where private health care providers play a significant role.<sup>22–24</sup> Although cooperation and reporting of new TB cases had increased considerably, treatment adherence to DOTS was still a challenge for the program.



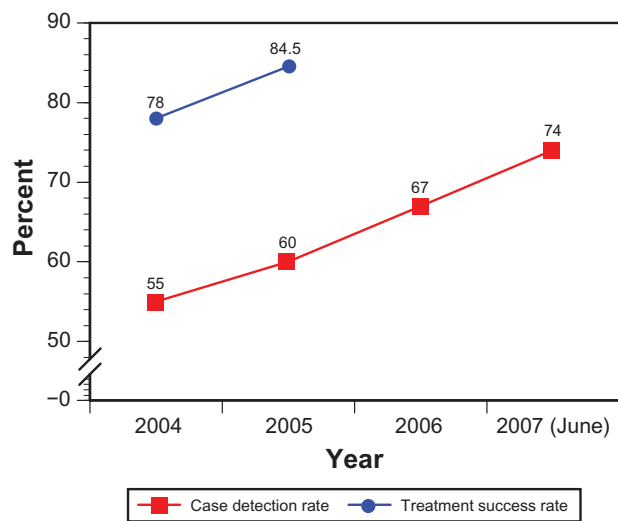
**Figure 1** Schematic diagram for the Management Information System and logistic supply of public private mix DOTS program in Bangladesh.

## DOTS in medical academic institutions and hospitals

DOTS corners were established in 33 medical institutions and government hospitals in 2006. NGOs were given the responsibility to operate these DOTS corners in collaboration with hospital authorities. Advocacy workshops were conducted to inform academics from these institutes on DOTS and national guidelines. A guideline-based referral system was developed to refer patients suspected/diagnosed to have TB, both from inpatient and outpatient departments, to the respective DOTS corner for sputum microscopy. After diagnosis, patients residing in close proximity are registered in the DOTS corners. Others are referred to the

center nearest to their residence for registration. Seriously ill inpatients receive initial treatment through attending nurses and, upon discharge, they are referred to their nearest local center.

A total of 3802 TB patients were registered at 33 hospitals during 2006, compared with 3051 patients at 21 hospitals in 2005 (Table 1). The treatment success rate increased from 76% in 2004 to 83.2% in 2005.<sup>25</sup> Although case notification in hospitals increased in 2006 compared with 2005, treatment success rates remained low compared with the national treatment success rate.<sup>6</sup> This low treatment success rate might be due to a lack of patient adherence to treatment regimens following hospital discharge. To overcome the challenges



**Figure 2** Trends in case detection and treatment success rates in six city corporation areas of Bangladesh.

of low treatment adherence, the referral system needs to be strengthened.

## DOTS in workplaces

DOTS services were implemented in 13 workplaces in Bangladesh, from which the National Tuberculosis Control Program receives individual reports. These workplaces are clustered in the export processing zones, industrial areas, and port areas of Dhaka, Chittagong, Khulna, and Bagerhat. The Dhaka export processing zone is located in the Savar sub-district, consisting of 94 factories with approximately 72,866 workers (90% women).<sup>26</sup> The Chittagong export processing zone consists of 134 industries. Having been a partner of the National Tuberculosis Control Program since 2001, the Youngone Group (Bangladesh) Ltd is one of the largest employers in the Chittagong export processing zone. They have their own health facilities, with a team of 21 doctors, 40 nurses, and 51 health counsellors.<sup>26</sup>

The overcrowded environment in most workplaces could be a potential risk factor for TB infection among workers. Moreover, workers often hide their illness, due to the fear of losing their jobs and being isolated by their coworkers.<sup>27,28</sup> Regular training on TB control management and sputum microscopy, as well as quarterly monitoring meetings, was conducted for the medical and laboratory staff working in the prescribed areas. In most cases, TB services were integrated within the existing health facilities of the workplaces. Advocacy workshops for factory owners, trade union leaders, supervisors, and workers were conducted to increase awareness for TB suspect identification, referrals, and DOT. DOT was provided by the supervisors, health staff, or coworkers.

**Table 1** Number of tuberculosis cases registered by year

	2005	2006
<b>City corporation area</b>		
New smear-positive cases	7913	9568
Retreatment cases	1171	1297
Smear-negative pulmonary cases	5320	5560
Extrapulmonary cases	2907	3722
Total TB patients	17,311	20,147
Case detection rate	60%	67%
<b>Medical academic institution hospitals</b>		
New smear-positive cases	1476	1791
Retreatment cases	421	427
Smear-negative pulmonary cases	650	893
Extrapulmonary cases	504	691
Total TB patients	3051	3802
<b>DOTS in workplaces</b>		
New smear-positive cases	376	706
Retreatment cases	22	21
Smear-negative pulmonary cases	148	222
Extrapulmonary cases	94	109
Total TB patients	640	1058
<b>DOTS in prison</b>		
New smear-positive cases	344	268
Retreatment cases	21	30
Smear-negative pulmonary cases	89	59
Extrapulmonary cases	24	44
Total TB patients	478	401

**Abbreviations:** DOTS, directly observed treatment, short-course; TB, tuberculosis.

A total of 1058 TB patients in 13 workplaces were registered during 2006, compared with 640 patients from 12 workplaces in 2005. The treatment success rate was 93% among patients registered in 2005 (details presented in Table 1).<sup>29</sup> DOT completions were higher among patients in workplaces, possibly due to the fact that these patients become ambulatory within a few weeks after starting their treatment and return to work. Workplace-based treatment adherence was also successful in other reports.<sup>6,24,26</sup>

## DOTS in prisons

Most of the prisons in Bangladesh are filled above capacity. Security measures and administrative formalities make it difficult to provide TB services to the prison communities. Continuation of treatment after prisoners are released is another potential barrier to successful completion of treatment.

According to the public-private mix guidelines, TB services were incorporated into prisons' existing health services, or an NGO was assigned to a prison to implement DOTS. Monthly sputum collection sessions for TB suspects were conducted in the prisons. However, microscopy services were performed in the nearest DOTS microscopy centers.

DOT services were provided by prison health staff. Following prisoner release, TB cases were transferred to the DOTS center nearest to the prisoner's residence for continuation of treatment.

A total of 401 TB patients were registered in 18 prisons during 2006. The sputum conversion rate increased from 74% in 2005 to 77.18% in 2006. The treatment success rate was 63% in 2005. A significant portion of patients were transferred out (18.93% and 35%, respectively, for sputum conversion and treatment success).<sup>30</sup>

Some studies have reported higher TB prevalence rates among prisoners compared with the general population.<sup>31,32</sup> However, existing TB management in the prison health facilities might not be sufficient enough to diagnose and successfully treat TB cases in difficult prison settings. An effective public-private mix DOTS should function to address TB among prisoners.

## Conclusion

It is crucial to engage all care providers with DOTS services in the National Tuberculosis Control Program to cover the entire population and make the services accessible for difficult to reach communities. Successful engagement of academics and clinicians in the DOTS program might eventually facilitate increased case detection and decreased discontinuation of treatment. Quality and performance in areas like prisons and workplaces is still a challenge for the successful implementation of a TB control program.

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## Disclosure

The authors report no conflicts of interest in this work.

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