Socioeconomic Divides in Tuberculosis Control

Study of Smear-Positive TB Prevalence, Care Seeking Behaviour and Role of Informal Healthcare Providers

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ACRONYMS

AFB	Acid fast bacilli
AIDS	Acquired immunodeficiency syndrome
BRAC	Bangladesh Rural Advancement Committee
CDM	Common diseases management
DF	Damien Foundation
DOTS	Directly observed treatment, short-course
EQA	External quality assurance
FP	Family planning
GFATM	Global Fund to Fight AIDS Tuberculosis and Malaria
GoB	Government of Bangladesh
HH	Household
HHH	Household head
HIC	High-income country
HIV	Human immunodeficiency virus
HSB	Help seeking behaviour
LEPRA	(The British) Leprosy Relief Association
LIC	Low-income country
LMAF	Local medical assistant and family planning training
MA	Medical Assistant
MDG	Millennium Development Goal
MTB	Mycobacterium tuberculosis
MW	Midwifery
NGO	Non-governmental Organization
NTP	National TB Control Programme
PC	*Palli Chikitsok* (Trained rural healthcare provider)
PHP	Private health provider
PLWH	People living with HIV/AIDS
PTB	Pulmonary TB
RDRS	Rangpur-Dinajpur Rural Services
RMP	Rural medical practitioner
SES	Socioeconomic status
SS	*Shasthya Shebika*
TB	Tuberculosis
UHC	*Upazila* Health Complex
WHO	World Health Organization

PREFACE

Worldwide, millions of people are infected with the Mycobacterium tuberculosis (MTB). Most of them live in profound poverty and die each year. Many more people will be badly afflicted and debilitated. Such a correlation between TB and the impact of poverty highlights the importance of a multifaceted approach to tackle the devastating problems facing the most vulnerable segments of the global community in the twenty-first century. The World Health Organization (WHO) thus declared TB as a global emergency, and relentlessly patronizes and promotes the directly observed treatment, short-course (DOTS) strategy for TB control, globally.

Spearheaded by the WHO approach, in many countries, a partnership between the governments (GO) and the non-governmental organizations (NGO), known as public-private mix partnerships to control TB is developed. Bangladesh is pioneer in this venture, where different NGOs, including BRAC, joined their hands with the government of Bangladesh (GoB) and have been playing a critical role in achieving high detection and cure of TB patients. The approach endeavours to accelerate equitable provision of TB services for all in dire need and advance the link between key disease control programmes and strategies to address the social determinants of health. The progress is mounting to the peak over time, but questions arise as to whether the DOTS services reach equitably to the people of all strata, is pulmonary TB equally prevalent in different social groups, and are all TB patients, regardless of their socioeconomic class, detected and treated? What do we know about knowledge, attitudes and practices of the vast informal rural healthcare providers regarding DOTS strategy, and what roles do they play? There is a lack of evidence to substantiate or disprove the existence of socioeconomic, demographic and gender differences in accessing the DOTS services, so also paucity of knowledge about the role of informal private healthcare providers in the DOTS.

In search of answers to these questions, the BRAC health programme commissioned a multi-component study, and the BRAC Research and Evaluation Division in cooperation with the Damien Foundation-Bangladesh implemented this aiming at measuring the prevalence of smear-positive pulmonary TB (PTB) in different population groups, understanding the patterns of people's behaviour of and barriers to healthcare seeking for respiratory illnesses, assessing the socioeconomic and gender differences in using of DOTS services, including treatment, and exploring the role of the private informal healthcare providers in the DOTS at the community level.

The findings revealed that the smear-positive PTB was more common in males than in females, and the geographical differences existed in the prevalence of smear-positive PTB. Although the programme is characterised as pro-poor and was well accessible to the poor, the elderly people, a growing marginalised group, did not have adequate access to it. Most patients encountered a longer delay while seeking healthcare from the appropriate healthcare systems providing TB care services. The informal rural private healthcare providers are popular among the community, and the people are largely dependent on their treatments, which are rather ineffective. However, most of them have no formal training on treatment of TB nor are aware of the DOTS strategy. These warrant appropriate strategy for their inclusion in effective DOTS programme for TB control in Bangladesh.

The issues addressed in the study are highly relevant to BRAC mission for TB control and poverty alleviation. Because cure and prevention of infectious diseases, such as TB, prevent economic shocks and save human resources for increased productivity. I am confident that this thoroughly executed piece of work will make important contribution to achieving the Millennium Development Goals. I strongly recommend this monograph to all who are involved in fighting against TB and extreme poverty in Bangladesh and elsewhere in the globe.

Fazle Hasan Abed
Chairperson, BRAC

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Public health experts from around the globe recently began to pour questions on the effectiveness of the DOTS strategy for TB control, especially on reaching the programme to the poor, who are hit hardest by the Mycobacterium tuberculosis (MTB). Sincere thanks to the BRAC Health Programme (BHP) for funding the study to explore answers particularly to the latter question and to Damien Foundation-Bangladesh for extending full cooperation to the implementation of the study. The researchers gratefully acknowledge the profound interest of FH Abed, founder chairperson of BRAC and Dr. AMR Chowdhury, Former Dean, JPSPH, BRAC University in this burning theme of the study. Special thanks are due to the head office managers and the field staff of Damien Foundation-Bangladesh for extending needed cooperation during data collection in their programme areas.

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EXECUTIVE SUMMARY

Background

The Government of Bangladesh (GoB) has intensified the implementation of the directly observed treatment, short-course (DOTS) strategy with the primary aims (i) to detect and treat at least 70% of TB cases in the community; and (ii) to ensure at least 85% cure rate of the detected cases using the DOTS strategy. Recently, the strategy has been further intensified in partnership with several non-governmental organizations (NGO), including BRAC. Now the strategy covers the entire country with the financial assistance from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM).

Although the BRAC programme achieved a case detection rate of 80% and the treatment success rate of 93% in 2006, concerns persist about the gender and socioeconomic differences in the detection, diagnosis, and treatment of TB cases. Thus, for a successful DOTS programme, the policy makers, planners, and managers should critically understand what happens at various identifiable domains of TB control, including incidence/prevalence of disease, case detection, diagnosis, treatment adherence, treatment outcomes, and roles of the private informal healthcare providers in the DOTS strategy. Evidence lacks to substantiate or disprove the existence of socioeconomic, demographic and gender differences. Given the situation, the Research and Evaluation Division of BRAC, in cooperation with the Damien Foundation-Bangladesh (DF), implemented this study to measure the existence and magnitude of DOTS divides in different domains of TB control in rural Bangladesh.

Objectives

General

The aims of the study were to measure the prevalence of smear-positive pulmonary TB (PTB) in different population groups, understand the patterns of people's behaviour of and barriers to healthcare seeking for respiratory illnesses, assess socioeconomic and gender differences in the use of the DOTS services including treatment, and explore the role of the private informal healthcare providers in the DOTS strategy at the community level.

Specific

The specific objectives of the study were to: (i) measure the prevalence of smear-positive PTB among different socioeconomic groups of population; (ii) assess the socioeconomic and gender background of sputum-positive TB cases and patients enrolled with BRAC and DF for TB treatment; (iii) assess healthcare seeking patterns of TB cases along with their sources and barriers to healthcare seeking; and (iv) explore the role of the informal private healthcare providers (PHP) in TB case detection and treatment, including the mechanisms they follow for monitoring TB treatment and adherence.

Methods

Study design

Following a cross-sectional design, we collected data in three stages (stage 1 study, stage 2 study and stage 3 study). The stage 1 study (Chapter 2) screened TB suspects at households to determine the period prevalence of smear-positive PTB by socioeconomic characteristics, assessed help seeking behaviour (HSB), such as use of informal private healthcare providers (PHP) including drug-sellers, and delay in care seeking for TB.

In the stage 2 study (Chapter 3), we collected data on socioeconomic conditions of patients diagnosed with smear-positive PTB during the population survey and those who were already enrolled with different NGOs for treatment of TB under the DOTS strategy and used benefit-incidence analysis to estimate the reach of the programme to the people in most need.

The stage 3 study (Chapter 4 and 5), explored the knowledge and practices of informal PHPs, and their role in the DOTS strategy for TB control.

Study area

To combat the TB havocs, the GoB, in partnership with different NGOs, including BRAC, has been implementing the National TB Control Programme (NTP) using the DOTS strategy. Being in lead, BRAC alone covers 283 subdistricts (61.5% of total 460) of the country, including 12 subdistricts, where this multi-component study was carried out. Among the remaining 177 *upazilas,* the DF covers 101, Health Education Economic Development (HEED) 25, Lamb Hospital 3, Danish Bangladesh Leprosy Mission 10, Rangpur Dinajpur Rural Services 14, and (The British) Leprosy Relief Association (LEPRA) 24. Besides, 6 city corporations are allocated to 16 NGOs, including BRAC. These partner

NGOs follow the NTP guidelines in programme implementation. However, for operational and logistical conveniences, the study area and population were drawn from Dhaka division only.

For the stage 1 study, Monohardi and Shibpur *upazilas in* Narsingdi district were randomly selected. These particularly helped determine the prevalence of smear-positive PTB in different population groups by different socioeconomic and demographic characteristics, and gender.

For the stage 2 study, 14 *upazilas* (7 each from DF and BRAC programme areas) were randomly selected from areas where interventions started in the mid-nineties.

The stage 3 study was carried out in 16 *upazilas,* including the stage 1 study *upazilas,* viz. Monohardi and Shibpur in Narsingdi district (Table 2, Chapter 1).

Sample size

The sample size for the stage 1 study was 209,738 rural people (105,900 females and 103,838 males) in 44,455 households of the two study *upazilas.*

In the stage 2 study, samples were drawn to get representative estimates of DF and BRAC operating areas separately. In total, 103 TB patients from each of the 14 *upazilas*, were sampled by consulting the TB treatment registers maintained by the respective NGOs. Following this, the selected patients were interviewed for socioeconomic background and HSB. This, when compared to the averages of general population of the area, would help assess the extent of socioeconomic and gender disparities in accessing the DOTS services.

The stage 3 study collected data from 1,006 informal PHPs representing 16 *upazials* spread over 6 districts.

Sampling methods

For the stage 1 study, Monohardi and Shibpur *upazila*s and the study villages/clusters were selected using two-stage sampling methods viz. (i) a list of programme *upazilas* by districts was prepared, and from this list, two *upazilas* out of total 6 in the Narsingdi district were drawn at random; (ii) from the list of villages of the selected *upazilas*, 30 clusters/villages were selected for the study in each *upazila.* The cluster interview method was employed to interview the expected number of households for screening the people with chronic cough of more than three weeks. On the other hand, the addresses of the available local health providers, including drug-sellers, to whom patients/community

people seek help in need, were collected for interview during visits to households.

For the stage 2 study, 103 patients undergoing treatment for TB were randomly selected from each of the 14 randomly chosen *upazila*s by consulting the TB treatment registers maintained by BRAC and DF. In doing so, a convenient 8-month reference period (preceding the interview) of enrollment for treatment was considered. Thus, 1,442 patients were randomly selected for the stage 2 study (721 for each NGO).

For the stage 3 study, the samples were purposively selected, representing 16 *upazilas*, spread over 6 districts, including Narsingdi.

Data collection

During July 2005 to January 2006, data were collected from the households and individuals using a blend of pretested structured and semi-structured schedules, formats, and checklists. Teams of trained interviewers carried out interviews in all the stages of the study. Moreover, through the population survey at the household level, the TB suspects with prolonged cough for more than three weeks were screened, and two sputum samples — in the morning and on the spot — were collected from each suspect for smearing and testing at the designated laboratories of BRAC, in Shibpur and Monohardi *upazilas*.

Of 144,023 adult people (≥12 years old) surveyed, 4,611 reported a history of prolonged cough for more than three weeks. Of them, 4,434 suspects, gave 8,868 sputum samples (2 each) for test. These samples were smeared at the village levels by trained mobile smearers and thereafter were brought to the designated laboratories of BRAC. BRAC-trained laboratory technicians stained and tested the samples. All sputum specimens were examined for acid fast bacilli (AFB) in the field laboratories. The required quantity of sputum was used for performing the Ziehl-Neelsen staining standard procedure. Stained smear was tested under microscope in oil immersion.

The stage 2 study surveyed 1,442 PTB patients undergoing treatment in the BRAC and DF programme areas. Using a pretested schedule, socioeconomic and demographic data were collected from households of the patients currently undergoing treatment and of those who were detected by the research team.

In the stage 3 study, interviews were conducted with 1,006 local informal private healthcare providers to assess their knowledge and practice on TB treatment and their role in the DOTS strategy for TB control. For this, a pretested semi-structured schedule containing closed and open-ended questions was used.

Laboratory work quality control

One laboratory expert from Dhaka (the capital city) paid weekly visit to check the quality of performance of field laboratory technicians in terms of staining and microscopic test of sputum. Besides, 10% randomly selected slides (n=886) were re-examined at the external quality assurance (EQA) laboratory at Uttara, Dhaka. A case of PTB was defined as having at least one sputum specimen positive for AFB.

Data management and analysis

All the filled-in questionnaires along with sputum test results, were checked and edited and were coded for computer entry. Data were cleaned and analysed using SPSS and Stata softwares (version 11.5 and 9.2, respectively). Bivariate and multivariate analyses were carried out for quantitative data to reveal the effects of socioeconomic (e.g. asset quintile, consumption and income poverty, etc.) and sex differentials in DOTS service use for TB control in rural Bangladesh.

Narrative data were translated into English and checked for completeness and consistency. Following this, two senior anthropologists repeatedly read the data independently to understand the meanings and implication, and then organised findings in matrices under different themes/sub-themes as emerged from the narratives. In the analysis and interpretation stage, the researchers mutually shared data and decided for final analysis and interpretations.

Key results

Socioeconomic and demographic divides in prevalence of smear-positive PTB

The 'true' period prevalence of smear-positive PTB (combining both the tracers) was 122.2/100,000, higher for males than for females (171.7 vs. 74.0/100,000; p=0.000). The prevalence was more common among younger females and older males. The rates were almost identical across different asset quintiles, indicating that all economic groups are at risk of PTB. Increased per capita space of dwelling house by square feet, use of tubewell water for all purposes, and proximity to health facilities reduced the prevalence of smear-positive PTB. One year rise in age of TB patients from the mean increased probability for remaining undetected by 0.006 in the routine programme. Chances of smokers to remain undetected increased by 0.32. The older people were more likely to ignore their health problems.

Socioeconomic determinants of case detection and delayed diagnosis and treatment

The study on the determinants of smear-positive PTB cases and the factors associated with the lag time between onset of symptoms and detection suggested that patients who were relatively older had lower detection. A similar pattern was observed among patients with smoking habit. The programme should inform the field operators about the systematic lower detection and longer delay among the older and smoker-patients to improve the detection rates. No gender disparity was observed in accessing DOTS services although the disease was more prevalent among males. In terms of socioeconomic status, the disease seemed to be equally prevalent across different asset groups but the patients receiving DOTS came from the poorer households, demonstrating a pro-poor nature in the DOTS service delivery system. Exploration of health-seeking behaviour suggested that patients from richer households preferred other formal sources of treatment. Patients often visited alternative sources of treatment before coming to the DOTS clinics and spent valuable time in the process. Finally, the process of programme implementation had influenced the case detection. Having a health force from the communities can reduce the amount of delay to DOTS services.

Role of rural informal private healthcare providers in TB control

The findings showed that two-thirds (66.4%) of the providers had no professional degree from formal or informal institutions, although they were involved in treatment for 10.8 years, on average. Over a half (52.5%) of the providers neither took any initiatives for diagnosis of TB nor did they refer the TB suspects to the DOTS facilities, though they found TB suspects among the patients presented for care from them. Some village doctors claimed that they treated TB suspects and cases with antibiotic or cough syrup. A vast majority (72.5%) of the providers never heard about the community-based DOTS strategy for TB control or about its objectives. Only 4.2% of the village doctors claimed that they applied DOT treatment for TB. However, the overwhelming majority of the village doctors showed their interest in implementing the DOTS strategy, if they would receive practical training on it. Thus, recognizing the importance of the role of informal village doctors and their acceptance in health service delivery, the national tuberculosis programme should provide training to these popular human resources, and thereby using them in the TB control initiatives.

Access barriers to TB control services through the lens of informal healthcare providers

Qualitative interview with the 1,006 rural informal private healthcare providers revealed multi-faceted barriers to healthcare seeking process

for patients with TB. These barriers were organized under 4 interconnected broad themes, viz. (a) barriers associated with patient's personal characteristics and behaviour, (b) sociocultural barriers, (c) economical barriers, and (d) barriers embedded in the public and private healthcare systems. The barriers confronted by patients included: lack of knowledge about the symptoms of TB, stopping of treatment when patient feel better, and tendency to hide disease because of shame. These conditions often resulted in delayed care seeking and non-adherence to full treatment for TB. Felt or enacted stigma, social rejection, and fear of marital problems due to TB, frequently acted as barriers to healthcare. Besides, worse socioeconomic conditions also posed severe obstacles to accessing care. The unavailability of doctors at the public facilities in emergency situation, unfriendly behaviour of doctors, poor attention of staff, unskilled/traditional healers, and lack of diagnostic centres were identified as critical barriers to care seeking. These barriers should be removed to improve case finding and adherence to treatment.

Conclusion

Population-based active case finding shows that a fewer women report chronic cough, and a fewer of them are likely to be smear-positive, if tested. The younger women have more occurrences, while it is observed more in older age groups of men. The prevalence of smear-positive PTB is almost identical across different asset quintiles, except for the 4th quintile, implying that all socioeconomic groups are equally susceptible to TB. Increased per capita food expenditure is associated with an increased prevalence of smear-positive PTB.

The DOTS strategy in the study areas appears to be pro-poor since the majority of the patients receiving DOTS come from poorer households. Smoking is also likely to influence the detection of cases among the smokers. May be the smokers ignore their prolonged coughing as an outcome of their smoking but not necessarily of their getting affected by Mycobacterium TB. It is unclear as to why a substantial number of cases remain undetected despite the presence of health volunteers — one for 200-300 households. Rate and speed of detection are higher in areas with relatively higher health vibrancy. This confirms the synergies between the alternative service providers and the importance of proper functioning of the entire health systems.

The overwhelming majority of the village doctors showed their interest in implementing the DOTS strategy, if they are imparted practical training on it. Thus, recognising the importance of the role of informal village doctors and their popular acceptance among the people, the national tuberculosis programme should provide training to these vast human resources, and thereby using them in the TB control initiatives.

Felt or enacted stigma, social rejection, fear of marital problems due to TB frequently acted as barriers to accessing healthcare. Besides, worse socioeconomic conditions also pose severe obstacles to accessing care. The unavailability of doctors at the public facilities in emergency situation, misbehaviour of doctors, poor attention of staff, unskilled/traditional healers, and lack of diagnostic centres were identified as critical barriers to care seeking. These barriers should be removed to improve case finding and adherence to treatment.

Recommendations

Focused interventions on the following issues appear to have particular value for the improved DOTS strategy:

1. Combined effort of the alternative service providers is important for the DOTS strategy to accelerate the case finding and reduce unnecessary delay in seeking healthcare for the management of TB at the community level. To this end, the informal healthcare providers ought to be trained on and actively engaged in DOTS service delivery and their role in DOTS be monitored towards effective implementation of DOTS strategy.
2. Active search among younger females, older males, and tobacco smokers may increase the detection of cases. All the stakeholders, including S*hasthayo Shebikas* and private healthcare providers, may be properly engaged in the process.

Chapter 1

Background and methodology

Fazlul Karim

Tuberculosis — a global health emergency

Despite proven cost-effective treatments have been available for decades, tuberculosis (TB) continues to be one of the major causes of death among adults, accounting for 1.7 million deaths each year worldwide (WHO 2008). Although the World Health Organization (WHO) declared TB a global health emergency over 10 years ago, it still takes a heavy toll, especially in low-income countries (LIC). One-third of the world's population is latently infected with Mycobacterium tuberculosis (MTB), although most will show no characteristic symptoms. In 2006, there were about 9.2 million new TB cases in the world (WHO 2008). Each active TB case can infect 10-15 people annually, on average. The incidence and prevalence of TB are rising in the LICs vis-à-vis re-emerging in high-income countries (HIC). To control TB, the WHO declared tuberculosis a global emergency in 1993.

TB and poverty

TB is often branded as a disease of poverty (WHO 2002) because it afflicts the poor most. Airborne Mycobacterium can easily spread in over-crowded places with inadequate ventilation, poor lighting, and poverty. Inter-current diseases and poor nutrition reduce the immune systems of the people living with these conditions. Thus, 95% of all global TB patients live in the LICs (WHO 2002). However, most of them are aged 15-54 years, who should be in their most productive and reproductive life cycle. Besides, TB infections are more likely to progress to a disease, as a result of the health consequences of poverty, especially malnutrition. In a vicious circle, TB itself causes poverty, imposing a severe economic burden on individual patients, their households, their healthcare

systems, and their communities, particularly through the costs of diagnosis and treatment and the loss of income due to illness. Though diagnostic services and drugs are free in the public sectors of many countries, other costs, such as travel and special nutrition during treatment, are often unaffordable to a bulk of the poor, especially those living on less than 1 dollar a day. The non-treatment costs borne by patients are often greater than the costs of treatment borne by the health systems. A Zambian study estimated that these non-medical costs paid by patients were more than twice of their medical costs (Needham *et al.* 1998). Moreover, the lengthy course of treatment involved substantial costs due to lost production and income. A study in India found that TB patients lost, on average, 83 working days, with 48 days before treatment and 35 days during treatment. Indirect costs represented 65% of the total family costs for TB disease (Rajeswari *et al.* 1999). Periods of inability to work through ill health have a profoundly negative impact on employment and economic security. Thus, TB thrives in conditions of poverty and can worsen poverty.

Gender and TB

TB is a major infectious killer of both men and women in their most productive life cycle. In 2002, TB accounted for 3.5% of all deaths among men and 2.0% of all deaths among women. More women died of TB than from all maternal conditions (1.9% of all female deaths) and breast cancer (1.8% of all female deaths) (WHO 2003). According to the TB case notification report submitted to the WHO, about twice as many men as women were notified as TB patients (WHO 2008). The prevalence surveys show that the prevalence of TB is comparable between males and females until the age of 15 years, and then disparity starts. But TB progresses from infection to active disease much faster in women during their reproductive ages than in similar age groups of men. The gender differences in behaviour may influence disease progression, for example, poor nutrition, smoking, and alcohol abuse in decreased immunity. A study in southern India found that the risk of progression from infections to disease for pulmonary TB was 8.6% among men and 3.1% among women. After excluding smokers and alcoholics, the male-female ratio fell from 2.7:1 to 1.2:1 (WHO 2004).

The gender difference in accessing the healthcare, and in preference for consulting private practitioners, such as traditional healers, embarrassment, or fear of stigma (Karim *et al.* 2007) may be factors in the difference in case detection between men and women in some areas (Hudelson 1996). Fear of losing job tends to discourage healthcare seeking among working men, resulting in delayed diagnosis and treatment, and/or high default rates. The poor women with TB especially tend to suffer from fear of being divorced, and/or rejecting by the family and the community. Women in many settings have to overcome several

barriers before they can access healthcare. Where they undertake multiple roles in reproduction, production, and child care, they may be left with less time to reach health centres than men. The health systems also could be barriers to women to be detected as TB case. Health providers may be less suspicious of TB in women due to the gender differences and, thus, may miss them.

The link between TB and HIV/AIDS

The emergence of HIV infections has fuelled the TB epidemic; TB is a leading killer of people with HIV. The deadly association between TB and HIV/AIDS has now been explicitly established. The hallmark of the disease caused by HIV is the depletion of CD4 cells, which are also responsible for the control of TB infection. People with this dual infection have a 2-5 fold increase in mortality (Tripathy and Tripathy 2002). Thus, TB is the leading cause of deaths among HIV infected people; and it can account for up to a third of AIDS deaths globally (WHO 2006). The case-fatality rates likewise seem to be greater in women because of decreased immune function caused by poor nutritional status and delay in healthcare seeking; and these are functions of gender indeed. The consequences of TB and HIV co-infection are: more transmission of TB bacteria, more people with latent TB leading to more TB in the population. People with co-infections of HIV and latent TB have up to 800 times higher risk of developing active TB and becoming infectious compared to those not infected with HIV (AVERT 2008). Today, over 42 million people living with HIV (PLWH), and of them, 19.2 million are women. In 2002, 5 million people became infected with HIV, and women represented 48% of all new infections (Türmen 2003), and all are at their younger ages than men. Globally, about a third of the PLWH are co-infected by Mycobacterium, and unfortunately about 70% of smear-positive TB patients are HIV-positive in Sub-Saharan Africa (Raviglione *et al.* 1997). However, South East Asia, with 22% of those co-infected, bears a substantial burden of HIV-related TB.

Women's vulnerability of dual infections

Biologically, women are more susceptible to HIV infection than men. Evidences show that male-to-female transmission of HIV infection is 2-4 times more efficient than female to male (UNFPA 2002). Furthermore, the presence of sexually transmitted infections (STI) intensifies the risk of transmission and acquiring HIV by up to 10-fold (WHO 2002). These are compounded by women's limited or no access to quality healthcare, inferior socioeconomic status, powerlessness in decision-making, unnecessary violence and discriminations against women, a lack of access to resources and education increase their vulnerability to TB and HIV co-infections.

DOTS (directly observed treatment, short-course) — a global strategy to TB control

Effective TB control depends on rapid identification of TB cases, treatment, and cure. The internationally recognized strategy for TB treatment DOTS — has been proven effective worldwide. Of 210 countries, 184 have been implementing the strategy since 1994. Alongside the WHO, the Stop TB Partnership is engaged in this global mission. The strategy produced rapid gains worldwide in TB control. The national TB control programme (NTP) of the Bangladesh Government has been implementing the DOTS strategy in partnership with non-government organizations (NGO) including BRAC. Recently, the partnership has been further strengthened through a joint policy implementation framework. Thus, since 2004, the programme has been expanded throughout the entire country with financial help from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM). Different NGOs including BRAC have been playing effective roles in TB control (BRAC 2006).

INTRODUCTION

Though TB has been branded as a disease of poverty (WHO 2002), the better-off segment of the population, particularly in the LICs including Bangladesh is not immune from this lethal disease. People from all socioeconomic strata are likely to be at risk of TB because of their recurrent exposure to environmental pollutions and extremely congested living conditions. These hazardous factors coupled with the unsafe and unhygienic behaviour amplify the risk of transmission of Mycobacterium tuberculosis to mass people, resulting in high incidence of TB infections and disease progressions among different socioeconomic groups of population. The estimated annual risk of TB infections (ARTI) was 2.3% in 1996 (Weyer, 1997), which indicates a high burden of TB in Bangladesh, and consequently Bangladesh ranks 5th among the world's 22 high burden countries of TB. Besides, every year, 300,000 incidences of TB take place among the people of Bangladesh, and of them, 70,000 die (The Daily Star, 2000). But the paucity of data makes it difficult to assess the socioeconomic divides in the incidences of TB and its treatment. The WHO estimates reveal a high burden of TB in Bangladesh (Table 1).

THE PROBLEM AND SETTING

To combat the TB havocs, the Government of Bangladesh (GoB), in partnership with NGOs, has been implementing the NTP using the DOTS strategy. Besides, the Government and NGOs, the private health

providers may play crucial role in TB treatment, but, unfortunately, the nature and extent of their role in this arena are unknown. The primary

Table 1. Current basic epidemiology of TB in Bangladesh

Indicators	Percent or rate/100,000 population
Incidence of all forms of TB	225
Incidence of new smear +ve cases	101
Prevalence of all forms of TB	391
TB mortality of all cases	45
% Prevalence of HIV in adult TB patients (15-49 years)	0.0
Multi-drug resistant cases among new TB cases	1.6

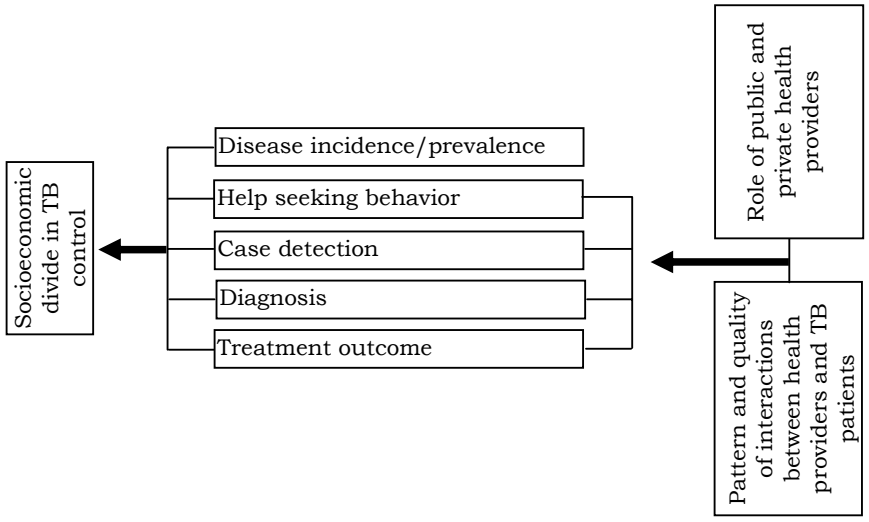
Source: WHO 2008.

aims of the NTP are (i) to detect and treat 70% of TB cases in the community and (ii) to ensure 85% cure rate of detected cases using the DOTS strategy. A study in the BRAC programme area (Karim *et al.* 2004) found a cure rate of 90.5% among new smear+ve patients, while the BRAC TB service statistics of 2006 revealed an average case detection of 80% (BRAC 2006), implying that the BRAC achieved both the aims of the DOTS strategy. But the gender difference in detection, diagnosis, and treatment of cases is widespread (Begum *et al.* 2001; Fair *et al.* 1997; Karim *et al.* 2004). Besides, socioeconomic divides in TB epidemiology and healthcare seeking for TB are hardly known in Bangladesh. This evidence bring up a grave concern about the access barriers of different social groups to the DOTS services, especially the services provisioned and delivered for case detection and holding. No denial that the TB treatment pathway is a complicated one, which contains several obvious steps beginning from the onset of symptom to the treatment along the path of cure of TB. This process is rarely linear. At each step, diverse socioeconomic divides can occur (Uplekar *et al.* 2001). However, for a successful DOTS programme, the policy makers, planners, and managers should critically understand what happens at various identifiable domains of TB, including: incidence/prevalence of the disease, detection and diagnosis of cases, treatment adherence, treatment outcome, and patterns and quality of interactions between health providers and TB suspects/patients (Figure 1).

Socioeconomic and demographic inequities in case notification and diagnosis, and sex disparity in the incidence/prevalence of TB, are most likely the major barriers to DOTS-based successful TB control interventions. In particular, unless the access barriers of different social groups to DOTS services are effectively tackled, it would be difficult to control the spread of extremely infectious pulmonary TB (PTB). However, the assumption is that the benefit of the DOTS is not equally accessible to all people, who are in pressing need of it. Though there is a paucity of evidence on the differential use of the DOTS services (especially those

provisioned and being delivered for sufficient case detection and holding and treatment), studies on the use of other health services, for instance, immunization and basic safe motherhood services, showed a significantly higher use among the better-off in Bangladesh (Chowdhury *et al.* 2003; Bhuiya *et al.* 1995; Karim *et al.* 2006). Likewise, the differential use of DOTS services is not unlikely. But we do not have sufficient evidence to substantiate the existence of socioeconomic, demographic and gender differences, together with their magnitude, especially in the domains of incidence/prevalence, case detection, diagnosis, and treatment, nor were these systematically explored in the past in Bangladesh.

Figure 1. Possible domains of socioeconomic divide in tuberculosis control



Relevance/usefulness of the study

To ensure universal and equal access of the people of all strata to the DOTS services and to maximize case detection and holding, appropriate strategic directions and a well-planned programme are crucial. However, we need to establish sufficient evidence about the existence of differentials in the crucial domains of incidence/prevalence, and detection, diagnosis, and treatment of TB, so that the policy-makers, planners and managers can take corrective measures for reducing access barriers to the DOTS services. Thus, the Research and Evaluation Division of BRAC in cooperation with the DF, implemented this study to measure the existence and magnitude of DOTS divides in TB control in rural Bangladesh. The study outcome would be immensely useful to the policy-makers, planners and managers for taking corrective measures to eliminate socioeconomic, demographic and gender barriers to accessing DOTS services for TB control.

OBJECTIVES

General

The study aimed at measuring the prevalence of smear-positive PTB in the population, understand the patterns of people's behaviour of and barriers to healthcare seeking for respiratory illnesses, assess socioeconomic and gender differences in the use of the DOTS services including treatment, and explore the role of traditional private healthcare providers in the DOTS strategy at the community level.

Specific

The specific objectives of the study were to: (i) measure the prevalence of smear-positive PTB among different socioeconomic groups of population; (ii) assess the socioeconomic and gender background of sputum +ve TB cases and patients enrolled with BRAC and DF for TB treatment; (iii) assess help seeking patterns of TB cases along with their sources of help seeking and barriers towards help seeking; and (iv) explore the role of traditional private healthcare providers (PHP) in detection and treatment of TB cases, including the mechanisms they follow for monitoring TB treatment and adherence. To substantiate the above objectives, three broad studies (stage 1, 2 and 3 studies) were carried out as delineated in Chapter 2 to 5.

Hypothesis

The poor are more likely to be afflicted with TB, vis-à-vis are less likely to access the existing DOTS strategy than the rich in rural Bangladesh.

Study outcome

Evidence is generated for the policy makers on the magnitude of socioeconomic, demographic and gender differentials in the use of DOTS services, vis-à-vis smear-positive PTB prevalence, and on the role of PHPs in TB control, using DOTS strategy.

MATERIALS AND METHODS

This section documents the general methods and materials of the overall study, and the Chapter-specific unique methods are delineated in the respective Chapters.

Study design

Spearheaded by the descriptive cross-sectional design, we collected data in three stages. The stage 1 study screened TB suspects/cases at households to determine the period prevalence of smear-positive PTB by socioeconomic characteristics; the stage 2 study assessed the help seeking behaviour (HSB), such as use of private health providers (PHP) including drug-sellers, and delay in healthcare seeking; and the stage 3 study explored the role of the PHPs in detection, treatment of TB cases, and their knowledge of the DOTS strategy.

Study area

Different NGOs, including BRAC has been implementing the NTP using the DOTS strategy. Being in lead, BRAC alone covers 283 subdistricts (61.5% of total 460) of the country including 12 subdistricts, where the studies were carried out. Of the remaining 177 *upazilas,* Damien Foundation covers 101, Health Education Economic Development (HEED) 25, Lamb Hospital 3, Danish Bangladesh Leprosy Mission 10, Rangpur Dinajpur Rural Services 14, and LEPRA 24 *upazilas*. Besides, 6 city corporations are allocated to 16 NGOs, including BRAC. These partner NGOs follow the NTP guidelines in programme implementation.

However, for operational and logistical conveniences, the study area and population were drawn from Dhaka division only.

The stage 1 study (Chapter 2) was conducted in Monohardi and Shibpur *upazilas* of Narshingdi district under the BRAC TB control programme area with comparable socioeconomic and demographic characteristics.

The stage 2 study (Chapter 3) on help seeking behaviour was implemented in 14 randomly chosen *upazilas* (7 from each of DF and BRAC programme areas), where the TB control interventions were started in the mid-nineties (Table 2).

The stage 3 study (Chapter 4 and 5) on the role of informal private healthcare providers in DOTS strategy for TB control was carried out in 16 *upazials,* including Monohardi and Shibpur (details in Chapter 4).

Sample size

For stage 1 study, we considered several factors to determine the sample size, viz. (i) the proportion of adult people (≥15 years) was estimated to be 63% of the total population; (ii) the true incidence of smear-positive PTB among this age group was assumed to be 0.11%.; and (iii) the poor-to-rich population ratio was about 0.50 (the poor refer to the people living with less than 2 US dollar a day). We determined the sample size in a way that enabled us to have had separate estimates for each *upazila* to

compare the study outcome between the study *upazilas.* Considering all these factors and taking 90% confidence level with 5% acceptable error, the sample size calculated for the stage 1 study was 200,000 people spread over 40,000 households. But in reality, we visited 209,738 rural people (105,900 females and 103,838 males) in 44,455 households of the two study *upazilas.*

In the stage 2 study, two NGOs—BRAC and DF—were included requiring separate estimate for each NGO. In fact, the woman-to-man ratio of patients undergoing TB treatment was 0.40:1, and the poor-to-non-poor ratio was 0.50. Thus, considering these facts and taking the 90% confidence level with 5% acceptable error, the sample size calculated for the stage 2 study stood at 711 patients (but we took 721) for each NGO. However, for each NGO, 7 *upazilas,* were selected at random, followed by 103 TB patients from each of them (Table 2), by consulting the TB treatment registers maintained by the respective NGOs. Following this, the selected patients were interviewed for socioeconomic background and HSB.

The stage 3 study collected data from 1,006 informal private healthcare providers, representing 16 *upazilas* including Monohardi and Shibpur in Narsingdi district.

Sampling methods

For the stage 1 study, Monohardi and Shibpur *upazila*s and the study villages were selected using the two-stage sampling methods: (i) a list of programme *upazilas* by districts was prepared. From this list, the expected number of *upazilas* (two) was drawn at random out of the total 6 in Narsingdi district; (ii) the *upazilas* comprised 341 villages with varied sizes (Monohardi 169 and Shibpur 176). Using the 30 cluster sampling method adopted by the Expanded Programme on Immunization of WHO (EPI 2005), a cluster sampling frame was prepared. In doing so, the small villages were merged with the nearest village, and the large ones were split to keep the number of households approximately at 667 for each cluster/village. Thus, 60 clusters (30 in each *upazila*) were selected. Afterwards, employing the cluster interview method, the expected number of households was interviewed for screening the population with chronic cough of more than three weeks. The addresses of the available local healthcare providers, including drug-sellers to whom the patients/community people seek help in need, were collected for interview during household visits.

As noted earlier, for the stage 2 study, 103 patients undergoing TB treatment were randomly selected from each of the 7 randomly chosen *upazila*s by consulting the TB treatment registers maintained by the respective NGOs (viz. BRAC and DF). In doing so, a convenient 8-month

(preceding the interview) reference period of enrollment for treatment was considered. Thus, 1,442 patients were randomly selected for the stage 2 study (721 for each NGO).

Table 2. Sample size for the stage 2 study by NGO (Dhaka division)

Upazila	Programme started on	District	Name of NGO	Patients per *Upazila*
Nalitabari	Dec. 1995	Sherpur	BRAC	103
Nakla	Dec. 1995	Sherpur	BRAC	103
Sherpur sadar	Jan. 1996	Sherpur	BRAC	103
Sreebordi	Jan. 1996	Sherpur	BRAC	103
Muktagacha	Dec. 1994	Mymensingh	BRAC	103
Fulpur	Dec. 1994	Mymensingh	BRAC	103
Trishal	Dec. 1994	Mymensingh	BRAC	103
Sharishabari	Mar. 1995	Jamalpur	DF	103
Bhaluka	Jan. 1995	Mymensingh	DF	103
Ishwarganj	Feb. 1995	Mymensingh	DF	103
Kalmakanda	Jun. 1995	Netrokona	DF	103
Durgapur	Feb. 1995	Netrokona	DF	103
Ghatail	Apr. 1995	Tangail	DF	103
Kalihati	Aug. 1995	Tangail	DF	103
Total: 14	-	5	-	1,442

Notes: (1) SES survey was done for all the selected patients. (2) Monohardi and Shibpur *upazilas* of Narsingdi district were not a part of the stage 2 study, and hence not shown in the table.

The rural healthcare providers were traced through informal discussions with community people, and in this way, about 50 healthcare providers were purposively selected from each of the old programme *upazilas* and 150 from each of the newly intervened *upazilas.* Thus, 1,006 healthcare providers (average 62.9 per *upazila*) were interviewed from both BRAC and DF programme areas. Of them, 656 healthcare providers (265 village doctors and 391 drug-sellers) came from the BRAC TB control programme areas spread over Narsingdi, Mymensingh and Sherpur districts, while 350 (140 village doctors and 210 drug sellers) came from the DF TB control programme area spread over Tangail, Mymensingh, Netrokona and Jamalpur districts.

Major variables investigated

Interview with TB suspects and TB cases

The variables included: prolonged cough/chronic respiratory illness, duration of cough, sputum smearing and results, HSB, barriers faced in help seeking, smoking habit, membership with NGOs, occupation, education, marital status, religion, sex and age.

Household survey

This survey generated data on the socioeconomic status of the smear +ve cases as identified by both population screening survey and the routine

programme for TB control (stage 1 study), and also an equal number of non-TB case households, and TB patients already receiving treatment from BRAC and DF (stage 2 study). The variables included: household members, number of members eligible for income earning and those earning income, construction materials and size of dwelling house, ownership of dwelling house, self-rated annual income/expenditure, sex and age of TB suspects, patients and household heads, occupations of household heads, education of household head, household toilet facility, sources of water for all-purpose use, present asset base of household, annual income and expenditure of household, consumption, current savings, loans, and proximity of institutional facilities.

Interview with private healthcare providers

Length of service/practice, education, professional training, mode of treatment being practised, drugs sold, average number of patients treated/drugs sold each month, treatment of TB patients, type of treatment used for TB, list of present TB patients under treatment, knowledge, attitudes, and practice of DOTS, together with self-experience-based barriers (barriers through the providers' lens) the patients confront to access available services.

Data collection

Although the groundwork and designing of the study started in August 2004, the actual implementation in the field was accomplished during July 2005 to January 2006. Data were collected from the households and individuals using a blend of pre-tested structured and semi-structured schedules, formats, and checklists. Teams of trained interviewers conducted interviews in the three stages. Also, through the population survey at the household level, the TB suspects with prolonged cough for more than three weeks were screened, and two sputum samples (in the morning and on the spot) were collected from each suspect for smearing and testing at the designated laboratories of BRAC, located at Shibpur and Monohardi *upazilas*. Each day an interviewer, on average, interviewed about 30 households for screening TB suspects at households. An interviewer could cover 5 households in each working day to collect data of socioeconomic status (SES) of the households of TB patients detected in the stage 1 study and the patients in the stage 2 study.

Of 144,023 adult people (aged ≥12 years) surveyed, 4,611 (3.2%) reported a history of prolonged cough for more than three weeks. Of them, 4,434 gave 8,868 sputum samples (2 each, 1 in the morning and 1 on the spot) for test. Trained mobile smearers smeared these at village levels and thereafter brought to the designated laboratories of BRAC. Trained laboratory technicians of BRAC stained and tested the samples. All sputum specimens were examined for acid fast bacilli (AFB) in the field

laboratories. The required quantity of sputum was used for the preparation of slides and performing Ziehl-Neelsen staining according to standard procedures. Microscopy of the slides under oil immersion was performed.

For the stage 2 study, the interviewers visited the households of the randomly selected TB patients (1,442) under treatment using the DOTS and interviewed the household heads for collecting socioeconomic and demographic data. A pretested schedule was used for the purpose.

For the stage 3 study, the interviewers interviewed the purposively selected informal private healthcare providers using a pretested semi-structured schedule containing pre-coded and open-ended questions.

Quality control

In doing this, the following measures were implemented at various stages of data collection, processing, analysis, and management:

Preparation of field guideline

A guideline incorporating all aspects of the study, including instruments and methods for sputum and data collection was developed for the fieldworkers.

Pre-testing

Before launching the actual study, all the techniques and tools were pre-tested involving the researchers recruited for the study and then was finalised.

Training

All members at different levels were imparted an extensive training in both classroom and field setting for data collection and management with quality.

Supervision

Effective and supportive supervision was ensured on a continuous basis at all levels of the study. The investigators supervised data collection, verified the validity, accuracy, and completeness of data through spot-checking and revisiting the household and individuals at random.

Monitoring

Apart from continuous close supervision, separate groups of monitors randomly visited 10% of the households to check for accuracy and

completeness of data and ensured regular feedback to the interviewers. The monitors also observed at least one sputum collector twice a week and shared the findings to track the quality of sputum collection. The laboratory technicians monitored the field level smearing activity at least twice a week and, thus, helped improve the quality of sputum smearing.

Laboratory work

One laboratory expert from Dhaka (the capital city) paid weekly visit to check the quality of performance of the field laboratory technicians. Besides, 10% randomly selected sputum samples (n=886) were re-examined at the external quality assurance (EQA) laboratory at Uttara, Dhaka. Results of 98% of the samples re-examined were found to be consistent. A case of PTB was defined as having at least one sputum specimen positive for AFB.

Data management and analysis

All the filled-in questionnaires, and formats, along with sputum test results, were checked, edited, and coded for computer entry. The data were cleaned and analysed using the SPSS and the Stata softwares (version 11.5 and 9.2, respectively). Bivariate and multivariate analyses were carried out to reveal the socioeconomic (e.g. asset quintile, consumption, income poverty, etc.) and sex differentials in TB control in rural Bangladesh.

Construction of asset index

For assessing the socioeconomic divides in the prevalence of smear-positive PTB and help seeking behaviour and delay, an asset index was constructed using households representing general population. Several combinations of different household assets were used in trails of principal component analysis. Nineteen indicators were used in the final analysis, and the asset index is a composite value of these indicators (Table 3).

One principal component was extracted which explained 42% of variations in the indicators, and by the signs of the factor loadings, it was inferred that the component was the asset status of the households. Factor loadings show the strength of association between the indicators and the asset status, and usually a value of at least 0.30 was considered adequate (Henry *et al.* 2003). Overall Kaiser-Meyer-Olkin (KMO) sample adequacy was 0.92, which was highly acceptable. Finally, the value of asset index for each household in the general population was estimated using regression coefficients. The same coefficients were used in estimating the asset index for households of the smear-positive PTB patients.

Table 3. Results of principal component analysis for asset index

Types of assets owned	Factor loadings	KMO* measure	Scoring coefficient
Number of houses	0.57	0.92	0.07
Size of homestead (in decimal)	0.60	0.90	0.07
Number of cows-buffalos	0.40	0.83	0.05
Number of wood trees	0.44	0.86	0.06
Number of coconut/plum trees	0.52	0.92	0.07
Number of bicycles	0.49	0.91	0.06
Number of wrist watches	0.76	0.95	0.09
Number of wall clocks	0.76	0.95	0.10
Number of tubewells	0.34	0.90	0.04
Amount of gold ornaments	0.66	0.94	0.08
Number of radio sets	0.40	0.90	0.05
Number of television sets	0.67	0.92	0.08
Number of cots	0.80	0.93	0.10
Number of chairs	0.83	0.92	0.10
Number of tables	0.76	0.90	0.10
Number of *almirahs*	0.65	0.95	0.08
Number of show-cases	0.71	0.95	0.09
Number of electric fans	0.78	0.94	0.10
Number of *alna*	0.82	0.94	0.10

*KMO=Kaiser-Meyer-Olkin

These scores gave a relative picture of asset status. To demonstrate the relative poverty concentration of the households with TB patients, the general populations were ranked into quintiles by their asset scores. The same cut-off marks from their asset quintiles were used for observing the distribution of TB patients' households (Figure 2 in Chapter 2).

Besides the asset index, probit analysis was conducted to identify the determinants of smear-positive PTB prevalence. In the analysis of prevalence, probability weight factors were used. However, results without weights were also presented.

Construction of health vibrancy

For health vibrancy, we used distance from 9 sources of health care (government primary health centre, government *upazila* hospital, government district hospital, private clinic, private hospital, NGO clinic, NGO hospital, trained government doctor, and trained private doctor). We categorised the distance from each into 5 categories (0=does not have access to it, 1=have beyond 6 km, 2=have within 3-6 km, 3=have within 1-3 km, 4=have within 1 km). The scores were then added for all 9 sources. Therefore, higher score means greater vibrancy. Later, we divided it into 3 groups: low (<4), medium (4-5), and high (6 or above). These cut-offs were arbitrarily decided to keep an adequate number of frequencies in each group.

Per-capita food expenditure

The food expense of the 3-day recall period was converted into daily. Thus, per-capita food expenditure was calculated by dividing total food expenses by consumption units (number of persons taking meals, including guests).

Ethical considerations

Bangladesh Medical Research Council gave ethical clearance for implementing the study. Verbal informed consent was taken from each household and patients willing to participate in the study. The households and patients were assured that any refusal would not affect their treatment. No name of the respondents was used in data analysis. Thus, confidentiality of data was maintained strictly.

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Chapter 2

Socioeconomic divides in the prevalence of smear-positive pulmonary tuberculosis: findings from a cross-sectional study in rural Bangladesh

Fazlul Karim, Shafayetul Islam, Munshi Sulaiman, and Md. Akramul Islam

ABSTRACT

Each year, Bangladesh experiences 101 incidences of smear-positive pulmonary tuberculosis (PTB) and 45 deaths per 100,000 population. Though the sex difference is well documented in epidemiology of TB, little is known about the socioeconomic characteristics of patients. A population-based cross-sectional study, including 144,023 adult populations spread over 60 clusters, 30 each in Monohardi and Shibpur *upazilas*, was carried out. Persons with prolonged cough for more than three weeks were screened; and their socioeconomic and demographic data were collected through a household survey among 60 clusters. Two sputum samples (morning and spot) were collected from each identified TB suspect, and trained technicians examined these samples for AFB in field laboratories. Ten percent randomly selected samples were re-examined at the external quality assurance (EQA) laboratory for quality control, giving a 98% concordance. Composition of asset index, bivariate and multivariate analyses assessed the socioeconomic divides. The 'true' period prevalence of smear-positive PTB (combining both the tracers) was 122.2/100,000, higher for males than for females (171.7 vs. 74.0/100,000; p=0.000). The rates were almost identical across different asset quintiles, indicating that all economic groups are at risk of PTB. Increased per capita space of dwelling house by square feet, use of tubewell water for all purposes, and proximity to health facilities, reduced the prevalence of smear-positive PTB. One year rise in the age of

TB patients from the mean increased the probability for remaining undetected by 0.006 in the routine programme. Chances of smokers to remain undetected increased by 0.32. Need-based, especially sex and age targeted programme strategies, are essential to address the divergent sources of vulnerability of rural TB suspects and cases.

INTRODUCTION

Although Bangladesh encounters 101 incidences of smear-positive PTB and 45 deaths per 100,000 population annually (WHO 2008), many facets of the disease, including socioeconomic and demographic divides in incidence/prevalence, help seeking, etc., are not much known to help for making effective policy and management decisions.

Spearheaded by the population-based cross-sectional design, this study screened the TB suspects or cases in the population through a household survey. The study was implemented in Monohardi and Shibpur *upazilas* of Narsingdi district, with comparable socioeconomic and demographic characteristics. This enabled the researchers to detect TB suspects (a person with prolonged cough for more than three weeks) in different population groups in the community. Data collection was done between July 2005 and January 2006. Data were collected from the households and individuals using pre-tested structured and semi-structured schedules, formats, and checklist. Teams of trained interviewers visited 44,455 households in 60 rural clusters, 30 in each study *upazila*. Using the cluster interview method, household heads — generally a competent woman conversant about everybody in the household was interviewed to screen whether any member of the households had persistent cough for more than three weeks. Thus, the adult population in each household with prolonged cough for more than three weeks was screened, and two sputum samples (one in the morning and one on the spot) were collected from each suspect for smearing and testing at the designated laboratories of BRAC. The sputum samples (two for each suspect) were immediately sent to trained technicians for smearing and microscopic test. All sputum specimens were examined for AFB at two field laboratories. From these, 10% randomly selected samples (n=886) were re-examined at the EQA laboratory at Uttara, Dhaka[1], giving concordance in 98% of total sputum samples tested (n=8,868). A case of PTB was defined as having at least one sputum specimen positive for AFB.

[1] The required quantity of sputum was used for performing Ziehl-Neelsen staining standard procedure. Stained smear was tested under microscope in oil immersion.

RESULTS

Table 1 presents the salient findings of prevalence of smear-positive PTB by study *upazilas*. Persistent cough for at least three weeks was prevalent in 3.2% of the people, significantly more common in men than in women (4.8% vs. 1.7%; p=0.000).

Of the 4,611 suspects with cough for at least three weeks, 4,434 (96.2%) suspects gave sputum samples (2 each) for microscopy examination, and 83 of them (1.9%) had at least one smear-positive slide (women 1.6% and men 2.0%). The estimated prevalence of smear-positive PTB by type of tracer showed that the research screening survey-based point prevalence per 100,000 people was 52.8 (female 23.3 vs. male 83.0: female-male (F/M) ratio 0.29) whereas the routine programme detection-based period prevalence was 69.4 (female 50.7 vs. male 88.7: F/M ratio 0.59). The estimate of 'true' PTB period prevalence rate by adding up the cases found by both the tracers (research and programme) was 122.2/100,000 (female 74 vs. male 171.7; p=0.000: F/M ratio 0.44). However, the routine programme missed out 76 cases (female 17 and male 59) of total 176 cases (43.2) (Table 1). Columns in row J of Table 1 also show a substantial geographical variation in prevalence of smear-positive PTB, a higher rate in Monohardi than in Shibpur (128.4 vs. 116.4/100,000). Fewer women than men had TB in both the *upazilas*. Figure 1 shows that, for women, smear-positive PTB was more likely to occur in younger age groups (12-29 years) and for men the occurrence increased with the increase in age.

Figure 1. Prevalence of smear-positive PTB (%) by sex and age

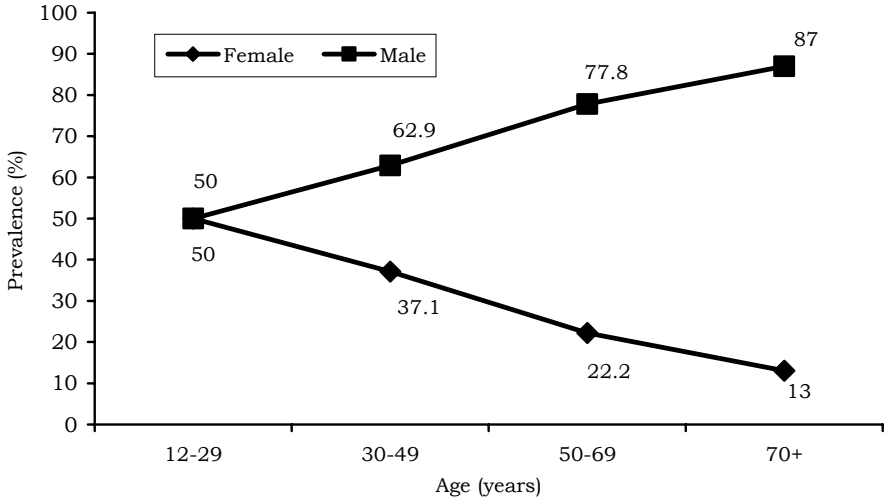
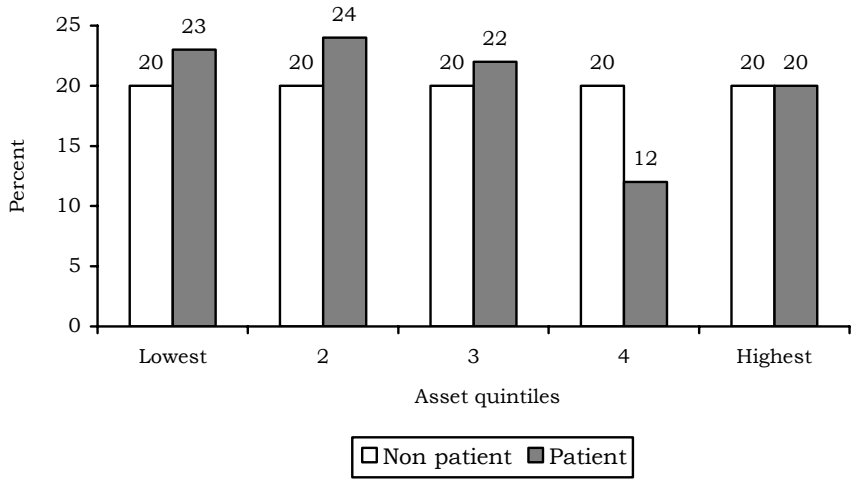


Table 1. Prevalence of smear-positive pulmonary TB and some related indicators by *upazila*

Indicators		Subdistricts						All		
		Monohardi			Shibpur					
		F	M	Total	F	M	Total	F	M	Total
1	2	3	4	5	6	7	8	9	10	11
A.	Total subdistrict population >=12 years old	35157	34154	69311	37808	36904	74712	72965	71058	144023
B.	TB suspects with prolonged cough for at least 3 weeks (% of A)	1.7 (612)	4.5 (1550)	3.2 (2162)	1.7 (638)	4.9 (1811)	3.3 (2449)	1.7 (1250)	4.8 (3361)	3.2 (4611)
C.	TB suspects gave two sputum samples (per head) for smearing (% of B)	95.8 (586)	95.3 (1477)	95.4 (2063)	98.1 (626)	96.4 (1745)	96.8 (2371)	97.0 (1212)	95.9 (3222)	96.2 (4434)
D.	SS+ cases (% of C)	1.4 (8)	1.3 (19)	1.3 (27)	1.8 (11)	2.6 (45)	2.4 (56)	1.6 (19)	2.0 (64)	1.9 (83)
E.	New suspects with SS+ cases identified by the research team	(7)	(16)	(23)	(10)	(43)	(53)	(17)	(59)	(76)
F.	Programme identified SS+ cases	(25)	(41)	(66)	(12)	(22)	(34)	(37)	(63)	(100)
G.	Total TB cases detected (E+F)	(32)	(57)	(89)	(22)	(65)	(87)	(54)	(122)	(176)
H.	Research identified cases-based SS+ PTB point prevalence (E/Ax100,000)	19.9	46.8	33.2	26.4	116.5	70.9	23.3	83.0	52.8
I.	Programme identified cases-based SS+ PTB period prevalence (F/Ax100,000)	71.1	120.0	95.2	31.7	59.6	45.5	50.7	88.7	69.4
J.	Estimated 'true' SS+ PTB period prevalence (G/Ax100,000)	91.0	166.9	128.4	58.2	176.1	116.4	74.0	171.7	122.2

F=Female, M=Male. Figures in parentheses indicate absolute cell frequency; SS+= Sputum smear-positive test. Percentages of females and males on total population aged >=12 years and above are 68.9% and 68%, respectively.

Figure 2. Prevalence of smear-positive PTB by asset quintile (%)



The period prevalence rates of smear-positive PTB were almost identical across different asset quintiles, except for the 4th quintile (Figure 2), showing an unclear association between asset status and the prevalence of smear-positive PTB. Increased per capita space of dwelling house by square feet, use of tubewell water for all purposes, and proximity to health facilities, reduced the prevalence of smear-positive PTB by -0.000004, -0.002515, and -0.000483, respectively (Table 2). Increased per capita food expenditures was associated with an increased smear-positive PTB prevalence.

Table 2. Association of SES with prevalence of smear-positive PTB (1=TB case, 0=others) (weighted)

Independent variables	Weighted		Un-weighted	
	Marginal effect	Robust z	Marginal effect	robust z
Per capita dwelling space (square feet)	-0.000004	-2.22**	-0.0009	-2.38**
Per capita food expenditure	0.000021	1.94*	0.0036	1.87*
Use of sanitary latrine (1=yes, 0 otherwise)	-0.000451	-1.48	-0.0762	-1.25
Use of tubewell water for all purposes (1=yes, 0= otherwise)	-0.002515	-2.03**	-0.2569	-1.96*
Years of schooling of household head	-0.000018	-0.57	-0.0032	-0.49
Vibrancy-medium (1=medium, 0=otherwise)	-0.000483	-1.72*	-0.1121	-1.85*
Vibrancy-high (1=high, 0=otherwise)	-0.000383	-1.33	-0.0832	-1.29
Observations	403		403	
Pseudo r^2	1.3%		3.0%	

*= significant at less than 10% level. **= significant at 5% level. SES= socioeconomic status.

Table 3. Determinants of remaining 'undetected'

Determinants	Marginal effects	(Robust t)
Length of cough	-0.001	(0.07)
Age of patient	0.006	(2.14)**
Female patient	-0.058	(0.46)
Patient is an earning member	0.099	(0.78)
Patient is household head	-0.213	(1.60)
Patient smokes	0.316	(3.13)***
Per capita food expenditure	0.003	(1.31)
Have history of TB in the household	-0.153	(1.37)
Medium health vibrancy	-0.228	(2.59)***
High health vibrancy	-0.232	(2.25)**
Observations	176	
Pseudo R^2	14%	

= significant at less than 5% level. *= significant at 1% level.

Determinants for being remained undetected (76 cases) by the routine programme were explored by performing probit analysis (Table 3). The outcome variable was whether or not the regular programme detected the patient. Holding the other variables (Table 3) constant at their means, increase of age of smear-positive PTB patients by one year increased the probability for remaining undetected by 0.006. Chances of smokers to remain undetected increased by 0.316. Medium and high health vibrancies reduced the chances for remaining undetected by -0.288 and -0.232, respectively.

DISCUSSION AND CONCLUSION

The prevalence of smear-positive PTB was not clearly associated with the asset quintiles, implying that all socioeconomic groups are likely at risk of contracting the disease. This disturbing finding contradicts the findings of other studies that conclude TB as a disease of poverty (WHO 2002; Muniyandi *et al.* 2007), necessitating a thorough study for further confirmation. However, most Bangladeshis, regardless of their asset status quo, are constantly exposed to environmental hazards and adverse consequences of extremely high population density. Because different social groups are not in isolation, they rather co-exist in the same hazardous environment, increasing the likely risks of infection and progression to active TB in either group. Thus, smear-positive PTB is termed as a community disease (WHO 2002), warranting a concerted efforts to fight against.

Increased per capita food expenditure was associated with an increased prevalence of smear-positive PTB contrary to the expectations of poverty among patients' households. It is likely that the households with TB cases have increased their food consumptions both in volume and quality as an improved dietary support to the patients. This was clearly reflected

in our dataset. The households with TB cases spent significantly more on milk, milk products, fruits, and lentils, and although insignificant, they also spent more on fish/meat. Such practice is consistent with dietary advices that vitamin-rich diets improve patients' treatment efficacy and effectiveness (University of Maryland Medical Center, undated). This evidence supports that the TB incident households spent money for quality foods, especially for patients.

However, the pathways as to how the use of tubewell water for all purposes helps reduce TB occurrence cannot be explained with the study data. Perhaps, the lifestyles of these facility users are healthy enough resulting in improved immune systems towards preventing the infection and disease occurrence.

Though the BRAC TB control programme maintains a semi-active case finding approach in its programme areas including the two study *upazilas*, the case detection rate among women is lower than among men. Compared to the routine programme, our active case finding method at household level detected even much lower cases in women than in men, implying that gender is less likely a problem in case detection by the BRAC routine programme for TB control. The present study data cannot explain actual reasons for such variations between the screening survey and the routine programme, requiring a thorough study. Though the findings of other studies support the results of our study (Salim *et al.* 2004; Kolappan *et al.* 2007), a study using the active case finding method in Vietnam traced more cases in females than in males (F/M ratio 1:0.7) (Thorson *et al.* 2004), whereas the passive case finding strategy detects excessively lower cases among females than among males (F/M ratio 1:2.7) in the same setting. This also triggered a question about the true epidemiology of TB.

The difference between women and men in the prevalence of chronic cough (1.7 vs. 4.8%) indicates a likely underreporting of TB suspects among women, but per head two sputum samples were given by almost an equal number of women and men (97 vs. 96%). Despite this, a fewer women than men tested were smear-positive. Females may have low Mycobacterium load in the lungs (less than 5,000 organisms per ml sputum, but requires more than this to be smear-positive) (Toman 1979), causing likely poor smear positivity in them.

The sex difference in the prevalence of smear-positive PTB by age groups has been a concern for TB control programme. Younger women had more occurrences while for men; it was more in older age groups. Other studies also corroborate this finding (Karim *et al.* 2004; Begum *et al.* 2001; Thorson *et al.* 2004). Studies show that women TB patients are more vulnerable due to social rejections, fear of spoiled marital life or divorce or marital prospects, and stigma causing severe psychosocial and

mental sufferings (Karim *et al.* 2007; Somma *et al.* 2008). Such vulnerability is likely to be more intense for younger women, because, in poor settings, it is the prime period for marriage which traditionally socially arranged, and disclosure of TB may jeopardise the marital prospects or disrupt the ongoing marital life. On the other side, higher occurrence in men of older age may make the process of cure difficult, necessitating sex and age differentiated programme strategies to address these two groups, demonstrating the divergent sources of vulnerability.

Determinants for being remained undetected (76 cases) by the routine programme were explored by performing regression analysis. Holding the other variables (Table 3) constant at their means, increase of age of smear-positive PTB patients by one year from the mean increased the probability of remaining undetected by 0.006. Poor home visits by the community health workers and weak interactions between them and the TB suspects may also be barrier to early detection. Thus, symptomatic search in older people should be enhanced to improve case detection rates.

Smoking is one of the major risk factor of TB, and is also likely to influence the case detection among smokers. Their chances to remain undetected increased by 0.316, implying that the smokers ignore their prolonged coughing as an outcome of their smoking but not necessarily of their getting affected by Mycobacterium. About 45% of the male cases (n=122), in this study were smokers (female none), a big risk factor of TB infections and increased relapse (Batista *et al.* 2008; Watkins *et al.* 2006). Watkins *et al.* study further indicates that cigarette consumption is a significant predictor of the sex ratio of TB notification and explained 33% of the variance in the sex ratio of the notifications. It is imperative to launch anti-tobacco programmes to reduce the burden of TB.

Easily accessible health services can promote patients' participation in control interventions (Karim *et al.* 2005), thereby increasing the case detection, diagnosis and treatment of TB cases among the vulnerable groups in particular. Consequently, we found that higher health vibrancy reduced the chances for remaining undetected of TB cases. But it is unclear as to why a substantial number of cases remained undetected despite the presence of health volunteers— one for 200-300 households. This warrants the synergies between the alternative service providers and the importance of proper functioning of the entire health systems.

Limitations

(i) Use of male interviewers might have caused females' underreporting of cough but as noted earlier, the findings showed no dropouts of females from giving sputum samples. During pilot testing of the methods and instruments, though both female and male interviewers

were equally acceptable for discoursing on the issues, the former were apparently less enthusiastic to carry out interviews with the potential TB suspects. This experience led us to involve the male interviewers. Besides, the use of only sputum microscopy as a diagnostic test in population screening survey at the community level might have not been able to capture all the cases. But we relied on it to keep consistency with the diagnostic approach of the DOTS strategy. These apparently had not so much affected the reliability of our study outcomes as the prevalence rate of our smear-positive TB was comparable with other similar studies (Salim *et al.* 2004; Begum *et al.* 2001; Balasubramanian *et al.* 2004;

(ii) The programme defines a case with two sputum slides positive or one sputum slide positive supported by radiography. The research defined a case with a sputum slide positive. This might upwardly biased our estimated prevalence; (iii) The prevalence of smear-positive PTB did not show considerable association with the asset quintiles, which contradicts the current knowledge. Our data and analysis might have limitation in proper classification of different asset groups; and (iv) The findings are generalisable only for patients and their source populations.

However in conclusion, the estimated 'true' period prevalence rate of smear-positive PTB by adding up the cases found by both the tracers (research and programme) was 122.2/100,000 (female 74 vs. male 171.7; F/M ratio 0.44). Geographical variation was evident in the prevalence of smear-positive PTB — Monohardi subdistrict shared a higher rate than Shibpur (128.4 vs. 116.4/100,000). Its occurrence was higher in younger females (12-29 years) and in older males (50 years or more).

The period prevalence rates of smear-positive PTB were almost identical across different asset quintiles, indicating an imprecise association between the asset status and the prevalence of smear-positive PTB. Increased per capita space of dwelling house by square feet, use of tubewell water for all purposes, and proximity to health facilities reduced the prevalence of smear-positive PTB.

Smokers were less likely to report their chronic cough. Rate and speed of detection were higher in areas with relatively higher health vibrancy. It is unclear as to why a substantial number of cases remained undetected despite the presence of health volunteers one for 200-300 households. This confirms the synergies between the alternative service providers and the importance of proper functioning of the entire health systems.

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Chapter 3

Treating tuberculosis with DOTS: socioeconomic determinants of case detection and delay in Bangladesh

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ABSTRACT

Directly observed treatment, short-course (DOTS) has been the major strategy to achieve the Millennium Development Goals set for tuberculosis. Higher and faster detection of case is imperative for reaching the goal of halving the incidence of this disease by 2015. Although the overall cure rate is satisfactory, the rate of case detection is often a cause of concern. This study assessed the determinants of smear-positive PTB cases being detected and the factors associated with the lag time between onset of symptom and detection. Using primary data, this study focused on the socioeconomic determinants of tuberculosis case detection and its speed in the rural areas of Dhaka division in Bangladesh. The results suggest that patients who were relatively older had both lower and slower detection. Similar pattern was observed among smoker-patients. Health vibrancy, in terms of having had alternative formal health providers, of patients' locality could have positive influence on detection. No apparent difference in gender or economic status for accessing DOTS services was observed though the disease was more prevalent among the poorer people. Finally, the process of programme implementation had influenced the detection of cases.

INTRODUCTION

Many recent studies on tuberculosis, as does this paper, start by quoting a few numbers to demonstrate the importance of the issue, e.g.

Mycobacterium tuberculosis has infected one-third of the world's population, affects 9.2 million additional people each year and causes death to 1.7 million people annually (WHO 2008). Though these numbers change every year, tuberculosis remains one of the leading killers of adult worldwide. After a decline in the pervasiveness of tuberculosis globally, the trend reversed in the later part of the twentieth century (Gandy and Zumla 2002).

Resurgence of TB has been taken up as a serious cause of concern and targets had been set, as part of the MDG, to achieve a detection rate of 70% and cure rate of 85% by 2005 to reduce the incidence by half in 2015 compared to 1990. Despite the considerable progress 53% detection rate and 82% cure rate of detected cases in 2004 — acceleration is required to achieve the targets of 2015 (WHO 2006).

Many studies have been conducted to facilitate the process and to revise the strategies for tackling the disease successfully. The issue has been looked at from different perspectives and in different contexts, which range from biomedical explanations to emphasis on environmental, social, economic, political and cultural details (Ming-Jung Ho 2004). Prevalence and treatment seeking of this disease are often strongly associated with poverty and inequity (Grange and Zumla 2002; WHO 2005), gender (Uplekar *et al.* 2001), urbanization (Dierdinando 1999), migration (Baussano *et al.* 2006), drug addiction (Sadeghi-Hassanabadi *et al.* 1998). More recently human immunodeficiency virus has also become a very significant risk factor though mostly in the African context.

This contagious disease spreads through smear-positive cases as the major vehicle. If untreated, each smear-positive patient may infect, on average, more than 10 persons annually (Styblo 1991). After an extensive literature survey, Murray and Nardell (2002) have argued that recent acquisition of the disease has a relatively high contribution to TB burden. Therefore, both detection rate and speed of detection are important to reduce the rate of transmission. Farmer (1997) has argued about the importance of considering the socioeconomic factors in this disease.

DOTS has been the core component of the strategies to achieve the goals. Endorsing the DOTS strategy for TB control at the World Health Assembly in Geneva in 1991, Bangladesh formally established the National Tuberculosis Control Programme in 1993. Service delivery in the NTP is done through the Government-run centres and NGO clinics. Eleven NGOs provide DOTS services either directly or through sub-awardees under the NTP (Guda *et al.* 2004).

The objective of this paper is to look at the case detection and healthcare seeking for TB in Bangladesh. We tried to identify the systematic differences in the characteristics of the 'detected' and 'undetected'/'new'

cases, and the factors associated with the delay in detection. By the term 'delay,' we mean the time lag between onset of symptom and visiting the DOTS providers for treatment. This study also addresses the questions of who are the patients being treated and what is their treatment seeking behaviour to better understand the delay.

Data

The study was based on two sets of data. Both the datasets used the similar survey instrument and their difference was in the sampling frame only.

One set of data was used for exploring the detection of cases. For this purpose, data were collected from two subdistricts in Bangladesh. These two subdistricts were randomly selected from a list of all the 6 subdistricts in Narsingdi district. Following the cluster sampling method, a list of villages in these two subdistricts was prepared and 30 of these clusters were randomly selected for the study. In total, 144,023 adults aged ≥12 years, from 44,455 households in these clusters were screened to identify TB suspects with more than three weeks of cough. All the adult members who reported more than 3 weeks of prolonged cough were identified as TB suspects. One hundred seventy six smear-positive PTB cases were identified, of whom 100 were already detected and brought under treatment by the routine DOTS programme of BRAC and the remaining were new cases identified in the research project. We call these new cases were 'undetected'. The detailed household questionnaire was administered for all the 176 cases.

The other data set covered only patients who were receiving treatment under the DOTS strategy of BRAC and DF. This survey was conducted in 14 subdistricts, which were randomly selected from a list of all rural subdistricts in Dhaka division. Of these 14 locations, BRAC is the DOTS delivery agent in 7 subdistricts, and the other 7 areas were served by the DF. This difference of implementing agencies gave us the opportunity to explore the efficacy of alternative processes[2]. In each of the subdistricts,

[2] The basic difference between BRAC and DF is in their workers for case detection and service delivery. BRAC use their extensive outreach through the health volunteers (*Shasthya Shebika* or SS) in the villages. These SSs, selected from within the villages, are trained on 10 common diseases. Each of them is assigned for 200-300 households surrounding her house. Besides giving free health advices, the SSs sell medicines to them for the 10 diseases and other basic health commodities e.g. sanitary napkins, family planning stuffs, etc. There are over 70,000 such SSs, and they are involved in different essential healthcare activities, such as health and nutrition education, water and sanitation, basic curative services for 10 common diseases, family planning, pre and post natal care, immunization, vitamin A, TB control, etc. The SSs carry out semi-active TB case finding activity, and refer the suspects for sputum smearing, initiate DOT at community, ensure follow-up of the TB patients under treatment. On the other hand, the DF depends on village doctors for both case detection and treatment. Patients come to the doctors' office for DOT.

103 patients were randomly selected from a list of all the patients who were enrolled for DOTS in the last 8 months before the survey.

RESULTS

In this paper, findings are presented in four sections. First, the profiles of the 'detected' and 'undetected' cases are compared using the first set of data (presented in the Chapter 2). The socioeconomic status of the patients currently being treated, their treatment seeking behaviour and the determinants of delay were explored subsequently based on the second set of data.

How do the 'undetected' cases differ from the 'detected' ones?

Table 1 presents a comparative picture of the TB cases identified by the regular case identification mechanisms of BRAC and DF and who were not. No significant difference was observed between the two types of cases in terms of the mean duration between the onset of symptom and the survey. Among the other variables, they differed in age, sex, employment status, smoking habit, and incidence of TB previously among the family members, their participation in NGO, and health vibrancy. On average, the TB cases that remained 'undetected' were 6 years older than the 'detected' cases. Contrary to the general understanding of gender discrimination in healthcare, we found that 37% of the 'detected' cases were female compared to only 22% of the 'undetected' cases.

One would expect that, in a poor country, if intra-household health inequality persists, the health of earning members would get priority over the health of non-earning members. However, in our survey, we found that 49% of the 'detected' cases were earning members compared to 64% for the 'undetected' cases. In terms of their household headship, there was no variation between the two groups of cases. However, about 58% of the detected and 68% of the undetected TB cases were household heads. With an average family size of around 5, only 20% of the population was household heads.

Table 1. Characteristics of 'detected' versus 'undetected' smear positive patients

Characteristics	'Detected'	'Undetected'	Difference
Number of cases (n)	100	76	NA
Time (average in weeks) from symptom onset	19.55	19.63	-0.08
Patients' age (average in years)	45	51	-5.96**
Patients' sex (% female)	37	22	14.63**
Patient is an earning member (%)	49	64	-15.47**
Patient is the household head (%)	58	68	-10.42
Patient is an NGO member (%)	40	33	7.10
Patient is a smoker (% of only male)	6	32	-29.27***
Have history of TB in the family (%)	19	8	11.10**
Have a BRAC member in the family (%)	17	8	9.10*
Per capita daily food expenditure (average Tk.)	26.73	29.51	-2.78
Value of asset index (average)	0.21	0.20	0.01
Living in low health vibrant area (%)	29	53	23.6***

Notes: NA.= Not applicable. *= Significant at less than 10% level. **= Significant at 5% level. ***= Significant at 1% level. Tk.= Taka, Bangladesh currency.

The extent of smoking was much higher among the 'undetected' cases than among the other group. The difference could be an outcome of different causality. The smokers might have ignored their coughing as an indication of suspected TB and/or they might have stopped smoking once identified as a TB patient. Having a previously identified TB patient as a member of family was likely to make other members aware of the disease and consequently influencing the chances of being 'detected'. Interestingly, TB suspects from the areas of low health vibrancy, in terms of distance from different health service providers, were more likely to remain undetected.

To explore the relative influence of the factors identified in the previous Table, the results of regression are presented in Table 2. The outcome variable was whether or not the patient was already detected in the regular case identification mechanism before the survey. The three characteristics that had significant influence on the probability of detection were the age of the patient, their smoking habit, and health vibrancy of the area. Holding the other variables constant at their means, increase of the age of TB patient by one year increased the probability of remaining 'undetected' by 0.6%. Moreover, about 60% of the 'undetected' cases were at least 50 years old. Therefore, for improving the detection rate, the programme needs to be more careful about the symptoms among the older people.

Table 2. Determinants of remaining 'undetected'[3]

Determinant	Marginal effects	(Robust t)
Length of cough	-0.001	(0.07)
Age of patient	0.006	(2.14)**
Female patient	-0.058	(0.46)
Patient is an earning member	0.099	(0.78)
Patient is the HHH	-0.213	(1.60)
Patient smokes	0.316	(3.13)***
Per capita food expenditure	0.003	(1.31)
Have history of TB in the HH	-0.153	(1.37)
Medium health vibrancy	-0.228	(2.59)***
High health vibrancy	-0.232	(2.25)**
Observations	176	
Pseudo R^2	14%	

= Significant at less than 5% level.*= Significant at 1% level. HHH=Household head.

Socioeconomic status of patients being treated with DOTS

One of the objectives of the study was to explore the socioeconomic status of the patients to get a sense of whether there was any divide in accessing the DOTS service. For this, an asset index was constructed using the national Household Income Expenditure Survey (HIES) of 2005 (BBS 2007), which was carried out on a nationally representative sample covering both rural and urban areas. Since the DOTS patient survey was conducted in the rural areas of Dhaka division, for a greater comparability, we took only those households that represented the rural areas of Dhaka division in the HIES (1,720 households).

An asset index was formulated using 8 different indicators for these 1,720 households. Three issues were considered in the selection of indicators for asset index, viz. (a) the indicators were reflective of asset status, (b) the information on DOTS patients was available in our survey, and (c) the indicators were less sensitive to the instrument design. Different combinations of such indicators were used in trails of principal component analysis (Henry *et al.* 2003). Finally, 8 indicators were used for forming the index with the selected households from the HIES. Table 3 presents various estimates of the asset index that has been used.

One principal component was extracted, and by the signs of the factor loadings, it was inferred that the component was the asset status of the households. Factor loadings show the strength of association between the indicators and the asset status, and usually a value of at least 0.30 was considered adequate (Henry *et al.* 2003). Overall KMO sample adequacy was 0.84 which is highly acceptable. Finally, the value of index for each household was estimated using regression coefficients reported

[3] This analysis has also been presented in the previous Chapter in the context of prevalence.

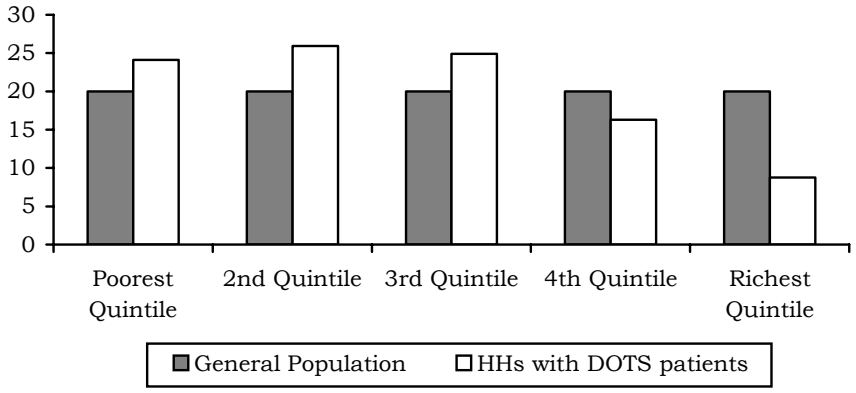
in the last column of Table 3. Using these same coefficients, asset scores were estimated for the households in our survey of patients.

Table 3. Results of principal component analysis for asset index

Variables	Factor loadings	KMO* measure	Scoring coefficient
Have cassette player	0.56	0.86	0.18
Have electric fan	0.70	0.81	0.22
Have television	0.69	0.82	0.22
Have wall clock	0.65	0.88	0.21
Years of schooling of HH head	0.60	0.82	0.19
Per capita clothing expenditure	0.63	0.84	0.20
Type of latrine used	-0.56	0.87	-0.18
Material of wall of living room	-0.60	0.88	-0.19

* Kaiser-Meyer-Olkin measure for sample adequacy. HH=Household

Figure 1. Asset quintiles for the general population and the HHs with DOTS patients



These scores gave a relative picture of poverty/asset status. To demonstrate the relative poverty concentration of the households with TB patients, the general population (i.e. households from the HIES) were ranked into quintiles by their asset scores. The same cut-off marks from their asset quintiles were used for having the distribution of the households of TB patients (Figure 1). Clearly, these households were concentrated in the lower quintiles, and only 9% of them belonged to the richest quintile.

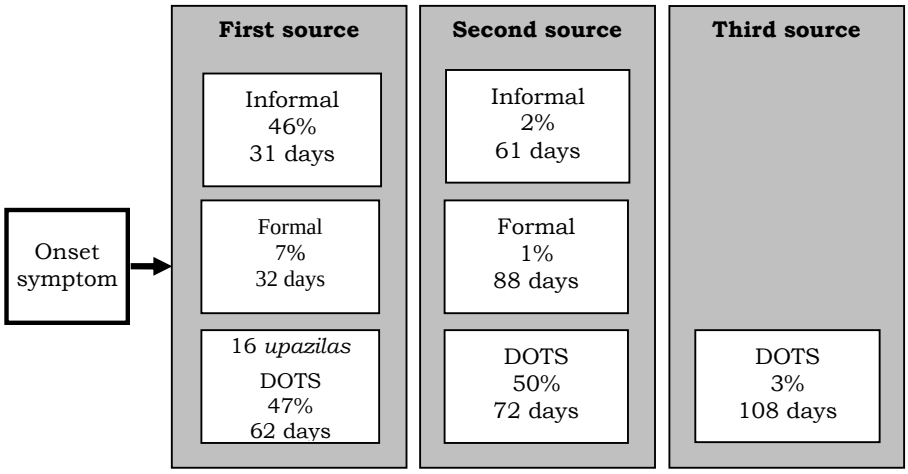
Treatment seeking behaviour of DOTS patients

The TB patients surveyed were treated using the DOTS strategy. However, they came to the DOTS facilities through various pathways

which had an implication on the time taken for getting enrolled for DOT. Initially, the patients relied on remedies from home, friends, or self-care. Here, we looked at the sources of treatment outside home. The sources from where these patients received treatment had been categorised as informal[4], formal and DOT. We looked at the extent of the use of these sources of treatment, the characteristics of users of different sources, the reasons for going to these sources, and types of treatment received.

Figure 2 presents the percentage of patients using different sources and the respective averages of time lag between the onset of symptom and treatment seeking. After the onset of symptom (symptom for which received treatment), about an equal proportion of the patients received treatment from the informal sources and DOTS facilities. They waited, on average, for 31 days before visiting the informal sources and 62 days before visiting the DOTS facilities when these were their first treatment sources outside home. About 97% of the patients started receiving DOT as their first or second source of treatment. It took, on average, 10 additional days, when the patients came to the DOTS facilities after receiving treatment from one or more source.

Figure 2. Sources of treatment used and time taken from onset



[4] Informal sources of treatment, includes drug seller, herbal, unqualified doctors, homeopathic, magical healing, village doctors, and religious treatments. The formal sources of treatment, includes government hospital, government doctors, government health workers, TB clinic, private/NGO hospital, private/NGO doctors, and NGO health workers.

Nonetheless, the fact was that a good proportion (46%) of the TB patients received treatment from informal sources and, at an early stage showed the possibility of developing a referral system of TB suspects by these sources. To develop specific strategies for this, we need to look at the dynamics of the service providers. They may not be referring TB cases because of their lack of awareness, fear of loosing patients, etc.

We looked at the use of different sources for first-time treatment other than self-care or home-care by different patient groups (Table 4). The significant difference was observed only in the asset distribution of the patients. Of the three groups (poor bottom two quintiles, middle 3rd and 4th quintile and rich top quintile), patients from rich households were more likely to visit the formal sources for treatment.

Both asset distribution of the DOTS patients and preference of sources by asset groups gave some indication of accessibility of services for the relatively poorer patients. Therefore, we need to look at the reasons for visiting these different sources. The reported reasons for taking treatment from different sources were ranked in terms of frequency (Table 5). About 38% of the patients who received treatment from the informal service providers considered their health problem a trivial one. Familiarity with the provider and geographical proximity were also among the frequently reported reasons for visiting the informal healers.

Table 4. Choice of first treatment source by different variables

Sources		Informal	Formal	DOTS	Chi-square (p-value)
Economic status	Poor	47	6	47	9.75
	Middle	44	7	49	0.05**
	Rich	43	13	44	
Sex	Male	46	7	48	0.90
	Female	45	8	47	0.64*
NGO in operation	BRAC	45	7	48	0.72
	DF	47	7	47	0.69*

*=Significant at less than 10% level. **= Significant at less than 5% level.

The main reported reasons for taking DOTS were quality of treatment and low cost. Suggestion of the SS (*shasthaya shebika* or health volunteers) and other health providers (HP) was the most frequently reported reason in the case of taking DOT as the second treatment source. The same reason was also reported by 15% of the patients who started taking DOT as the first-time treatment outside their homes. Overall, about 20% of the patients reported suggestions of SS/HP as the reason for coming to DOTS. While the actual figure of referrals by them was likely to be higher, there is a scope of further strengthening the suspected case identification to improve detection.

Table 5. Major reasons for source preference

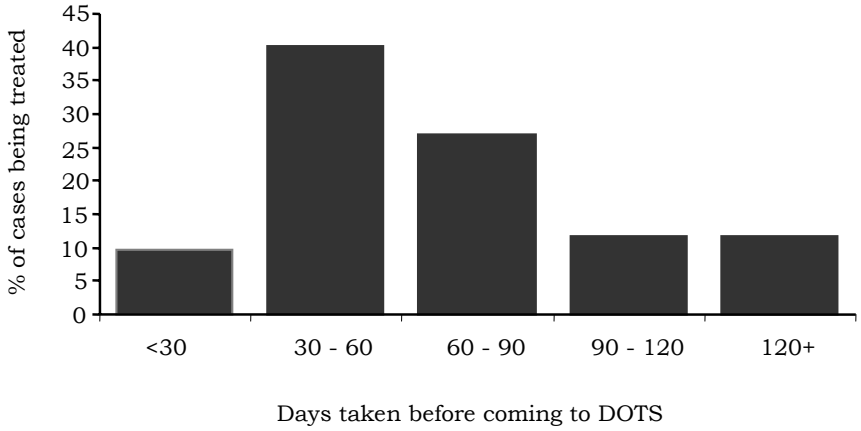
Ranks of reasons	First source			Second source
	Informal	Formal	DOTS	DOTS
First	Simple disease (38%)	Family/Relatives suggested (24%)	For quality treatment (21%)	SS/other HP suggested (27%)
Second	Familiarity with provider (26%)	Simple disease (19%)	Low cost (19%)	For quality treatment (15%)
Third	Geographical proximity (16%)	Complicated disease (14%)	SS/other HP suggested (15%)	Low cost (11%)

Moreover, while the patients take treatment from these sources without proper diagnosis they waste valuable time. When asked about the treatments received from the non-DOTS sources, about 36% reported that they were prescribed medicine for cough. Besides, 15% took medicine for fever, and 40% took medicine, for both cough and fever. The misuse of antibiotics may have serious health consequences.

Delay to DOTS clinics and the determinants

On average, the time lag between onset of symptom and seeking treatment from the DOTS facilities was 68 days (with a standard error of 1.1). As shown in Figure 3, about 40% of the patients visited the DOTS facilities within 30-60 days after the onset of symptom. However, there is a scope of speeding up the process since about half of the patients took more than 60 days to seek treatment from the DOTS providers.

Figure 3. Distribution of time lag between onset of symptom and visiting the DOTS facilities



The determinants of the delay are presented in Table 6. There were some similarities in the determinants of case detection and delay. Older patients were not only less likely to be detected but also they took slightly longer time to be detected. The smokers were likely to make a delay for additional 8 days compared to the non-smokers. These figures reflect that the older patients and smokers are likely to ignore their symptoms of TB.

Per capita expenditure of the patients, a proxy for welfare status, did not have any significant association with the delay. This reflects an equal access to usage of the DOTS for the patients across different well-being groups. Patients who took treatment from sources other than the DOTS providers spent about 12 days in the clinical process. This figure was highly significant, showing a stronger opportunity of faster detection by involving the other health service providers. A qualitative study, which was a component of this research project, showed the lack of awareness among the health providers, especially the informal ones, about DOTS. Notably, delay was lower in the areas where BRAC is providing DOT compared to the area under the DF. On average, delay was lower in the BRAC area by about 9 days.

Table 6. Determinants of lag time from onset of symptom to enrolment in DOTS facilities (in days)

Independent variables	Coefficients
Age of patient	0.12 (1.67)*
Education of patient (years of schooling)	–0.08 (0.24)
Patient is an earning member	–6.16 (2.11)**
Patient is a female	–2.59 (0.79)
Patient is a smoker	7.85 (2.21)**
Per capita food expenditure	–3.36 (1.26)
Patient came direct to DOTS	–12.23 (5.63)***
BRAC operation area	–8.77 (4.11)***
Have government health centre nearby village	–4.75 (2.10)**
Have NGO clinic nearby village	–14.15 (6.70)***
Constant	96.95 (10. 38)***
Observations	1435
R-squared	8%

*= Significant at less than 10% level. **= Significant at less than 5% level. ***= Significant at 1% level. Robust t in parentheses.

DISCUSSION AND CONCLUSION

The study broadly looked at three themes of PTB treatment by the DOTS strategy, viz. factors associated with detection of cases, healthcare seeking patterns of the detected cases, and the determinants of delay to the DOTS system.

One would expect that the unidentified cases are the relatively recent ones with the understanding that a portion of them would have been detected through the existing system in due course of time. However, the length of time between the onset of symptom and the survey did not show such pattern. The average duration of symptom of both types of cases was similar. Although the onset of symptom cannot differentiate between acquisition of the disease and activation of the old cases, it clearly negates any claim that time is the principal cause for these cases for remaining 'undetected'.

The older people are more likely to ignore their health problems. Results of qualitative study in rural Bangladesh showed that old age and ill-health were considered as inseparable, and the older people often ignore these problems (Biswas *et al.* 2006). Some other studies found that receiving healthcare was driven more by socioeconomic status and age (Young *et al.* 2006; Ahmed *et al.* 2005). However, the present study clearly showed a strong effect of age on chances of receiving treatment for TB patients.

Different studies have shown that the case detection rate is lower among female TB cases compared to male TB cases. The present study results contradict with those findings. Here, a larger proportion of female among the 'detected' patients than among the 'undetected' group was observed. Given that the persons involved in the case detection system are almost exclusively female, absence of such bias against the female is not surprising.

Whether or not the TB patients presently smoke has a highly significant association with their 'detection' status. Smoking is established as one of the major risk factors of TB. However, it is also highly likely to influence the detection. There are chances that the smokers ignore their prolonged coughing as an outcome of their smoking but not necessarily of their getting affected by TB.

For case detection and implementation of DOTS, the health volunteers of BRAC are the field agents. Significant influence of health vibrancy on case detection, despite having the volunteers in almost every village, is remarkable. This demonstrates the synergies between the alternative service providers and the importance of proper functioning of the whole health system.

Findings from the socioeconomic profile of the patients are quite in line with the accepted association of the disease with poverty. Moreover, it also indicates that the poor can access the existing DOTS services. On the service recipients' end, despite the multitudes of efforts for awareness building about the disease, about half of them were still relying on the informal healthcare providers as, thus, the first source of treatment. Building an active referral system with the informal providers is essential for improving detection.

According to the estimates, we found that the age of patients was not only associated with lower likelihood of being detected but also with longer delay. Similar studies in Gambia and Bangladesh also showed that young TB patients had shorter delay (Lienhardt *et al.* 2001; Karim *et al.* 2007). If the patient is an earning member, the delay is, on average, 6 days lower than the delay of the non-earners. We did not find any difference in detection probability or in lag time between the male and female patients. This is quite in contrast to different other studies, e.g. Balasubramanian *et al.* (2000) in Kerala, India, Needham *et al.* (2001) in Zambia. A study (Lienhardt *et al.* 2001) in Zambia found no influence of sex on the delay.

The difference in average delay between the subdistricts served by BRAC and DF is the reflection of the difference in case detection mechanisms between the two providers. BRAC has greater proximity with people through their health volunteers. These agents, where available, could be made part of TB suspect identification even if the principal responsibility of service delivery lies with other agencies. Possibility of developing broader partnerships is also demonstrated by the fact that delays are significantly lower if there is a government or NGO health service centre nearby the village.

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Chapter 4

Role of rural private healthcare providers in detecting and treating tuberculosis cases

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ABSTRACT

This cross-sectional study explored the role of rural healthcare providers, such as village doctors and drug-sellers, in detecting and treating TB patients in rural Bangladesh. The study was conducted in 16 randomly selected *upazilas* of Dhaka division under TB control programme areas of two NGOs, such as BRAC and Damien Foundation (DF). One thousand and six purposively chosen rural healthcare providers were interviewed using the pre-tested schedule containing structured and semi-structured questions. The major variables studied were basic profile of rural health providers, initiative taken for detection and treatment of TB cases, nature of treatment, knowledge, and practice of DOTS strategy for TB control. The findings showed that two-thirds (66.4%) of the providers had no professional degrees from formal or informal institutions, although they had been practising on providing treatment for, on average, 10.8 years. Over a half (52.5%) of the providers neither took any initiatives for the diagnosis of TB nor referred the cases to the DOTS facilities; despite they found TB suspects among the patients seeking care from them. Some village doctors claimed that they treated TB suspects and cases with antibiotic or cough syrup. A vast majority (72.5%) of the providers never heard of the community-based DOTS strategy for TB control or about its objectives. Only 4.2% of the village doctors claimed that they applied DOTS for TB treatment. However, overwhelming majority of the village doctors showed their interest in implementing the DOTS strategy, if they are imparted practical training on it. Thus, recognizing the importance of the role of the informal village doctors and their popular acceptance

among the people, the national tuberculosis programme should provide training to these vast human resources, thereby using them in the TB control initiatives.

INTRODUCTION

Given the pluralistic health service delivery systems, apart from the public sector, a large private sector is actively engaged in health service delivery in Bangladesh. In rural areas, unqualified and unregistered informal private providers are the dominant healthcare providers, and people largely rely on them (Claquin 1981; Sarder and Chen 2003). Thus, they provide 60% of treatment services in rural Bangladesh **(**Cockroft *et al.* 2007**)**. Although a majority of these care providers have no formal education in medicine (Ahmed 2005), they are the most popular, especially among the poor and disadvantaged (World Bank 2003, Ahmed *et al.* 2005), because their influence is deeply embedded in the local community and culture, and they are easily accessible, and they render inexpensive services to the villagers. The quality of their service is often poor (Mamun *et al.* 2006; Bhugha 2003; Roy 1997; Rahman 1996), and most of them prescribe inappropriately in terms of drugs, dose and duration. In the case of TB, people most likely seek care from these unqualified but popular health providers, but how they do diagnose and treat TB cases is unknown. Thus, inappropriate treatment of TB may increase drug resistant TB cases, complicating the pathway for effective TB control. Though many rural people die as a result of their inappropriate care or incorrect treatment in Bangladesh (Rahman 1996), people seldom ignore their influence and role. However, the formal and public health systems do not recognise or regulate their role in health service delivery.

Basic features of rural private health providers

Diverse categories of private health providers exist in rural Bangladesh. Most important among others are: traditional healers (*kabiraj, totka, faith healers*), homeopathic practitioners, village doctors (mainly *Palli Chikitsoks/gramdakter*), and drug sellers who sells allopathic medicine on demand over the counter (Table 1).

In partnership with the Government of Bangladesh (GoB), different non-governmental organizations (NGO) including BRAC, have been engaged in TB control using the DOTS strategy. Active engagement of the private health providers' network may enhance the successfulness of the DOTS interventions, especially in rural Bangladesh.

Table 1. Healthcare providers in rural Bangladesh by types of training and service provided (Source: Ahmed 2005)

Provider	Status of training received	Types of service provided
Village doctors (Rural medical practitioners [RMP], and PCs)	Majority have (RMPs) have 3-6 months training from semi-formal, unregulated private organization of doubtful quality. A few (*PCs*) have had one year training from a short lived government programme in the early 1980s (PC training programme) which stopped in 1982	Allopathic
Drugstore sales people/ Drug vendors/drug-sellers, village quack	No formal training on dispensing, none of them is trained in diagnosis and treatment; some learn treatment; some learn treatment through apprenticeship and working in drug store ('quack')	Allopathic; in addition to dispensing, they also diagnose and treat
Homeopath	Mostly self-educated and some possess recognized qualification from government or private homeopath colleges	Homeopathic

Note: RMP= Rural Medical Practitioners. PC= *Palli Chikitsoks*

However, their knowledge and practice of the DOTS strategy is poorly understood, necessitating a systematic study for generating sufficient evidences regarding different aspects of the rural informal health providers. Thus, BRAC Research and Evaluation Division in cooperation with the DF carried out a study to this end. The research findings would help the policy makers understand the needs of and ways to engage the informal healthcare providers in NTP for an effective TB control.

OBJECTIVES

The general objective was to explore the role of private health providers in detecting and treating TB patients in the rural community along with their knowledge, attitudes and practice of the DOTS strategy.

The specific objectives were to explore:

1. the profile of rural healthcare providers (in terms of education, professional trainings, years of professional involvement, etc);
2. the role of the providers in detecting/diagnosing TB cases and their mode of TB treatment;
3. the number of TB suspects/cases seeking care from the rural healthcare providers; and
4. the provider's knowledge of and practice on DOTS for treating TB.

MATERIAL AND METHODS

Study area

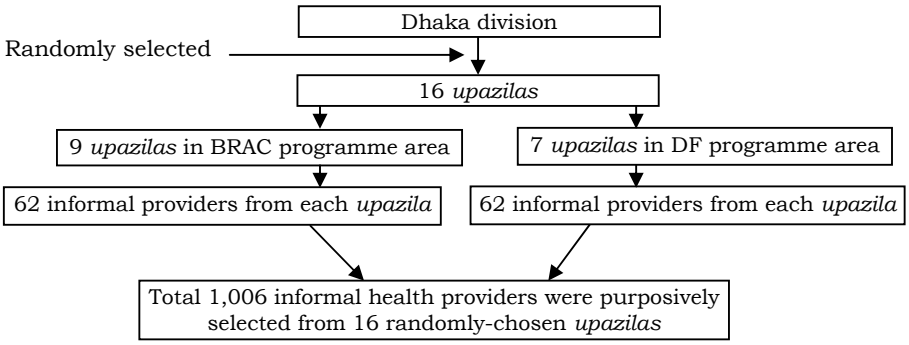
The study was implemented in 16 randomly selected *upazilas* of Dhaka division spread over 7 districts: 9 from BRAC TB programme area (Monohardi, Shibpur, Muktagacha, Trishal, Fulpur, Sherpur, Sreebardi, Nakla, and Nalitabari), and 7 from the DF TB programme area (Kalihati, Ishargonj, Bhaluka, Kalmakanda, Durgapur, Sharishabari, and Ghatail) (Figure 1). The areas were chosen on the basis of: (a) operational and logistic conveniences and (b) duration of TB control programme implementation by BRAC and DF. However, the study areas were divided into two groups such as old and new, by the longevity of programme implementation. The old areas referred to the areas where the TB control programme has been implemented for 10 years or more (Muktagacha, Trishal, Fulpur, Sherpur, Sreebardi, Nakla, Nalitabari, Kalihati, Ishargonj, Bhaluka, Kalmakanda, Durgapur, Sharishabari, and Ghatail), and the new areas referred to the areas with less than 10 years of programme implementation (Monohardi, and Shibpur).

Study sample and sampling methods

Different types of healthcare providers were included in the study, viz. allopathic drug shop-keepers (henceforth called drug-seller); and village doctors, locally known as *Palli chikitsok/gram dakter,* currently providing healthcare services to the community in the study areas. The rural healthcare providers were traced through informal discussion with community people, and in this way, over 62 healthcare providers were purposively selected from each *upazila.* Thus, 1,006 health providers were interviewed from both BRAC and DF programme. Of them, 656 health providers (265 village doctors and 391 drug-sellers) came from BRAC TB control programme areas spread over Narsingdi, Mymensingh and Sherpur districts, while 350 (140 village doctors and 210 drug sellers) came from DF TB control programme areas spread over Tangail, Mymensingh, Netrokona and Jamalpur districts.

The DF trained and engaged the village doctors in the DOTS strategy for detecting and treating TB. They detect and refer TB suspects to the DF's microscopy facilities usually at government *upazila* health complex (UHC), administer DOT to the smear-positive cases (a patient is to swallow drugs in front of them daily over the 6-month period of treatment). The trained village doctors also ensure follow-up of patients under treatment.

Figure 1. Flow-chart showing study *upazilas* and sample selection procedures



Data collection

Using a pretested questionnaire containing structured and semi-structured questions, the trained interviewers conducted interviews with the respondents. The variables included: length of service/practice, academic education, professional training, mode of treatment being practised/drugs sold, average number of patients treated/drugs sold each month, treatment of TB patients, and knowledge, attitudes and practice on DOTS. All interviews were held at the chambers or drug store shops of the respondents during October 2005 to January 2006. The duration of each interview was 30-45 minutes. Immediately after the completion of the session, both team members checked the notes together to assess the completeness of data. The principal investigator supervised and managed the whole survey activity.

Data processing and analysis

Data were edited, coded, and cleaned in the SPSSWIN (version 11.5) for analysis. Mean was computed for continuous variables. Multiple responses were considered during analysis. Two researchers translated, read, and re-read narrative data independently and organized findings thematically in matrices and thereafter shared mutually. Thus, the narrative data were analysed and interpreted.

RESULTS

Table 2 shows the basic profile of rural health providers. The overall mean year of general schooling of all the health providers was 11 years with no difference between the NGO areas. The aggregated mean years of experience in service delivery was 10.8 years, (highest 16 years. and

lowest 7 years), and it was slightly higher for the BRAC area. However, drug sale was the main task of the drug-seller category of providers.

Table 2. Basic profile of health care providers by type and NGO area

Parameters	Provider type by NGO area						All
	BRAC			DF			
	Drug seller	Village doctor	Total	Drug seller	Village doctor	Total	
Years of schooling							
6-10	61.0	42.0	54.0	58.0	49.0	54.0	54.0
11 Plus	39.0	58.0	46.0	42.0	51.0	46.0	46.0
Mean ±SD	10.86±1.7	11.47±1.6	11.11± 1.7	10.98±1.8	11.36±1.7	11.13±1.8	11.11±1.7
Mean years of experience (Mean±SD)	8.58±7.9	15.71±10.9	11.46±9.9	7.36±6.8	12.9±8.7	9.58±8.1	10.80±9.3
N	391	265	656	210	140	350	1006

Table 3 shows that the village doctors chiefly delivered allopathic and homeopathic treatment services. Some health providers were engaged in both providing treatment and selling drugs. Only 33.6% of all types of health providers had professional training of more than 1 month, higher in the BRAC area than in the DF area (37% vs. 27%). More village doctors than the drug-sellers had received professional training. Besides, a substantial number of them also received training on how to manage diarrhea, acute respiratory infections, fever, etc.

Table 3. Healthcare service delivery and training profile of healthcare providers by types and NGOs

Parameters	Provider type by NGO area						
	BRAC			DF			ALL
	Drug seller	Village doctor	Total	Drug seller	Village doctor	Total	
Nature of main service delivered (%)							
Drug-selling	94.9	0.0	56.6	96.2	0.0	57.7	56.9
Allopathic treatment	0.0	75.5	30.1	0.0	82.1	32.8	31.3
Both drug selling and treatment	5.4	10.9	7.5	3.8	10.7	6.6	7.1
Homeopathy	0.0	13.6	5.5	0.0	7.1	2.9	4.6
Ever received any professional training (> I month) (%)[5]							
Yes	5.3	83.8	36.9	3.8	62.9	27.4	33.6
Type/name of training %							
MA/MW	4.8	1.4	1.6	0.0	1.1	1.0	1.5
Pallichikitshak/LMAF	90.5	86.9	87.2	100.0	87.5	88.5	87.6
Homeopathy	0.0	11.3	10.3	0.0	9.1	8.3	9.7
Others	4.8	1.8	2.1	0.0	3.4	3.1	2.4
Short training (max 7 days) (%)							
CDM	16.4	66.0	36.4	16.2	67.1	36.6	36.5
FP, hygiene, and others	7.4	30.9	16.9	6.2	42.9	20.9	18.3
No training	77.5	12.8	51.4	78.6	7.1	50.0	50.9
N	391	265	656	210	140	350	1006

Note: Multiple responses considered.

[5] Regarding training majority could not show the certificate and mostly received training from unregulated private institutions. CDM (common disease management): Training on diarrhoea, pneumonia, common cold, fever, etc. They also received training on family planning orientation, hygiene and different diseases and DOTS. A majority of the training duration less than seven days and was organized by local private institutions of dubious quality organized by local private institutions.

Table 4 shows the basic socioeconomic profile of patients who consulted the health providers for help/treatment or buying drugs over the counter for their health problems. Almost all providers (ranged from 94.8% to 98.5%) reported that patients from all socioeconomic strata such as rich, poor, educated, and illiterate sought help from them.

Table 4. Socioeconomic characteristics of patients who generally visited health providers (providers' version)

Socioeconomic characteristics of patients	Type of health providers by NGOs (%)				
	BRAC		DF		
	Drug-seller	Village doctor	Drug-seller	Village doctor	All
All	98.6	96.6	96.0	96.0	97.0
Rich	99.7	93.6	89.5	91.4	94.8
Poor	99.7	99.6	100.0	99.3	99.7
Educated	96.2	95.5	95.2	93.6	95.4
Illiterate	98.7	97.7	99.0	98.6	98.5
N	391	265	210	140	1006

Note: Multiple responses

Table 5 shows patients by types of respiratory illnesses for which they sought help from the providers. An overwhelming majority of the patients with TB, chronic cough, asthma, bronchitis, fever, and common cold consulted both village doctors and drug sellers for treatment in both the NGO areas. On average, a provider attended 13.2 patients with chronic cough each month. TB patients also consulted the providers – a higher proportion with the village doctors than with drug sellers in both the areas. The confirmed TB patients seen each month were far less than the patient with chronic cough.

Table 6 shows the measures taken by the providers for diagnosing TB cases. Over a half (52.5%) of the providers reported that, due to lack of expertise, they could not diagnose TB in suspected patients.

Some respondents reported that TB could be confirmed in a patient if s/he had blood in sputum. Due to lack of expertise, most (86%) drug-sellers could not take any initiative to diagnose TB in suspected cases, who might have TB. Besides, most drug sellers perceived that handling of the TB cases was not their responsibility because it required specialized doctors.

Table 5. Type of respiratory illnesses for which patients sought help from providers

Disease type	Type of Health provider by NGOs (%)						
	BRAC			Damien Foundation			
	Drug-seller	Village doctor	All	Drug-seller	Village doctor	All	Grand total
Chronic cough	92.8	97.7	94.8	91.0	98.6	94.0	94.5
Asthma	93.9	99.2	96.0	88.1	95.0	90.0	92.4
Bronchitis	52.4	64.2	57.2	51.0	61.4	55.1	56.5
TB	9.0	14.7	11.3	4.3	17.9	9.7	10.7
Fever	99.2	99.2	99.2	99.0	99.3	99.1	99.2
Common cold	98.2	98.9	98.5	99.5	99.3	99.4	98.8
Patients seen per month (Mean ± SD)							
Chronic cough	13.2±11.3	13.34±2.0	13.23±2.0	12.28± 1.8	14.50±1.0	13.21±11.9	13.22±11.6
TB	2.86±2.0	2.21±1.1	2.51±1.6	2.33±1.1	2.84±1.5	2.71±1.4	2.57±1.5

Note: Multiple responses and descriptive analysis (mean with standard deviation).

Most drug-sellers did not refer TB suspects to the DOTS facilities available either at public or private/NGO clinics for diagnosis. Though qualitative findings revealed that most drug-sellers perceived that public facilities might be the place for TB diagnosis and treatment but they did not refer patients to those facilities as doctors were not available there in emergency situation nor were attentive to the poor patients, they added. Moreover, non-treatment costs, for instance transport costs to commute to and from these facilities were unaffordable to poor patients. In the case of referring to NGOs (BRAC and DF), the providers reported that many providers were not aware that the local NGOs provide the DOTS services free of charge in their localities. Most (90%) drug-sellers were not involved in treating cases even when they suspected TB in a patient. The village doctors of both the areas took some initiatives in terms of asking for sputum test or X-rays. Thus, most (96.3%) village doctors referred TB suspects mostly to the Government hospitals (85%). In addition to government hospitals, one-fourth of the village doctors in the DF areas also referred TB suspects to TB and Leprosy hospitals located in the area. But such facilities were non-existent in the BRAC areas. Besides these, the village doctors from both the BRAC and DF areas referred patients to the NGO facilities (BRAC 53.6% and DF 35.7%) for diagnosis and treatment. Twenty-nine percent of the village doctors in both the areas advised the TB suspects for sputum tests (BRAC 28.3% and DF 30.7%), and 19.5% also advised for chest X-rays (BRAC 19.2% DF 20.0%). The qualitative findings indicated lack of diagnostic facility in their areas. It was difficult to advice poor patients to do different tests at diagnostic facilities. But they were not aware of free TB services provided by the designated NGOs. About 36% of the providers did not have sufficient knowledge on diagnosis and treatment of TB, nor had expertise to treat TB cases. Nearly one-third (32.6%) of the providers did not have diagnostic facilities in their workplace.

Despite TB management was not the sole responsibility of the drug-sellers and village doctors, 16.5% of them reported to have treated TB patients, with cough syrup or antibiotics (11.5%). The qualitative findings indicated that they did it on the demand of patients, friendly social relations, poverty of patients, and inability of patients to consult the specialists. The proportion of health providers treating TB suspects was higher among the village doctors compared with those of the drug-sellers. Comparisons between the NGOs depicted that a higher proportion of the village doctors in the DF areas provided treatment with cough syrup/antibiotics than in the BRAC areas.

Table 6. Nature of TB diagnostic measure taken by providers for the suspects (%)

Health provider type by NGOs							
Foundation Parameters	BRAC			Damien			All
	Drug-seller	Village doctor	Total	Drug-seller	Village doctor	Total	
Diagnostic measures for TB suspects							
Sputum test	1.30	28.3	12.2	3.80	30.7	14.6	13.0
X-ray test	1.30	19.2	8.50	2.40	20.0	9.40	8.8
Refer	14.3	95.5	47.1	13.8	97.9	47.4	47.2
No initiative	85.7	3.40	52.4	86.2	2.10	52.6	52.5
Places of referrals							
GoB TB and Leprosy Hospital	1.00	6.80	3.40	1.40	25.0	10.9	6.0
Thana and district hospital	7.90	87.2	39.9	10.0	82.1	38.9	39.6
BRAC	7.40	53.6	26.1	0	0	0	17.2
DF	0	0	0	4.80	35.7	16.9	6.3
Others	1.60	17.0	7.40	1.00	7.1	3.5	5.8
Do not refer	85.7	3.80	52.6	86.2	2.1	52.6	52.6
Reason for referring							
Professional Treatment	32.1	48.0	45.2	34.5	49.6	47.0	45.8
Free treatment	41.1	56.6	53.8	100.0	94.9	95.8	68.4
Lack of knowledge	33.9	24.2	26.0	37.9	58.4	54.8	36.0
Lack of diagnostic facilities.	35.7	30.5	31.4	13.8	39.4	34.9	32.6
Treatment provided for TB suspects and cases [6]							
Yes	10.0	26.8	16.8	5.2	32.1	16.0	16.5
Treatment with cough syrup/antibiotics							
Yes	6.9	14.3	9.9	4.3	30.0	14.6	11.5
Others	3.1	12.5	6.9	0.9	2.1	1.4	5.0
N	391	265	656	210	140	350	1006

Note: Multiple responses considered.

Perception of providers about DOTS

Table 7 shows the summary qualitative findings on the perceptions health providers about the DOTS. The village doctors in the DF areas correctly understood the meaning of the DOTS (take medicines in front of village doctor for 6 months) compared with those in the BRAC areas, who were unable to give a definite definition. However, the drug-sellers of both BRAC and DF areas had no meaningful perceptions about DOTS. A drug seller said: *"I never heard the word DOTS. Perhaps you are talking about*

[6] The study explored the ways of treatment by providers such as (a) giving treatment on patients' demand without a precise assessment of their signs and symptoms termed as 'blind treatment' (b) giving different antibiotics of unknown quality, and (c) on the basis of physical symptoms (fever, sneezing etc), hence called symptomatic treatment.

new medicine/injection. Am I right? We do not sell DOTS and patients never ask for it." Some village doctors, especially in BRAC areas, expressed about DOTS in their own way. They mostly perceived DOTS as a symbolic name of TB treatment.

Table 7. Perception of providers regarding DOTS

Providers	Perceptions
BRAC	
Village doctor	Symbolic name, TB Treatment provided by qualified doctors, Treatment at household level with free medication, Treatment provided by BRAC health worker (*Shasthya Shebika*)
Drug seller	Injection/medicine
DF	
Village doctor	Take medicine in front of village doctor for 6 months
Drug seller	New medicine

A village doctor said, *"I know about DOTS. It is used in TB treatment. I think doctors would not like to say TB treatment. It is the doctor's language. Only patients can understand the name DOTS."* Some perceived that when qualified doctors gave TB treatment that was considered DOTS. A few village doctors in the BRAC areas reported that when TB treatment was given at the household level free of charge was called the DOTS.

The providers were also asked about the importance of DOTS implementation in community. Most providers were unaware of the DOTS or its meaning, and objectives or its importance and implementation in their areas. Some village doctors already associated with the DOTS implementation in the DF areas perceived that DOTS was implemented in the community for the poor. They believed that DOTS ensured patients' adherence to full treatment.

Table 8 shows the health providers' opinion regarding agencies/persons involved in DOTS implementation nationally and locally, and treatment and its duration under the DOTS strategy. Most providers had no idea about the DOTS implementers for TB controls nationally (BRAC 74.0% vs. DF 70.0%) and locally (BRAC 72.0% vs. DF 61.0%). In the DF areas, about 28.6% of the village doctors applied DOTS in treating TB, as opposed to 1.5% in BRAC area. This is because the DF trained and assigned them to treat TB patients using the DOTS strategy, while BRAC did not. A village doctor in DF area said:

> *When TB suspects with more than three weeks of cough come to us, we send them to the DF for sputum testing free of charge, and their technicians are skilled enough to do the test. None should be given TB drugs until his/her sputum test result is positive.*

Table 8. Opinion of health providers regarding agencies/persons giving DOTS services, and their knowledge about DOTS treatment, and its duration

	Type of health provider by NGOs						
	BRAC			Damien Foundation			All
Agencies/ Persons	Drug-seller	Village Doctor	Total	Drug-seller	Village Doctor	Total	
Opinion about national DOTS providers (%)							
Do not know	83.9	59.2	73.9	84.8	47.1	69.7	72.5
Government hospital	1.5	2.3	1.9	2.9	6.4	4.3	2.6
BRAC	15.9	40.8	25.9	3.3	7.9	5.1	18.7
DF	0.0	0.0	0.0	11.9	47.9	26.3	9.2
Village doctors	0.0	0.0	0.0	1.9	15.7	7.4	2.6
Opinion about local DOTS providers (%)							
Do not know	82.6	56.6(150)	72.1	77.1	37.1	61.1	68.3
BRAC (SS)	16.9	43.0 (114)	27.4	1.9	2.1	2.0	18.6
DF	0.0	0.0	0.0	16.7	41.4	26.6	9.3
Village Doctor	0.0	0.0	0.0	3.8	33.6	15.7	5.5
Government hospital	0.5	0.8	0.7	3.3	3.6	3.4	1.5
Knowledge on DOTS treatment duration (%)							
Correct knowledge	1.8	9.8	5.0	16.7	20.0	18.0	9.5
Using of DOTS (%)							
Yes	0.0	1.5	0.6	1.9	28.6	12.6	4.8
N	391	265	656	210	140	350	1006

Note: Multiple responses considered.

Reasons for not using DOTS

The main reason emerged as from the interviews was a lack of knowledge on TB and the DOTS strategy. A very few village doctors, who knew about DOTS, said that there were many service providers available in the community such as government hospitals, NGOs (BRAC, DF) to serve TB patients. As such, they were not interested in using DOTS in TB treatment. They perceived that the government hospital, and NGOs were well-equipped and skilled enough to detect TB. On the other hand, due to a lack expertise the drug sellers were not interested to consult or treat TB patients. A drug store salesman said:

> *I am a drug-seller. I can treat minor illnesses but I am not interested in treating TB patients, as I know that it is a complicated disease, and it thus, requires proper training to manage at community level. But I do not have such training.*

However, some health providers considered it an extra workload requiring sufficient time and energy to devote. This discouraged them to take any measure. A village doctor said, *"I do not have enough time to*

follow the patient whether he takes medicine or not. Everyday I have to examine many other patients."

Perceptions of health providers regarding their prospective role in DOTS implementation

The DOTS strategy was briefly explained to each respondent, and then each of them was asked to how he could contribute to implementing DOTS in the community. Most drug-sellers neither responded nor showed any interest in it, rather they were interested in drug- selling to patients. Contrary to this, a majority of the village doctors showed their interest to learn about DOTS and requested for training. Thus, they would be able to find out patients in the community, thereby motivating them for sputum test and providing the full course of treatment successfully using DOTS. They also suggested using different communication channels, such as miking (loud speaker), meetings, and mass media (radio, television) for raising awareness among the community people and civil society on the importance of TB and its treatment with DOTS.

DISCUSSION AND CONCLUSION

The study intended to understand the knowledge, attitudes and practices of the private informal health providers in detecting and treating TB patients in the rural community along with their practice and perceived role in the implementation of the DOTS strategy for TB control in the community. The analysis revealed that though often consulted, over a half (52.5%) of the health providers did not understand and/or failed to take a proper initiative towards diagnosis of TB in suspected patients showed up for care. This was because they (especially drug-sellers) had neither any expertise to handle TB patients nor received appropriate training on detecting, diagnosis and treatment of TB patients. This is a main barrier to taking any initiative either for treatment or for referral to elsewhere for proper management. Thus, this triggered to de-motivation for discharging any professional responsibility in the case of TB patients. Contrary to the drug-sellers, the village doctors mostly referred patients to public health facilities for case detection and treatment without properly knowing the exact sources for TB control service providers in their localities. They also admitted that, due to lack of training, they were unable to detect, diagnose, and treat TB patients.

Only 13% of the providers advised for sputum test for diagnosis of TB while consulting with patients and the study concluded that a majority of the providers did not consider sputum smear microscopy crucial in patients presenting with prolonged cough in rural Bangladesh. Similar negligence in TB case detection through sputum tests was also found

among the private health providers in Kenya (Chakaya 2005) and also among the general practitioners in India (Singla *et al.* 1998). Our study found that this was because they did not have any diagnostic facilities in their workplace and it was difficult to advise poor patients to do sputum examination at far. Unfortunately, the providers were not aware of free TB services provided by the designated NGOs in their local areas. The lack of knowledge of providers about the sputum test must be addressed by the NTP while designing health education.

Despite TB management was not the sole responsibility of the providers, 16.5% of them were actively involved in treating patients with mainly cough syrup or antibiotics. It was difficult to ignore the community people due to social intimacy and inability of the community people to consult specialists. Recovery from symptoms temporarily due to medication may interrupt the patient in accessing formal TB care services or could delay. The NTP should consider the issue in future planning.

Bangladesh adopted the DOTS strategy in 1993 in the NTP for TB control, and DOTS is delivered at the doorstep in provider's areas. However, most health providers did not know the DOTS or its meaning, and objectives or its importance of implementation in their areas. Even most providers had no idea about the DOTS implementers for TB controls locally and nationally. It indicates the lack of awareness of the informal providers about the popular DOTS strategy in TB control, though the programme passed more than one decade after its adoption. This knowledge gap must be addressed by the NTP. Thus, periodic training and refresher course vis-à-vis effective regulatory measures by the NTP may be stimuli to use this vast network unqualified and unregistered health providers in TB control in the community.

Some village doctors used the DOTS in TB control in the DF areas; because the DF trained and assigned them to treat TB patients using the DOTS strategy. An overwhelming majority of the village doctors were interested to implement the DOTS strategy, if they were imparted practical training on it. The same willingness has been found among the private practitioners in rural India (Thakur *et al.* 2006). This willingness could be used properly for building a public-private partnership for the control of TB in rural Bangladesh.

The study concluded that, although often consulted, a majority of the providers were not able to refer the patients to the nearby DOTS facilities nor they advised for free sputum examination for TB detection due to knowledge gap about TB and DOTS strategy among most popular providers in rural areas. Thus, a number of suspects went undiagnosed in the rural private health sector. Without proper skills and diagnosis, TB treatment with antibiotic or syrup has detrimental effect on health. Lack

of awareness or knowledge of health providers about the community based TB control programme provides the urgency of giving attention by the NTP. Simultaneously, the willingness of the providers in implementing the DOTS in the community could be used properly for building a public-private partnership for the control of TB in rural Bangladesh.

RECOMMENDATIONS

1. Regular intensive training for providers should be arranged to create awareness among them and enhance their knowledge on TB and the DOTS, diagnosis procedures, place of treatment, etc., for early diagnosis and treatment. Regular refresher training is also important to explore the retention of knowledge. Special attention is required for drug sellers to change their negative attitudes towards the DOTS implementation.
2. A referral mechanism between the informal health providers and the public and NGO facilities should be developed and implemented. Special incentives or rewards could be provided to providers for referring patients to formal place.
3. Referred patients should be routinely monitored to be sure of timely diagnosis and full treatment in referral places.
4. TB control programme should also focus on the abuse of antibiotics or wrong treatment by providers, and it should be prevented through health education.
5. Willingness of implementing DOTS in the community by providers could be used properly for building public private partnership.

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Chapter 5

Barriers to accessing tuberculosis care through the lens of the informal healthcare providers in rural Bangladesh

Qazi Shafayetul Islam, Fazlul Karim, Md. Akramul Islam, and Abdul Hamid Salim

ABSTRACT

Informal healthcare providers, a powerful stakeholder in the process of treatment, can be a major source of information, apart from patients themselves, about the barriers that patients often confront in accessing the existing tuberculosis control services. Past studies seldom considered the perspective of healthcare providers in exploring patients' barriers to accessing healthcare services. This study explored barriers that TB patients encounter in accessing existing care for TB control from a provider's perspective in rural Bangladesh. Face-to-face interviews were conducted with 1,006 purposively chosen rural healthcare providers spread over 16 *upazilas* of Dhaka division, where two NGOs (BRAC and Damien Foundation) have been implementing TB control programmes using the DOTS strategy. In doing this, a pretested questionnaire containing open-ended questions was used. Narrative data were translated into English and verified for completeness and accuracy. These were summarized and organized thematically in matrices for analysis and interpretation. Access barriers to care in the lens of healthcare providers were identified in different interconnected areas: (1) barriers associated with patient's personal characteristics and behaviour, (2) socio-cultural barriers, (3) economical barriers, and (4) barriers embedded in public and private healthcare systems. The barriers in the lens of informal healthcare providers confronted by patients included: lack of knowledge about the symptom of TB, stop treatment when patient feel better, and tendency to hide disease because of shame. These conditions often resulted in delayed healthcare seeking and non-

adherence to full treatment of TB. Felt or enacted stigma, social rejection, fear of marital problems due to TB frequently acted as barriers to healthcare. Besides, worse socioeconomic conditions also posed severe obstacles to accessing care. Unavailability of doctors at public facilities in emergency situation, misbehaviour of doctors, and poor attention of staff, unskilled/traditional healers, and lack of diagnostic centres were identified as critical barriers to healthcare seeking. These barriers ought to be taken into account to improve case finding and adherence to treatment.

INTRODUCTION

Delayed detection and diagnosis of TB and non-adherence to its full treatment had been major barriers to TB control, especially in settings with a high burden of TB (Silvio Waisbord 2007). But what factors contribute to these barriers? As a vital stakeholder in the process of TB management, healthcare providers can be one of practical sources of information about barriers and their features and causes that patients frequently confront. But in the past, researches mostly considered the patients' lens in investigating barriers. This, of course, helps reveal one of the multi-dimensions of the problem. To reveal a complete picture of the problem, the barriers in the lens of providers should also be explored but past studies seldom addressed this issue, although, in rural Bangladesh, the informal providers are important stakeholders, and they provide 60% of services to the people (Cockroft *et al.* 2007). Thus, this study explored the barriers associated with patients' personal characteristics and behaviour, sociocultural barriers, economical barriers, and barriers in the public and private healthcare systems, in the lens of rural healthcare providers. The findings of this study would have implications for a range of stakeholders, national policy makers, and international bodies working towards reducing the global burden of tuberculosis.

OBJECTIVES

The study aimed at exploring patients' personal characteristics and behaviour associated with diagnosis and treatment of TB, sociocultural barriers, economical barriers, and barriers in the public and private healthcare systems that influence patients' healthcare seeking behaviour through the lens of informal healthcare providers.

MATERIALS AND METHODS

This study formed a part of the study presented in Chapter 4. Apart from structured and semi-structured questions, respondents were also asked

some open-ended questions on different domains from which barriers may stem towards health seeking behaviour of patients (the methods are detailed out in Chapter 4). Face-to-face interviews with the informal healthcare providers elicited practical views/perceptions and experiences on barriers that TB patients encounter in accessing TB care services. The inquiry concentrated mainly on barriers associated with patients' personal characteristics and behaviour, sociocultural milieus, economic domain, and healthcare systems. Probing questions to further explore providers' in-depth views and experiences followed up open-ended questions. Teams of trained interviewers (anthropologists/sociologists) carried out the interviews. These were general qualitative interviews, where no point of saturation was considered. The narrative responses were translated into English and checked for completeness and accuracy. Two researchers independently read and re-read data for understanding their meanings and implications, thereby picking themes and subthemes (Table 1). This process ended for responses to each thematic question when repetitions of responses began to emerge under the themes and subthemes. Finally, the researchers organized the summary findings in matrices and shared with the fellow researchers for mutual feedback and decision on interpretations.

Table 1. Themes and subthemes of perceived barriers in providers' perspective

Themes	Subthemes/categories
Personal characteristics and behaviour	Misperception, knowledge of TB Fear of loosing job, reluctance, and geographical distance
Sociocultural barriers	TB impacts on married/unmarried life, social life, and social rights
Economical barriers	TB impacts on direct and indirect costs
Barriers associated with healthcare systems	Availability of and accessibility to diagnostic facilities at public-private systems, and public hospital management systems

RESULTS

Personal characteristics and behaviour of patients

A majority of the providers stated that TB patients were not interested in receiving a lengthy treatment and, thus, often would default. Despite the effective treatment available and the healthcare providers made best efforts, most patients perceived that TB was not curable, and no TB patient could escape death. "Jar hoi jokkha, nai tar rokkha," stated by a village doctor.

Lack of information and critical awareness could have affected timely healthcare seeking. Most TB patients and the community people even did not know the appropriate sources for TB treatment, medicines, and duration of treatment. A few providers mentioned that fear of side-effects such as alteration in urine colour, change in taste, development of jaundice, and itching vis-à-vis poor provision of side effect management, also affect patients' healthcare seeking. A village doctor said:

> *I know a patient in my village. When he started taking medicines he experienced a change in urine colour. He got afraid of it and perceived that intake of TB medicines developed a complicated disease in his body. Then he stopped taking medicines for ever.*

Especially the severe or elderly patients were not much interested to travel a long way for treatment. Apart from incurring costs, longer travel to the health facilities resulted in loss of time and wages. These factors often would de-motivate patients to seek healthcare. A drug salesman stated:

> *We do not have a hospital, MBBS doctors, and diagnostic centres in our area. We often need to send patients far for proper treatment. They have job or business. Fear for loss of job and income refrain them from going to appropriate centres for treatmen, they rather seek help from us.*

Some providers specified that patients would try to hide their illness in fear of losing job and, thus, would remain untreated.

Such a problem compounded with TB-related stigma discouraged females to seek healthcare. Besides, they had to depend on males' decision for healthcare seeking, which they often would not get straightforward. Their solitary outside mobility was restricted, requiring escort, which would have been considered costly and, thus, discouraged them to go for treatment. A village doctor said:

> *I heard from my mother that one day she went to a village doctor with chronic cough when I was a child. My grandfather scolded her a lot, and she was not allowed to visit a health facility outside home.*

The other issue was that many patients would stop taking medicine while feeling better in the initial phase of treatment and, thus, would drop out.

Sociocultural barriers

Impact of TB on marital/personal/family life—TB was often viewed as an incurable dangerous disease, which would affect social fabric of personal

and familial life. So, many patients often would fear its diagnosis. They would, thus, think that the local health providers would make public their TB. Such a fear often discouraged to go for treatment. Social rejections and isolations would start from households, and females were the most vulnerable groups to such phenomenon. In many cases, it might end up with divorce or separation. A village doctor said:

> *One day I saw a husband scolding his wife and asked her to leave the home because of her TB. The husband was afraid of spreading TB from her to others. He also says that TB is incurable, and patient is to die.*

Female TB patients often would become victims of physical assault by their husbands, and some husbands temporarily would transfer their wives to their parental houses to protect their children from transmission. Such a condition would result in fear of isolation. Thus, a sort of reluctance for diagnosis would develop in women. "I saw a husband beating her wife frequently. It was a sin to get TB. Every day when husband used to return from outside, he started hitting her", a drug salesman stated.

Young unmarried girls were not beyond these cultural constructions. The respondents said that the unmarried girls were more vulnerable than unmarried boys in the case of marriage. Some providers stated that the girls who got TB could bring misfortune for the boys. Guardian of a boy would dismiss the arranged marriage with a girl with TB and vice versa. This problem would be more acute for females than males.

TB impacts on social relation and social right

Two kinds of isolation emerged (i) isolation from the community and (ii) isolation from household members. Whatever isolation it would severely affect the psychosocial and mental state of patients. "Few years ago a TB patient was compelled to leave our village. I met him in another area. He was feeling sad for his children. He cried for his family," a drug salesman said. In most cases, the family members would separate a patient's plates, food, clothes, and bed. The community people often would not associate with TB patients, they would rather avoid in fear of transmission, as TB is as highly infectious. "My cousin got TB. Some relatives stopped visiting his house. They also asked us for not to visit his house nor help him even in emergency," a village doctor stated.

Some providers also pointed out those TB patients were deprived of casting their votes during elections, getting free food from chairman, and getting fish from pond. They would not be invited to any social party, meetings, *shalish/bichar* (arbitration). Some providers also said that NGOs' free TB treatment was meant for the poor. Therefore, if the rich TB

patients would take this advantage would loose their name and fame. Such a feeling often would refrain the rich from seeking care, especially from the NGOs.

Economical barriers

Direct cost

A majority of the providers perceived that TB treatment was expensive. According to them, the poor were unable to bear the full treatment costs from skilled doctors. A village doctor said:

> *Sometimes I send patients to hospitals for treatment from a qualified doctor. Thus, one of my poor patients went there. The doctor charged a lot from my patient. He could not pay. In the middle of treatment, the doctor stopped giving treatment and asked him to come back with money. But the patient could not manage money and, thus, stopped seeking healthcare from the doctor.*

A drug salesman said regarding TB drug:

> *TB drugs are not available at local pharmacies. One of my relatives had TB. I went to market in town to buy but I did not get it. One of my friends managed it but he charged a lot for it. My relative was poor. He could not maintain the dose, as the drug was expensive to buy from outside.*

Indirect cost

Long distance to skilled doctors, diagnostic laboratories, and pharmacy require travel and time, resulting in loss of wage income for poor patients. Most providers emphasized on having nutritious food during illness. Patients needed to have chicken, meat, milk, and eggs everyday. But the poor patients would be unable to afford these expensive items. "I suggested a TB patient to have nutritious foods, such as chicken, fish, vegetables, etc. But he could not mange even rice for household members, because of poverty," a village doctor cited. TB would debilitate patients' working ability leading to low income, and even one would loose job, increasing economic vulnerability of family. A village doctor said:

> *My neighbour had TB a few days ago. He worked in a shop in the market. When his employer heard it, he forced the patient to leave job. The patient was the only earning member of his family. He is cured now. Still he has not yet returned the job.*

Health system-related barriers

Private health system

Most providers did not correctly know the names of TB medicines, their dosages, and duration of TB treatment. Such a lack of correct knowledge would deprive particularly the rural poor patients, who were to rely on these healthcare providers for proper treatment. Given this poor knowledge base, they could have delayed patients in accessing the formal TB care sources. A drug-seller said, "One of my relatives had cough for two months before he visited a doctor. He was taking medicine (Bashak leaves juice) from traditional healers for the treatment of cough but later it turned worst."

These traditional healers even did not know where to refer patients for appropriate care. Some village doctors stated that traditional healers were unable to handle patients timely and properly. Most health providers (drug-sellers) pointed out that their locality lacked in skilled/trained doctors. "My mother has asthma. One night her condition became severe. I failed to find out an MBBS doctor or a hospital in the area. Thus, at that night, my mother suffered a lot," a village doctor commented.

Some drug-sellers mentioned that their local village doctors tended not to refer the patients to specialized doctors in need. This unfair tendency might be rooted in business motive. If they could keep the patients with them for a longer time, they could make more money. A drug salesman noted:

> *A patient was suffering from a serious disease in my village. The village doctor did not diagnose his illness. There is a government Thana Health Complex nearby our village. He could have sent him there for early diagnosis and case management. But he intentionally did not do, resulting in huge unnecessary expenses to the patient.*

Most providers perceived that TB was highly infectious and were afraid of getting infected from TB patients and tend to refrain from providing treatment. Lack of diagnostic tools (X-ray machine, blood testing facilities, blood pressure machine, stethoscope, and thermometer) also hinders check-up. A village doctor cited:

> *I asked a patient to go to a government hospital for diagnosis of the disease. He did not want to go there due to his past experience. But there is no good diagnostic centre alternative to public facilities. Then he remained undiagnosed.*

Public health system

Most all the providers were concerned regarding the place/sources for appropriate treatment. They mostly focused on public facilities (*upazila* health complex, district hospital, etc.). They perceived that treatment and associated costs are free and skilled doctors are available there but negative opinions were also emerged regarding using the public facilities. Some providers perceived that doctors were not available in emergency situation. Multiple visits to a public hospital would cause economic loss, including mental sufferings. Rude behaviour of doctors at government hospitals and intimidation and carelessness were rampant. A village doctor said:

> *One day, I took my mother to a government hospital. We waited for a long time for the doctor. He was not there. When he came back, we tried to visit him. He asked us to tell the problem briefly. But while narrating the problem, he did not listen to my mother attentively. Besides, on trying elaboration of the problem, he lost patience and began to scold saying that he had no time to listen. Thus, he gave a verbal advice and went out quickly.*

Sometimes the providers charged money from patients, and the poor were unable to pay for. Medicines for TB treatment were not sold over the counter or in the open market, which was considered another barrier to provide treatment. A village doctor said:

> *Sometimes I get TB patients. But I cannot treat them because I cannot collect drugs from local pharmacy, even from big markets in my areas. Even I went to a government hospital to collect it but they did not sell it.*

Some providers perceived (both village doctors and drug salesmen) that BRAC/DF provided free treatment for TB patients. They perceived that there was no treatment barrier in seeking TB cares there. “So far I know BRAC has a TB control programme. They visit house to house to find out TB patients. They diagnose TB, and patients collect drugs free of charge from the them”, a drug salesman stated.

DISCUSSION AND CONCLUSION

This study elicited barriers that the patients encountered in course of TB diagnosis and treatment through the lens of the informal healthcare providers. A wide range of barriers emerged from interviews with the rural informal healthcare providers, and these fall into several interlinked broad groups: (i) personal characteristics and behaviour associated with TB treatment, (ii) socio-cultural barriers, (iii) economical barriers and barriers associated with the healthcare systems.

Providers' experiences indicated that a lack of awareness and effective knowledge about TB was widespread among the rural community people of Bangladesh. A similar scenario was observed among TB patients in Tanzania and China albeit they were under formal treatment (Wandwalo and Morkve 2000; Buu *et al.* 2003). Results of other studies indicate that this was due to limited provision of health education in the community (Khan *et al.* 2000). Lack of knowledge especially on the signs/symptoms often results in delay in appropriate healthcare seeking. Studies in Mexico, Thailand, and Nigeria found similar results (Alverez 2001, Ngamvithayapong 2000, Enwuru *et al.* 2002). This warrants for effective health education interventions using the popular communication channels for improving knowledge.

Most patients in rural Bangladesh default in the middle of TB treatment when they feel better, creating a barrier to effective treatment. This is also common in India (Jaiswal *et al.* 2003) due to lack of motivation among TB patients about treatment.

Distance could still be challenging for severely sick and older people. These patients often default from treatment. A study in Burkino Faso, Africa found the similar challenge faced by older patients (Sanou *et al.* 2004).

Social isolation or rejection of TB patients is still common in rural Bangladesh. The main reason of social rejection is fear of transmission of the disease within the community, and TB is considered highly infectious and incurable. This indicates the poor level of awareness among the community and special motivation is required to change the behaviour of the community people. Besides, stigma appeared to be important deterrents from seeking timely care in rural Bangladesh, and its consequences are not only damaging to personal well-being of TB patients but also likely to undermine effective TB control and promote disease transmission. Social support can help patient overcome the structural and personal barriers. Stronger involvement of local networks to support TB patients may be justified.

Females still lagged behind in accessing the DOTS care due to patriarchal nature of society in rural Bangladesh. Male's decision is very important for female in seeking care in rural Bangladesh. A female is to depend on decision of her husband or other male family members for treatment (Ito 1999). In rural Bangladesh, females diagnosed with TB confront risk of divorce or of being transferred to their natal homes. Thus, family and social support is the key to female patients' adherence to treatment (Khan *et al.* 2005, Harper *et al.* 2003).

In rural Bangladesh, time and work constraints are especially acute for males. They might have to forego income or to lose their jobs to go for

daily treatment. This is consistent with the findings of the preliminary social survey (Johansson *et al.* 1996, Jaiswal *et al.* 2003, Sanou *et al.* 2004). Sometimes patients prioritized work over taking treatment (Khan *et al.* 2000). Some form of financial assistance could be provided to male patients during the illness period from a locally formed social fund.

Delays were, however, more frequent among patients who visited the informal providers (traditional healers) first (see also Chapter 3). The study found that these traditional healers were incapable to diagnose and to treat or even to refer patients in emergency situation due to lack of knowledge. An Ethiopian study (Yimer *et al.* 2005) found a similar situation. Thus, referral from these informal private sectors is an important problem. We cannot ignore these providers as they are deeply and culturally well footed in our society. The NTP should recognise the role of these informal healthcare providers, thereby building the linkage between healthcare providers, and regulate effectively.

Accessibility to public facilities sometimes was hampered by poor quality of care in terms of non-availability of doctors in emergency, lack of patience of health providers, lack of attentiveness of staff towards patients, and unofficial charges at public health facilities. These findings are consistent with those of other studies in developing countries (Sanou *et al.* 2004; Jaiswal *et al.* 2003). The consequences of these factors would reduce the use of public facilities or DOTS centres.

Study concluded that patients often take medication under difficult circumstances and experience difficult challenges, many of which are beyond their direct control. In the lens of the rural informal healthcare providers barriers, such as lack of knowledge about TB, social stigma and its consequences, economical constraints, and poor quality of services are acute in our community to accessing the DOTS services. According to them, the barriers associated with personal characteristics and behaviour of patients, social stigma, public and private healthcare system etc. would not be eliminated within a short time, unless farsighted policy and a plan are framed and implemented.

RECOMMENDATIONS

1. The visibility of the TB control programme in the community must be increased, which may increase knowledge of the community people and improve attitudes towards TB. Besides, the existing health education programme on TB must be revised and delivered the message by using the culturally acceptable popular communication channels, such as folk media, interpersonal communication, etc.

2. Continuous motivation is required by health workers at the household level to ensure that patients adhere to the full course (up to six months).
3. A special DOTS service can be offered at the household level for older and sick people to minimize the geographical barriers.
4. Social support can help patients overcome the social stigma. A social support network ought to be established within the community to ensure needful support for patients during their illness.
5. Females are always vulnerable in our society. Special attention is required for these vulnerable groups. Family and social support including legal aids are required to overcome females' special issues.
6. The NTP should arrange regular training for informal healthcare providers to be knowledgeable about TB and capable to refer patients quickly without any delay.

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