

Tuberculosis in 'hard to reach' areas: misperceptions, knowledge, health-seeking behaviour, and challenges

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List of acronyms

DOTS	Directly Observed Treatment, Short-course
GoB	Government of Bangladesh
NGO	Non-governmental Organization
NTP	National Tuberculosis Programme
PI	Principal Investigator
RED	Research and Evaluation Division
SS	<i>Shasthya Sebika</i>
SPSS	Statistical Package for Social Science
TB	Tuberculosis
Tk	Taka (currency of Bangladesh)
WHO	World Health Organization

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Abstract

This study was conducted to explore the knowledge and perceptions of health workers and community people about tuberculosis in geographically inaccessible (hard-to-reach) tuberculosis (TB) programme areas of BRAC. The study also explored the health-seeking behaviour of TB suspects (having cough >3weeks) and challenges faced by the programme in this particular situation. This cross-sectional survey was conducted in 15 'hard-to-reach' *upazilas* (out of 30 such *upazilas*), and another 15 *upazilas*, adjacent to the above *upazilas* and selected randomly for comparison. The study included 338 health workers (*Shasthya Shebika* or SS), 3,600 community people, 1,800 TB suspects and 1,800 non-suspects. Two modules of questionnaires (structured and semi-structured) were developed for the health workers and the community people. The study found that the misperception that TB is 'a disease of only male' was common among the health workers (44%) and community people (46-57%). Further, many of them misperceived the common ways of acquiring TB such as by sharing patients' utensils (46-49%), smoking (80-87%), and that TB could be prevented by avoiding smoking (58-63%). Almost half of the SSs (49%) could not recall at least four messages on TB that they learned from training. Many of the SSs confessed that they were not involved (64%) in delivering TB messages in the community, and a significant numbers of SS (41%) were not motivated to work in the TB control programme.

The community people lacked basic information on TB. Further, almost about half of the community people (41-47%) were afraid of TB in both the study areas, and a majority of community people (52-56%) reported that they wanted to stay away from the TB patients. The study further found that one-third did not take any treatment for their illness (median duration of illness being six weeks), and two-third did not undergo sputum test. The main sources of treatment of TB suspects were village doctors (26-35%) and attendants at drug shops (35-36%). The geographical distance, treatment non-compliance, and lack of trust in SSs' management were identified as the major constraints in hard-to-reach areas for implementing TB programme efficiently. The implications of these in management of TB control programme are discussed and recommendations are made.

Executive summary

Tuberculosis (TB) is a major public health problem in Bangladesh, which ranks 6th among the 22 'high TB burden' countries. The overall prevalence of new smear positive is estimated at 79.4 per 100,000 adult population. To combat the TB havocs, the government of Bangladesh (GoB), in partnership with different non-governmental organizations (NGO) including BRAC (one of the largest NGOs in the world), has been implementing a community-based TB control programme using the Directly Observed Treatment, Short-course (DOTS) strategy. At the core of the model is BRAC's female community health volunteers known as *Shasthya Shebikas* (SS). As frontline health workers, the SSs maintain a semi-active case finding strategy, and mobilize the community people during their routine home visits to search for TB suspects (person with prolonged cough for at least three weeks), and refer them to either BRAC union level sputum collection sub-centre or sub-district microscopy facilities, depending on the patients' convenience for sputum test. Identified TB patients visit the SS's home daily during the initial 2-3 months of treatment. Subsequently, patients collect medicines once a week from the SSs' homes, and the SSs ensure follow-up over the full 6-9 months course of treatment.

Currently BRAC is implementing the TB control programme in 293 sub-districts of 42 districts with technical support from the National TB Control Programme (NTP). Despite being successful in achieving a high rate of case detection and treatment completion, there are challenges as well. BRAC's TB control programme includes some areas which have poor communication, such as Char area (surrounded by water), hill tracts, and coastal areas. The programme refers to these areas as 'hard-to-reach' areas. There is paucity of information on the performance of the programme in these areas. So far, no independent evaluation has been conducted to explore how far the programme objectives have been achieved in terms of raising awareness among the health workers and community people about pulmonary TB (PTB), and changing health-seeking behaviour of the community people for appropriate and quick treatment. Misperceptions associated with TB, inadequate knowledge and poor health-seeking behaviour are often observed in high TB burden countries. These may act as important obstacles to service utilization and to successful control of TB.

This study explored the existing misperceptions, and the knowledge of health workers and community people regarding TB. In addition, the study explored the health-seeking behaviour of TB suspects, and challenges of the programme that impaired implementation of TB control efficiently. The findings would help further fine-tuning of the programme in terms of resource allocation, programme modifications, etc., and provide a benchmark for future impact assessment. More specifically, the study aimed to investigate:

1. Misperceptions and knowledge of health workers and community people (TB suspects and non-suspects) about tuberculosis
2. Health-seeking behaviour of TB suspects
3. Challenges the TB control programme faces in hard-to-reach areas

Methods

This cross-sectional survey was conducted in 15 'hard-to-reach' *upazilas* (out of 30, defined by the programme) and another 15 *upazilas* (adjacent to the hard-to-reach

upazilas), selected randomly for comparison. The study respondents were general people or non-suspects (without clinical symptoms of TB, n=1,800), TB suspects (having cough ≥ 3 weeks, n=1,800), and the SS of the BRAC programme (n=338). Both structured and semi-structured questionnaires were used for data collection.

Key findings

Domains	Key findings	Comments
Sociodemographic variables of SSs	The study found that one-fifth of SS (19%) had no school education. The average length of service of SS was around six years. Many SSs (75%) frequently consulted TB suspects during the last month, and treated TB patients (88%) using DOTS during the last year. Interestingly, one-fourth of SSs (24%) did not know or did not have knowledge about the correct meaning of DOTS.	Table 4-5
Challenges for the programme	Almost half of SSs (47%) could not remember more than three basic TB messages for the community which they learned from training. More than half of SSs (60%) faced difficulties in moving around in the hard-to-reach areas, and 41% lacked the motivation to work in the TB programme. Further, poverty of health workers (28%) and lack of trust in SSs' management (20%) were noted.	Table 6 and 10
Misperception and knowledge	Misperception such as TB is 'a disease of only male' was common among health workers (45%) and community people (46-57%). Other misperceptions among the community such as 'TB is mainly caused by smoking' (86-88%), 'TB is transmitted while sharing patients' utensils' (46%), 'TB can be prevented by quitting smoking' (56-60%) etc. were commonly observed.	Table 5 and 12
	The main source of TB information of community people were neighbours (43-52%) and mass media (37%) followed by SSs (35-42%). Nearly half of the community people (42%) did not have adequate knowledge about TB. The probability of a maximum knowledge score (0.77) was observed when the respondents were aware of the TB control programme of BRAC, received information on TB from SSs, BRAC office is situated within half kilometer, respondents hailed from the least poor households, and have secondary education. However, the probability of knowledge was only 14% when one never heard about BRAC's TB control programme, did not receive information from SSs but received from community people, BRAC office is situated more than half kilometer away, and the respondents hailed from the poorest households and had no school education.	Table 13, 16,18
Attitudes towards TB	A majority of the respondents would counsel patients to go to the government hospital (52-54%), and NGO clinic (47-52%) for availing treatment beyond asking for sputum test (29-30%) in both areas.	Table 19
	Nearly half of the respondents (41-46%) in both areas were afraid of TB, and the majority of the respondents (52-56%) reported that community people wanted to stay away from TB patients.	
	Though median duration of cough of TB suspects was six weeks, at least one-third did not take any treatment, and two-third did not do sputum test. Those who sought treatment, mainly received it from informal providers such as village doctors (26-35%), drug shop attendants (35-36%) rather than formal providers like government hospital (21-27%), and MBBS doctors (17-20%) in both areas.	Table 20

Conclusion

This study showed that misperceptions regarding TB were widespread in hard-to-reach and adjacent areas among health workers and community people. Health workers were not knowledgeable enough to manage TB patients. The community was also stigmatized against TB, had poor knowledge on TB and revealed poor health-seeking behaviour. Further, there were social, economical, and geographical barriers that health workers and community people mostly confront in providing and receiving services respectively. The programme needs to address these issues to improve the TB programme in hard-to-reach areas at par with plain land.

Recommendations

1. The training is the primary source of TB knowledge of the SSs. Findings reveal a poor level of knowledge among them, and therefore, among the community people. Thus, the form and content of the training need a thorough overhauling in these hard-to-reach and adjacent areas. Misperceptions and stigma are widely prevalent among these communities. Sustained and culture-sensitive IEC campaigns are needed to reverse this situation. These may take the form of folk songs, popular theatre, community/courtyard meetings, etc. Cured patients/patients under treatment may be used as motivators in these various forums.
2. Reasons for poor motivation of the SSs need to be explored. Performance-based incentive schemes could be introduced for increasing motivation of the SSs. They may be provided with extra travel allowances since distance is a big hindrance for routine home visits in these areas.
3. Supportive supervision is needed to ensure early case detection and initiation of treatment. Community may also be involved in this process so as to reduce stigma and ensure early sputum examination and initiation of treatment.
4. Fostering collaboration between the national TB control programme and other healthcare providers, such as in the private sectors (village doctors, drug sellers) and NGOs, are also recommended so that they can refer patients to appropriate places for treatment.

Introduction

Over one-third of the global population are infected with *Mycobacterium tuberculosis* (TB) (WHO 2008), and they may turn into active TB cases at any time of their life cycle. Despite the availability of affordable and effective treatment, there were 8.8 million new cases of TB and an estimated 1.4 million deaths from TB globally (WHO 2010). This represents an intolerable burden of human sufferings and an unacceptable barrier to socioeconomic development. In fact, the increase in the incidence of TB in developing countries and its re-emergence in the developed world had led the World Health Organization (WHO) to declare TB as a 'Global emergency' in 1993. TB is a major public health problem in Bangladesh. WHO ranks Bangladesh 6th among the 22 'high TB burden' countries (WHO 2008). The overall sputum smear positive is estimated at 79.4 per 100,000 adult population in Bangladesh, and it was higher in rural areas than urban (WHO 2010). Everyday 188 people die of TB in Bangladesh (WHO 2012).

To combat the TB havocs, the government of Bangladesh (GoB), in partnership with different non-governmental organizations (NGO) including BRAC (one of the largest NGOs in the world), is implementing TB control using the Directly Observed Treatment Short-course (DOTS) strategy. The approach was intensified in 2004 with Global Fund financial support. Being in lead, BRAC alone covers 297 sub-districts (64% of the total 460) of the country. The remaining sub-districts are covered by other NGOs. BRAC's community-based DOTS model consists of female volunteers known as *shasthya shebikas* (SS). They work under supervision of *Shasthya Kormi* (paid health worker), para professionals, and physicians. BRAC assigns on average 250 neighbourhood households to each SS. As frontiers, the SSs maintain a semi-active case finding strategy, and they mobilize the community people during their routine home visits, search for TB suspects (person with prolonged cough for at least three weeks), and refer them to either BRAC union level sputum collection sub-centre or sub-district microscopy facilities, depending on the patients' convenience for sputum examination. Identified TB patients visit the SS's home daily during the initial 2-3 months for directly observed treatment (DOT). Subsequently, patients collect medicines once a week from the SSs' homes, and the SSs ensure follow-up over the full 6-9 months course of treatment.

The National TB control programme (NTP) adopted the DOTS strategy in 1993, and expanded it progressively to the entire country by 2007. Thereafter, the case detection rates steadily increased to 72% in 2007, and treatment success has improved remarkably; the present rate is 92% 2006 which is consistent with the WHO target of over 85% (Barua *et al.* 2008).

Rationale

BRAC's TB control programme includes some areas with poor communication, such as the *Char* areas (surrounded by water), hill tracts, and the coastal areas. The programme refers to these areas as 'hard-to-reach' areas. There is a paucity of information on the performance of the programme in 'these hard-to-reach areas'. So far, no independent evaluation has been conducted to explore to what extent the objectives of the programme have been achieved in terms of raising awareness about TB, and changing health-seeking behaviour of community people for appropriate and quick initiation of treatment. This is necessary because inadequate knowledge about TB and poor health-seeking behaviour may act as important barriers to service utilization and to successful control of TB. This study explored the awareness and knowledge of health workers and

community people including TB suspects regarding TB and its treatment. In addition, the study explored the health-seeking behaviour of TB suspects, and challenges for the TB programme in implementing DOTS. The findings will help further fine-tuning the programme in terms of resource allocation, programme modifications, etc., and provide a benchmark for future impact assessment.

Objectives

The study aims to investigate:

1. Misperceptions and knowledge of health workers and community people (suspects and non-suspects) about TB, its prevention and treatment
2. Health-seeking behaviour of TB suspects.
3. Challenges for the TB control programme in hard- to- reach areas

Methods and materials

Study areas and population

This cross-sectional survey was conducted in programme defined 'hard-to-reach' *upazilas* (Table 1) and *upazilas* adjacent to the hard-to-reach areas for comparison. The study was conducted in *upazilas* where BRAC's TB control programme is being implemented for many years using the SS-based infrastructure. The study included general population or non-suspect (no history of cough), TB suspects (having cough ≥ 3 weeks), and SS of BRAC. The non-suspects and TB suspects were aged 15 years or more.

Table 1. Distribution of hard-to-reach areas of BRAC's TB programme

Division	District	No. of <i>upazila</i> /cluster	No. of <i>upazilas</i> for study
Dhaka	Manikganj	1	1
Chittagong	Noakhali, Cox's Bazar, Bandarban, Khagrachhari, Rangmati	16	8
Sylhet	Sunamganj, Habiganj, Kishoreganj	8	3
Khulna	Bagerhat	1	1
Barisal	Barisal, Bhola, Patuakhali	4	2
Grand Total		14	30

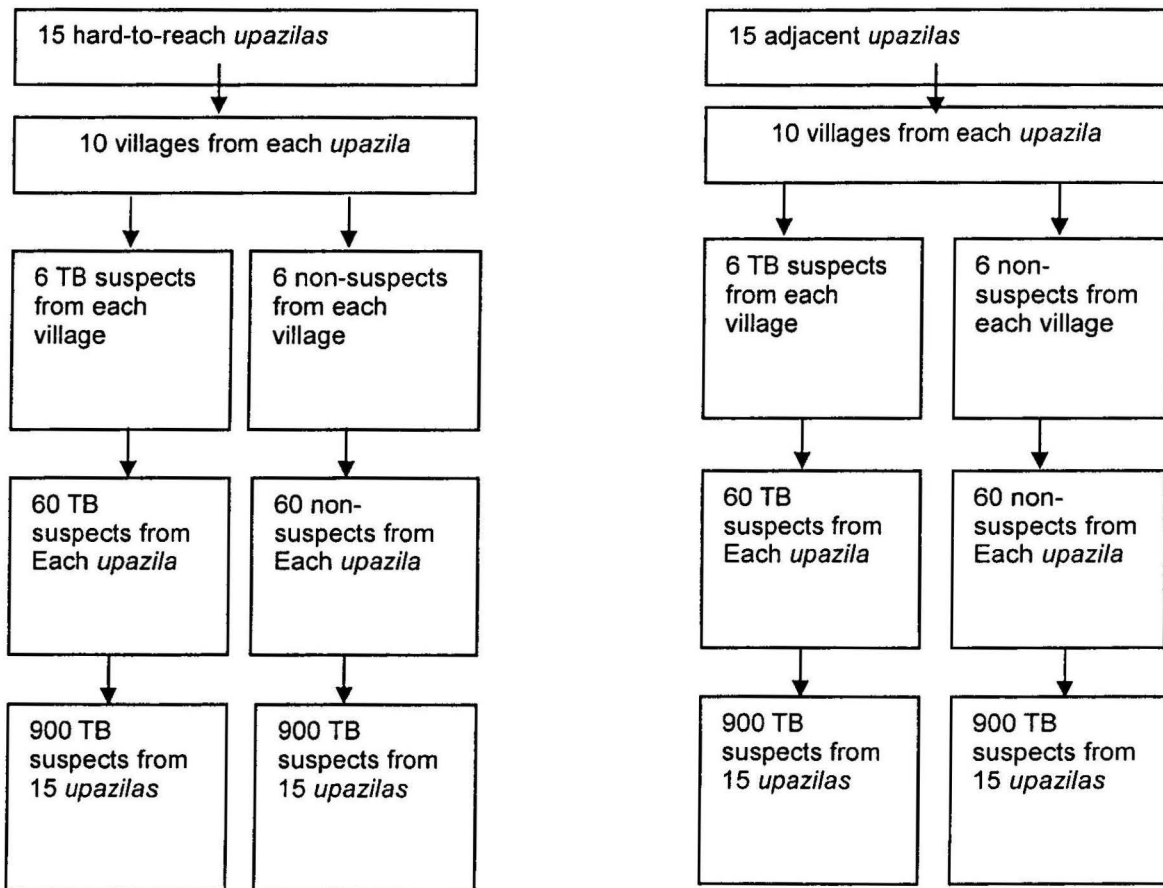
Sampling and sample size

Two stage-purposive sampling techniques were applied in the study. Initially, 15 *upazilas* from hard-to-reach areas and another 15 *upazilas* from areas adjacent to the hard-to-reach *upazilas* were selected randomly (Table 2). Secondly, 10 villages were randomly selected from each *upazila*. Three hundred villages (15x10 villages from each study area) were selected. The sample size was determined on the basis of maximum proportion (0.5) with a 5% significance level and with a 5% precision. The minimum calculated sample size for general population and TB suspects were 400 (for each group). To reduce design effects and keep provision for non-response, it was proposed to increase the sample size to 600 (400x1.5). The analysis was stratified by sex; further we added a design effect 1.5. The ultimate sample was 900 for each group. Thus, six general populations (non-TB suspects) and six TB suspects were selected from each selected village (Fig. 1 and Table 2). The SSs were selected on the basis of availability from each study village (238 SSs).

Table 2. Study *upazilas*

Hard to reach UZs	Adjacent to hard-to-reach UZs
Shibaloy	Harirampur
Hatia	Begumganj
Moheskhali	Teknaf
Ruangchhori	Lama
Panchhori	Matiranga
Mohalchhori	Ramgar
Dighinala	Khagrachhori Sadar
Rajasthali	Kaptai
Kawkhali	Rangamati Sadar
Mongla	Rampal
Hizla	Babuganj
Golachipa	Mirzaganj
Dhormopasha	Chatak
Jamalganj	Dirai
Jagannathpur	Tahirpur

Figure 1. Sampling procedure



Tools development

Three types of questionnaires (structured and semi-structured) were designed for collecting information from SSs, general population, and TB suspects. All the questionnaires were pre-tested in a village outside our sample for ascertaining consistency, appropriateness of languages, sequencing of questions, and to have an insight into the field operation procedure. The final questionnaire was modified and updated on the basis of field-testing. We collected information on the following variables:

For SSs,

- 1) Basic profile of SSs (age, education, income, marital status, years of involvement in health services, number of patients they consult every day)
- 2) Basic knowledge on TB, causes, transmission routes, prevention, and meaning of DOTS,
- 3) knowledge retention of SSs regarding TB messages obtained from health training/refresher training, etc., (Table 3)
- 4) The lists of challenges faced by the SSs in implementing the TB control programme and the role of SSs in solving the challenges.

For general populations and suspects:

- 1) Socio-demographic profile of the respondents,
- 2) Knowledge regarding TB, diagnosis and treatment,
- 3) Knowledge about BRAC TB programme, expectation from the programme,
- 4) Attitudes towards TB, and
- 5) Health-seeking behaviour of the suspects.

Table 4 presents the TB-related information that the programme provides to the health workers in the basic training and refresher training sessions.

Table 3. Information on TB disseminated to health workers by the programme at training sessions

1	If anyone has cough for long time, he/she must consult doctors
2	Cough more than three weeks suggestive symptom of TB
3	TB germ is detected by sputum test
4	Sputum test is free of cost
5	Sputum test is done at government hospital/NGO clinic/medical college/chest disease hospital
6	TB becomes dangerous if it is not treated properly
7	TB medicines should be taken in front of the health workers
8	TB treatment is free
9	TB is curable when TB medicines taken regularly and treatment is completed

Data collection

Skilled interviewers were recruited and a five-day intensive training was given consisting of didactic lectures, mock interviews, role play and field practice at community level. A guideline incorporating all aspects of the study was developed for the field workers. Field trial was done in other villages outside the study areas. The training manual was developed in Bangla to guide the interviewers. The team was deployed in the study villages one day before beginning the survey for rapport building and for households listing. During this time, the villagers were informed about the purpose and activities of

the survey and their cooperation was sought. The interviewers entered the study villages and screened the households to find out the suspects (having cough more than 3 weeks) and non-suspects in one day. TB suspects were identified through house-to-house survey by asking household heads for the presence of individuals with cough for at least three weeks. Similarly, the interviewers took information about non-suspects from household heads. All the respondents were listed and required numbers of suspects (six in numbers) and non-suspects (similar numbers) were taken at random in each village.

Households were visited at three repeated intervals if the first attempt was not successful. 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 households and individuals at random. 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.

Ethical issue

The study was reviewed and approved by the Research and evaluation Division (RED) of BRAC. The institutional ethics committee did not have to be consulted as no invasive intervention was involved. All respondents were informed that their responses would be remained anonymous, and verbal consent was obtained.

Analysis

Data entry and cleaning was done at Dhaka head office under the supervision of the principal investigator. The data analysis was done using SPSS (version 16.0). Univariate (frequency), bi-variate (cross-tabulation) and multi-variate (logistic regression) analyses were done. The wealth quintile was measured. The wealth index developed here is similar to that used in the BDHS survey (BDHS 2007). The index is calculated using a weighted sum of household assets. We used data on household assets and characteristics of the house (source of drinking water, sanitation facilities and type of material used for flooring, roof and walls). To conclude the index we recorded these variables in a dichotomous form and used principal components analysis (PCA) (Rustein and Johnson 2004). Each variable was then assigned a weight based on its loading in the first general factor identified in PCA. The resulting score for each household was standardized with a mean of zero and standard deviation of one. The households were then ranked and assigned a score in the range of one to five; those in the first quintile assigned a score of one, those in the second quintile assigned a score of two, etc. A one score identifies the poorest households and a five score identifies the richest households. All variables are compared for the two study areas (hard-to-reach vs. not hard-to-reach). Those with a total score equal or below the median were classified as having poor knowledge while those above the median were considered to have good knowledge/awareness. All statistical significance tests were 2-sided.

Results

Sociodemographic profile of *Shasthya Shebikas* (SS)

The majority of SSs (57%) in the study were aged between 30 and 49 years with mean age 38 years (Table 4). One-fifth of SSs had no school education, one-third had primary, and the rest (48%) had secondary education. Half of them (53%) were involved in health services for more than six years. One-third was involved in other professions. Mean income of SSs from health services was around Tk. 666 per month. Almost all SSs (97%) of both study areas reported that they attended monthly refresher training. Seventy-five percent of SSs reported that they consulted TB suspects during the last month and 88% of them gave treatment through DOTS.

Table 4. Sociodemographic profile of *Shasthya Shebika* (SS) by study areas (%)

	Hard-to-reach areas	Adjacent areas	All	P- value
Age in years				
<30	29.55	22.06	25.75	
30-39	25.00	22.79	23.88	0.295
40-49	28.03	38.24	33.21	
50 and above	17.42	16.91	17.16	
Mean (\pm SD)	36.9(\pm 12.1)	38.8(\pm 10.6)	37.9(\pm 11.4)	
School education				
No	18.94	19.12	19.03	
Primary (I-V)	28.79	36.76	32.84	0.329
Secondary (VI-X)	52.27	44.12	48.13	
Mean (\pm SD)	5.7(\pm 3.4)	5.1(\pm 3.3)	5.4(\pm 3.3)	0.178
Years involved in health services				
\leq 5 years	50.00	44.12	47.01	
6-10 years	38.64	41.91	40.30	0.597
10+	11.36	13.97	12.69	
Mean (\pm SD)	6.2(\pm 4.6)	6.8(\pm 4.5)	6.5(\pm 4.6)	0.279
Average monthly income from health services (Tk.)	637.5(\pm 599.6)	693.8(\pm 830.9)	666.1(\pm 725.5)	0.524
SSs consulted suspects in last month	74.24	76.47	75.37	0.848
SSs consulted TB patients in last year	84.85	91.91	88.43	0.333
Participated in monthly refresher training regularly	97.73	97.79	97.76	0.971
N	132	136	268	
SSs consulted number of TB suspects in last month				
1-3	51.02	53.85	52.48	0.731
4-6	33.67	34.62	34.16	
7+	15.31	11.54	13.37	
Mean(\pm SD)	4(\pm 2.6)	3.8(\pm 2.5)	3.9(\pm 2.6)	0.831
N	98	104	202	

(Table 4 continued-----)

(-----continued Table 4)

SSs consulted number of TB patients in last year				
1-3	46.43	45.60	45.99	
4-6	27.68	26.40	27.00	0.932
7+	25.89	28.00	27.00	
Mean(\pm SD)	6.5(\pm 9.1)	5.4(\pm 4.6)	6.0(\pm 7.1)	0.520
N	112	125	237	

Basic knowledge of SSs regarding tuberculosis

Nearly half of the SSs (45%) reported that TB was a 'disease of male' (Table 5). The proportion was higher among illiterate SSs (49%) and who (SS) did not consult TB suspects in the last month (59%) (Annex Table 2). Only one-third of the SSs had knowledge about the germ causes TB. However, the knowledge was higher among the SSs having secondary education (40%) (Annex Table 2). They mostly reported about smoking (80%), and unhygienic environment (52%) as the main causes of TB (Table 5). Knowledge of the main transmitting route (sneezing and coughing) was comprehensive in hard-to-reach (96%) and adjacent to hard-to-reach areas (88%), ($p=0.015$) (Table 5). In addition, 49% reported that TB was also transmitted through the used utensils of patients. The ideas of SSs about the possible ways of prevention of TB included avoiding smoking (63%), maintaining good hygienic environment (54%), and avoiding use of patients' utensils. Only one-third (37%) had fair knowledge about BCG vaccination as preventive measure. Further, we found that one-fourth of the SSs (24%) did not know or had no correct knowledge about the meaning of DOTS in TB control (Table 5). However, knowledge about the appropriate meaning of DOTS increased with education ($p=0.000$) and with number of suspects they attended in the last month ($p=0.016$) (Annex Table 2-3).

Table 5. Basic knowledge of *Shasthya Shebika* (SS) about TB by study areas (%)

	Hard-to-reach areas	Adjacent areas	All	P-value
Tuberculosis is a disease of				
Male	37.88	51.47	44.78	
Female	3.79	3.68	3.73	0.077
Both	58.33	44.85	51.49	
*Causes of TB				
Smoking	78.8	80.1	79.5	0.783
Cold weather	27.3	30.9	29.1	0.515
Unhygienic environment	50.8	53.7	52.2	0.632
Contact with TB patients	25.0	19.9	22.4	0.312
TB germ	43.2	29.4	36.2	0.019
*Transmitting routes for TB				
Breath	38.6	42.6	40.7	0.504
Sneezing and coughing	96.2	88.2	92.2	0.015
Spitting	41.7	36.8	39.2	0.411
Patients' utensils	40.2	56.6	48.5	0.007

(Table 5 continued-----)

(---continued Table 5)

*Prevention of TB				
Vaccines	37.9	35.3	36.6	0.660
Avoiding TB patients	35.6	41.2	38.4	0.349
Avoid smoking	66.7	60.3	63.4	0.279
Avoid patients' utensils	44.7	55.1	50.0	0.087
Maintaining hygienic environment	60.6	47.8	54.1	0.035
*Meaning of DOTS				
Taking medicines in front of health workers regularly	72.0	79.4	75.7	0.155
Others	9.1	3.7	6.3	0.069
Do not know	19.7	17.6	18.7	0.667
N	132	136	268	

* multiple response , unhygienic environment: dirty, damp, dusty living condition

Knowledge retention of SSs regarding nine TB-related messages

The SSs were asked to tell spontaneously what they knew about TB from basic/refresher training (Table 6). They frequently reported two messages (out of nine) such as someone should consult a doctor if one had cough for a long time (78%), and cough for more than three weeks indicates suggestive symptom of TB (88%). Knowledge retention seemed lower on diagnosis- and treatment-related messages. The same situation was observed in both the study areas. The overall knowledge retention score of SSs was estimated based on nine basic information about TB (Table 6). An adequate knowledge retention score of TB was estimated if SSs could correctly mention at least four out of nine messages. We found that 53% (55 vs 52%, >0.05, p=0.701) of SSs could remember four or more messages regarding TB (Table 6).

Table 6. Knowledge retention's ability of *Shasthya Shebika* (SS) about TB by study areas (%)

	Hard-to-reach areas	Adjacent areas	All	95% confidence interval	P value
Consult doctor if patient has cough for long duration	77.3	78.7	78.0	73.0-83.0	0.782
Cough more than three weeks indicates suspect of TB	91.0	86.0	88.4	84.6-92.3	0.212
TB is detected by sputum test	46.2	39.0	42.5	36.6-48.5	0.231
Sputum test is free of cost	43.2	57.4	50.4	44.3-56.4	0.020
Sputum test is done at government hospital, NGO clinics/Medical college/ chest hospital/	30.3	19.1	24.6	19.4-29.8	0.034
TB becomes dangerous if it is not treated properly	9.1	11.0	10.1	6.4-13.7	0.598
TB medicines should be taken in front of health worker	25.8	22.8	24.3	19.1-29.4	0.571
TB treatment is free of cost	36.4	30.2	33.2	27.5-38.9	0.280
TB is curable if take full course of treatment	34.9	30.2	32.5	26.8-38.1	0.411
Knowledge retention score (4 & above or adequate score)	55.0	52.0	53.0	49.0-58.0	0.473
N	132	136	268		

The study also explored the association between adequate knowledge retention scores and socioeconomic variables (Table 7). The adequate knowledge retention score of TB increased with age, education level, years involved in health services, regular participation in training, and engagement in another profession, but all were not statistically significant ($p>0.05$).

Table 7. Sociodemographic characteristics of *Shasthya Shebika* (SS) related to an adequate knowledge retention score (%)

Study variables	Knowledge retention score		N
	Adequate (≥ 4)	Inadequate (< 4)	
Age in years			
≤ 35	49.5	50.5	119
35+	56.4	43.6	149
P	0.268		
Programme areas			
Hard-to-reach areas	54.5	45.5	132
Adjacent areas	52.2	47.8	136
p	0.701		
School education			
No	41.2	58.8	51
Primary (I-V)	55.7	44.3	88
Secondary (VI-X)	56.6	43.4	129
p	0.152		
Years involved in health services			
≤ 5	51.6	48.4	126
6+	54.9	45.1	142
p	0.584		
Burden of suspects consulted in last month			
≤ 4	53.7	46.3	134
4+	54.4	45.6	68
p	0.927		
Burden of TB patients consulted in last year			
≤ 6	58.4	41.6	173
6+	54.7	45.3	64
p	0.610		
Participated refresher training regularly			
Yes	53.8	46.2	262
No	33.3	66.7	6
p	0.320		
Engaged in other professions			
Yes	56.8	43.2	95
No	51.5	48.5	173
p	0.397		

- Adequate knowledge retention score was estimated if answered at least 4 or above (median) out of 9 (Table 6), low knowledge retention score was estimated if answered < 4 out of 9 items.

Table 8 gives odds ratios of selected variables indicating probability of adequate knowledge retention score of SSs about TB. Individuals, who were older (2.12 95%CI: 1.03-4.40), had secondary school education (3.37, 95% CI: 1.34-8.49), and participated regularly in refresher training (5.14, 95% CI: 0.46-65.3) had a higher retention ability.

Table 8. Odds ratios of selected variables indicating probability of high knowledge retention score of SSs in study areas

Predictor variables	High knowledge score (≥ 4)			
	β	Odds ratio	95% confidence interval	P value
Age				
≤ 35	0.00	1.00		
35+	0.75	2.12	1.03-4.40	0.043
Programme areas				
Adjacent areas	0.00	1.00		
Hard to reach areas	0.20	1.22	0.65-2.29	0.538
School education				
No	0.00	1.00		
Primary (I-V)	1.01	2.75	1.18-6.45	0.020
Secondary (VI-X)	1.22	3.37	1.34-8.49	0.010
Years involved in health services				
≤ 5	0.00	1.00		
6+	-0.35	0.71	0.35-1.42	0.327
*Burden of suspects consulted in last month				
≤ 4	0.00	1.00		
4+	0.36	1.43	0.72-2.85	0.306
Burden of TB patients consulted in last year				
≤ 6	0.00	1.00		
6+	-0.08	0.93	0.46-1.86	0.831
Participated refresher training regularly				
No	0.00	1.00		
Yes	1.64	5.14	0.41-65.25	0.207
Engaged in other professions				
No	0.00	1.00		
Yes	0.45	1.57	0.82-3.00	0.176
Income from health services(Tk.)				
<500	0.00	1.00		
500+	-0.71	0.49	0.25-0.98	0.042
Constant	-2.34			
Model chi-square	17.74			
Model's p value	0.059			

Table 9 shows the probabilities about knowledge retention scores as outcomes of the effect of various combinations of factors. The knowledge was found maximum (0.81) when the SSs were older (>35 years), had minimum primary education, attended more than four TB suspects in last month, and attended refresher training regularly. The probability was the lowest (9%) when SSs had no education, attended less than four, and attended refresher training irregularly.

Table 9. Estimated probabilities of adequate knowledge of *Shasthya Shebika* (SS) regarding TB by combination of predictors

Combination of factors	Estimated probabilities of SS's adequate knowledge
1. Age 35+, having at least primary education, SSs attended > 4 TB suspects in last month and participating in refresher training regularly	0.81
2. Age 35+, having at least primary education, burden of suspects attended ≤4 in last month and participating in refresher training regularly	0.74
3. Age 35+, having at least primary education, burden of suspects attended 4+ in last month and participating in refresher training regularly	0.60
4. Age 35+, having no institutional education, burden of suspects attended 4+ in last month and not participating in refresher training regularly	0.45
5. Age 35+, having no institutional education, burden of suspects attended ≤4 in last month and not participating refresher training regularly	0.09

Note: Above probabilities are calculated from the estimated coefficients of Table 8 by using the following equation: $P = \exp(a + \sum b_i x_i) / [1 + \exp(a + \sum b_i x_i)]$

Activities of SSs and problems that they faced in the TB control programme

The SSs were mainly involved in referring patients to health facilities for sputum examination (46%) and ensuring DOTS during treatment (26%), rather than delivering TB messages in the community (44%) (Table 10). They also reported problems that they faced especially in hard-to-reach areas; these included difficulties in moving for TB activities (60%), and non-compliance of treatment by community patients (24%). However, poverty of SSs (28%) and lack of trust on SSs' management (20%) were noted in non-hard-to-reach areas. Lack of awareness about TB (12%), social stigma (12%), and dependency on decisions by others (12%) were cited by SSs in both areas. The SSs were asked to mention the ways to improve the TB control programme in study areas. The answers in both study areas included that the SSs of the TB control programme should be highly motivated (41%), and performance-based incentives for SSs should be provided in the TB programme (26%). However, more establishments of sputum centres (18%), more recruitment of SSs (17%), and arrangement of transport for movement (14%) were noted in hard-to-reach areas.

Table 10. Activities of *Shasthya Shebika* (SS) in TB control programme and problems faced in programme by study areas (%)

	Hard-to-reach areas	Adjacent areas	All	P-value
SSs delivered TB messages	40.2	47.8	44.0	0.210
SSs ensured DOTS	29.5	22.8	26.1	0.208
SSs referred patients to health centre for sputum examination	43.2	48.5	45.9	0.381
SSs involved in social mobilization	25.0	28.7	26.9	0.492
SSs faced problem with TB programme	54.5	39.7	47.0	0.015
N	132	136	268	
Types of problem				
Difficulties in moving with TB programme in catchment areas	59.7	35.2	49.2	0.006
Poverty of SSs	22.2	27.8	24.6	0.473
Dependency on others' decision at patients' home	15.3	7.4	11.9	0.177
Social stigma	4.2	14.8	8.7	0.038
Lack of trust on SSs health management	5.6	20.4	11.9	0.011
Unwillingness of patients in taking medicine regularly	23.6	3.7	15.1	0.001
Ways of overcoming the problems				
Increase number of sputum examination centres in catchment area	18.1	3.7	11.9	0.014
Easy, accessible transportation system should be established for health workers	13.9	9.3	11.9	0.427
More SSs should be included in the programme to reduce workload	16.7	7.4	12.7	0.122
SSs should be paid for better performance	18.1	37.0	26.2	0.016
SSs should be motivated to work with TB programme	37.5	44.4	40.5	0.431
MBBS doctors should be involved in TB control programme	12.5	3.7	8.7	0.075
Weekly meeting should be organized for health workers	9.7	13.0	11.1	0.566
SK/PO should be involved in motivating TB patients	6.9	11.1	8.7	0.305
N	72	54	126	

II. The community

Socioeconomic characteristics of community respondents

The majority of suspects and non-suspects in the study were aged between 30-59 years, mean 41 years (Table 11). They were predominantly Muslim (64-77%). Half of them (47-52%) could read and write letters, but the majority of them (54-59%) did not have school education. Nearly 50% of respondents were not involved in income generating activities. However, the majority of the earning people did not earn more than Tk. 5,000 per month. More than 50% of the respondents reported that their households passed deficit economy during the last year. About two-third of households had smokers. At least 10% of the households had TB patients. Two-third of the respondents had a BCG scar on the left arm. The average number of adults (>15 years) in a household was four. The main occupation of the respondents was farming (10-14%), daily labour (12-14%), and business (10-11%). The females were mostly involved in household chores or as housewives.

Table 11. Socio-demographic characteristics of TB suspects and non-suspects by study areas (%)

	Hard-to-reach areas			Adjacent areas			P-value cvs. f
	Suspect a	Non-suspect b	All c	Suspect d	Non-suspect e	All f	
Age in years							
15-29	22.0	34.9	28.4	21.6	31.7	26.6	
30-44	29.9	36.8	33.4	27.6	33.1	30.4	0.016
45-59	25.4	19.2	22.3	28.9	24.2	26.6	
≥60	22.7	9.1	15.9	21.9	11.0	16.4	
Mean years	43.6	36.7	40.2	44.2	38.6	41.4	0.017
Religion							
Muslim	64.7	64.1	64.4	78.2	75.2	76.7	0.000
Non-muslim	35.3	35.9	35.6	21.8	24.8	23.3	
Education							
Can read and write letter	40.0	54.4	47.2	43.4	59.9	51.6	0.008
No school education	56.8	41.2	49.0	53.6	36.9	45.3	
Primary	16.6	21.3	18.9	19.2	22.0	20.6	0.007
Secondary	26.6	37.4	32.1	27.2	41.1	34.1	
Mean years	3.0	4.3	3.7	3.2	4.7	4.0	0.049
Have monthly income	46.2	51.3	48.8	45.5	53.2	49.4	0.726
Perceived economy in last year							
Surplus	6.6	14.8	10.7	6.7	15.4	11.1	
Equal	31.7	38.0	34.8	33.3	39.6	36.4	
Deficit	61.7	47.2	54.5	60.0	45.0	52.5	0.494
Have smoker in the house	65.7	62.2	63.9	66.9	64.9	65.9	0.226
House Had TB patient	12.3	6.6	9.4	10.8	8.3	9.6	0.905
Left arm had BCG mark	61.8	60.3	61.1	65.1	71.4	68.3	0.000

(Table 11 continued----)

(---continued Table 11)

Average adult members in houses (>15 years)	3.9	3.9	3.9	4.0	3.9	4.0	0.636
Occupation							
Farmer	13.3	13.8	13.6	10.1	8.8	9.5	
Day labour	12.2	11.6	11.7	14.7	13.2	14.0	
Self employment	2.3	2.2	2.3	4.0	3.3	3.7	
Job	2.7	6.4	4.6	2.3	7.1	4.6	0.002
Business	8.2	11.3	9.8	8.0	14.2	11.1	
Housewife	37.3	41.8	2.5	36.9	39.6	38.2	
Jobless	13.6	6.0	9.8	14.1	6.1	10.1	
Student	5.0	4.8	4.9	3.2	5.0	4.1	
Others	5.4	2.1	3.8	6.7	2.7	4.7	
N	900	900	1800	899	900	1799	

Knowledge of TB by general and TB suspects

The majority of the respondents (46-57%) in both the study areas reported that TB was a 'disease of male' rather than a 'disease of both sexes' (32-46%) (Table 12). Very few (8-13%) knew the germ cause of TB. However, cigarette smoking was frequently cited as main cause (86-88%). Further, in both the areas two-third of the respondents reported that TB was transmitted through sneezing and coughing. The richest knew more (74%) than the poorest (57%) (Annex Table 4). The difference was also observed by education and sex. In addition, 46% reported that TB was also transmitted through patients' utensils. Almost all the respondents had an idea about different ways of prevention of TB. Avoiding smoking (56-60%) and avoiding patients' utensils (33-36%) were cited commonly as preventive strategies. One-fourth had fair knowledge about BCG vaccination against TB (Table 12). The knowledge about BCG vaccination increased with secondary education (36%) and household assets (richest wealth quintal, 40%) (Annex Table 5). The respondents were also asked to report where TB was commonly found. Nearly half of them reported that TB was commonly found among poor people (42-49%) and in crowded areas (39-47%) (Table 12). More than 90% of respondents knew about prolonged cough as suggestive symptom of TB. On the other hand, many of them did not know other associated symptoms such as fever, weight loss, loss of appetite, weakness, and bloody sputum, etc. (Table 12).

Table 12. Basic knowledge of TB suspects and non-suspects about TB by study areas (%)

	Hard-to-reach areas			Adjacent areas			P-value cvs. f
	Suspect a	Non-suspect b	All c	Suspect d	Non-suspect e	All f	
Who is affected by TB							
Male	43.2	49.3	46.3	53.8	59.9	56.9	0.000
Female	8.1	5.3	6.7	12.5	6.8	9.6	
Both	47.8	44.6	46.2	31.6	32.1	31.6	
*Cause of TB							
Smoking (cigarette)	84.8	91.2	88.0	85.2	87.4	86.3	0.133
Exposure to cold	33.0	23.7	28.3	31.4	27.7	29.5	0.412
Hazardous environment	27.0	29.8	28.4	31.1	30.1	30.6	0.161
Contact with TB patients	9.4	10.3	9.9	9.2	14.1	11.7	0.084
TB germ	11.4	14.2	12.8	9.0	6.1	7.6	0.000
*Symptoms of TB							
Fever	34.4	42.1	38.3	39.4	36.4	37.9	0.820
Chronic cough	94.6	94.3	94.4	94.5	94.4	94.5	0.945
Weight loss	8.2	10.1	9.2	12.0	13.0	12.5	0.001
Weakness	29.7	21.4	25.6	23.4	25.8	24.6	0.495
Loss appetite	14.3	12.6	13.4	13.0	9.3	11.2	0.038
Blood sputum	20.2	20.4	20.3	23.4	25.7	24.5	0.003
Chest pain	16.7	10.2	13.4	17.7	13.1	15.4	0.095
*TB is transmitted							
Breath	26.7	23.4	25.1	21.1	24.3	22.7	0.103
Sneezing-coughing	61.1	65.8	63.4	60.6	69.9	65.3	0.256
Patient's sputum	18.0	17.2	17.6	22.9	20.9	21.9	0.001
Patient's used utensils	44.3	47.3	45.8	46.7	44.7	45.7	0.959
No idea	5.7	5.0	5.3	5.9	4.2	5.1	0.710
*Prevention of TB							
BCG vaccine	28.1	30.8	29.4	19.8	23.8	21.8	0.000
By avoiding TB patients	22.2	19.2	20.7	27.1	27.6	27.3	0.000
By avoiding smoking	56.0	63.4	59.7	53.7	57.9	55.8	0.245
By avoid patient's utensil	29.1	28.4	28.8	37.5	34.6	36.0	0.000
By maintaining hygiene	31.7	32.1	31.9	30.0	31.2	30.6	0.415
TB occurs frequently in							
Living area of TB patients	21.2	12.6	16.9	12.6	13.8	13.2	0.002
Crowd	42.7	50.3	46.5	34.5	43.2	38.9	0.000
Among poor people	40.7	43.6	42.1	52.1	46.1	49.1	0.000
No idea	8.6	8.9	8.7	9.6	8.0	8.8	0.949
N	900	900	1800	899	900	1799	

*Multiple responses

Half of them (49%) correctly knew the exact duration of cough (3 weeks) that indicates that the patients might have TB (Table 13). Young (59%), having secondary education (62%), and those living in surplus economy (63%) knew better (Annex Table 6). The poorest knowledge was observed in the poorest wealth quintile (39%). A great majority (two-third) had knowledge about government hospital and BRAC for sputum examination (Table 13). The knowledge about free sputum examination was fair (72%), however, still one-third (28%) did not know it (Table 13). The knowledge increased with education and the richest wealth quintiles (Annex Table 7). The main sources of free sputum examination were neighbours (43-52%) and mass media (38%). Only one-third received the information from SSs. More than 90% were aware of TB medicines (Table 13).

Table 13. Knowledge of TB suspects and non-suspects about TB diagnosis and treatment study areas (%)

	Hard-to-reach areas			Adjacent areas			P-value cvs. f
	Suspect a	Non- suspect b	All c	Suspect d	Non- suspect e	All f	
Duration of cough indicates patient might have TB							
One week	5.3	10.2	7.8	5.0	7.0	6.0	0.220
Two weeks	12.6	14.6	13.6	15.9	14.2	15.1	
Three weeks	47.3	51.0	49.2	44.4	53.2	48.8	
Four weeks and above	29.6	20.5	25.0	28.7	22.8	25.7	
No idea	5.2	3.7	4.4	6.0	2.8	4.4	
Place where sputum test is done							
Govt. hospital	65.2	68.4	66.8	61.3	68.0	64.6	0.167
BRAC	61.8	61.8	61.8	65.7	62.2	64.0	0.172
Private clinics	2.6	2.6	2.6	2.7	1.7	2.2	0.444
No idea	4.4	3.7	4.1	5.0	2.9	3.9	0.868
Awareness about free sputum test							
Yes	70.7	70.1	70.4	72.5	71.3	71.9	0.267
Sources of TB information							
Self	16.3	13.3	14.8	12.7	15.0	13.8	0.396
Family members	13.4	10.6	12.0	19.8	16.6	18.2	0.000
Neighbours	42.1	44.1	43.1	52.8	51.1	52.0	0.000
Shebika	42.3	41.8	42.1	38.0	32.0	35.0	0.000
Mass media	31.2	45.4	38.3	33.0	40.4	36.7	0.324
Appropriate treatment of TB							
TB medicines	92.8	94.2	93.5	90.2	92.2	91.7	0.041
Blessing	2.3	1.2	1.8	2.0	2.8	2.4	0.198
Rest	8.8	8.1	8.4	8.5	8.6	8.5	0.948
No idea	2.4	2.4	2.4	4.8	3.9	4.3	0.002
Place/providers of TB treatment							
Govt. hospital	63.8	66.2	65.0	59.8	66.0	62.9	0.195
BRAC	64.1	64.9	64.5	66.9	63.7	65.3	0.634
Private clinics	1.8	2.2	2.0	1.8	2.7	2.2	0.641
Village doctors	4.2	3.3	3.8	2.8	2.4	2.6	0.047
No idea	3.2	3.2	3.2	5.1	3.4	4.3	0.095

(Table 13 continued----)

(---continued Table 13)

Awareness about free treatment policy							
Yes	72.9	74.9	73.9	73.5	76.3	74.9	0.474
Standard TB treatment lasts for							
<6 months	32.2	32.2	32.2	35.6	36.2	35.9	0.027
6 months	46.3	51.4	48.9	46.4	46.0	46.2	
7 month and above	8.7	5.8	7.2	8.8	7.6	8.2	
No idea	12.8	10.6	11.7	9.2	10.2	9.7	
N	900	900	1800	899	900	1799	

In both the areas almost 70% of the respondents had heard about BRAC's TB control programme, mainly from SSs (68-71%) (Table 14). Two-third (65%) knew about TB treatment given at community level by BRAC. Further, 75% of the respondents had knowledge about free TB treatment. Knowledge varied with education and wealth quantities (Annex Table 8). More than half of the respondents in both the areas did not know about the standard duration of TB treatment (six months).

Table 14. Knowledge of general populations and TB suspects about BRAC TB programme activities by study areas (%)

	Hard-to-reach areas			Adjacent areas			P-value* cvs. f
	Suspect a	Non-suspect b	All c	Suspect d	Non-suspect e	All f	
Awareness about BRAC TB programme							
Yes	66.2	69.6	67.9	72.5	69.4	71.0	0.044
How far BRAC							
<1/2 km	29.9	34.7	32.3	34.5	44.3	39.3	0.000
½ to 1 km	25.7	17.9	21.7	31.6	27.0	29.4	
More than 1 km	44.1	45.5	44.8	33.0	27.0	30.1	
Do not know	0.3	1.9	1.1	0.9	1.6	1.3	
Who told you about the programme							
Shebika	70.8	71.2	71.0	71.8	64.6	68.3	0.136
Neighbour	57.2	53.5	55.3	60.9	61.1	61.0	0.004
Doctors	7.6	10.2	8.9	3.4	4.5	3.9	0.000
N	596	626	1222	652	625	1277	

Knowledge score

Overall knowledge was calculated based on 10 TB messages (Table 15). Knowledge score was estimated by using a median. Seven or more correct answers are defined as adequate knowledge. Around 58% of the respondents had adequate knowledge about TB. No knowledge difference was observed between the two study areas.

Table 15. Knowledge of people regarding ten TB-related messages

Awareness of TB information	%
1. Awareness about both male and female get TB	39.0
2. Awareness about germ cause of TB	10.2
3. Awareness about suggestive symptom (prolonged cough) of TB	94.5
4. Awareness about the route of transmission (sneezing and coughing) of TB	64.4
5. Awareness about appropriate place of sputum test*	94.5
6. Awareness about free policy of sputum test	71.2
7. Awareness about allopathic treatment of TB	92.6
8. about free policy of TB treatment	74.4
9. about standard treatment lasts for six months	47.5
10. Awareness about BRAC TB control programme	69.4

Knowledge score was estimated on the basis of median. If one could answer seven or more is defined as adequate knowledge

*appropriate places were the facilities that national TB control programme identified for sputum test

However, the knowledge scores increased with education ($p < 0.0001$), assets ($p < 0.001$), awareness about BRAC's TB programme ($p < 0.001$), exposure to doctors ($p < 0.001$), and when BRAC TB office was situated within half kilometer of respondents' house ($p < 0.001$) (Table 16). The study also applied logistic model to calculate odds to explore the association between knowledge scores (dependent variables), and other socio-demographic variables (independent variables) (Table 17). We found that the richest were two times more knowledgeable compared to the poorest. Controlling all the factors, we observed that the respondents were more knowledgeable when received information from SSSs (Odds:3.5) compared to doctors (Odds: 2.78) and community people (Odds: 1.77).

Table 16. Sociodemographic characteristics related with knowledge score of TB (%)

Study variables	Knowledge scores		N
	Adequate*	Not adequate	
Sex			
Male	58.3	41.7	1782
Female	57.9	42.1	1817
p		0.813	
Age			
15-29	63.1	36.9	991
30-44	59.9	40.1	1146
45+	53.4	46.6	1462
p		0.000	
Programme areas			
Hard to reach areas	58.4	41.6	1800
Adjacent areas	57.8	42.2	1799
p		0.685	
Types of the respondents			
Suspect	57.0	43.0	1799
Non-suspect	59.2	40.8	1800
p		0.177	

(Table 16 continued----)

(---continued Table 16)

School education			
No	52.4	47.6	1696
Primary	55.1	44.9	712
Secondary	68.1	31.9	1191
p		0.000	
Income of the respondents (in Tk.)			
No	59.3	40.7	1833
≤5000	55.5	44.5	1277
5000+	60.3	39.7	489
p		0.062	
Perceived economy in last year			
Surplus	66.8	33.2	391
Equal	63.7	36.3	1282
Deficit	52.6	47.4	1926
p		0.000	
Wealth quintiles			
Poorest	47.7	52.3	719
Second	52.4	47.6	720
Middle	56.9	43.1	728
Fourth	64.6	35.4	731
Richest	69.2	30.8	701
p		0.000	
Awareness about BRAC TB control programme			
Yes	75.8	24.2	2499
No	17.8	82.2	1100
p		0.000	
How TB Programme was informed			
BRAC health workers (<i>Sebika</i>)	80.4	19.6	1740
p		0.000	
Community people	75.7	24.3	1455
p		0.000	
Doctors	83.6	16.4	159
p		0.000	
Distance to BRAC			
<half kilometer	73.4	26.6	897
>half kilometer	53.0	47.0	2672
p		0.000	

*Adequate knowledge score is estimated if answered at least 7 (median) out of 10

Table 17. Odds and log odds ratios of selected variables indicating probability of adequate knowledge score of the respondents about tuberculosis

Predictor variables	Knowledge score			
	β	Odds ratio	95% confidence interval	P value
Sex				
Male	0.19	1.21	0.98-1.49	0.071
Female	0.00	1.00		
Age in years				
15-29	0.25	1.29	1.02-1.61	0.031
30-44	0.25	1.29	1.05-1.58	0.015
45+	0.00	1.00		
Programme areas				
Hard to reach areas	0.00	1.00		
Adjacent areas	0.17	1.19	1.00-1.40	0.047
Types of the respondents				
Suspect	0.00	1.00	0.85-1.19	0.966
Non-suspect	0.00	1.00		
School education				
No	0.00	1.00		
Primary (I-V)	-0.04	0.96	0.77-1.21	0.754
Secondary (VI-X)	0.28	1.33	1.06-1.66	0.015
Income of the respondents (in Tk.)				
No	0.00	1.00		
≤ 5000	-0.11	0.90	0.72-1.11	0.313
5000+	-0.42	0.66	0.49-0.89	0.007
Perceived economy in last year				
Surplus	0.37	1.45	1.07-1.98	0.017
Equal	0.38	1.47	1.22-1.77	0.000
Deficit	0.00	1.00		
Wealth quintiles				
Poorest	0.00	1.00		
Second	0.09	1.09	0.84-1.42	0.493
Middle	0.26	1.29	0.99-1.69	0.058
Fourth	0.58	1.79	1.35-2.36	0.000
Richest	0.75	2.11	1.55-2.87	0.000
Awareness about BRAC TB control programme				
Yes	1.60	4.96	3.59-6.85	0.000
No	0.00	1.00		
TB Programme was informed by <i>Sebika</i>				
Yes	1.25	3.49	2.74-4.44	0.000
No	0.00	1.00		
TB Programme was informed by Community people				
Yes	0.57	1.77	1.40-2.24	0.000
No	0.00	1.00		
TB Programme was informed by Doctors				
Yes	1.02	2.78	1.72-4.48	0.000
No	0.00	1.00		
Distance to BRAC health centre				
<half kilometer	-0.31	0.73	0.60-0.90	0.003
>half kilometer	0.00	1.00		
Constant	-2.36			
Model chi-square	1333.40			
Model's p value	0.0000			

Table 18 shows the probabilities of knowledge scores of the respondents as outcomes of the effect of various combinations of factors. The knowledge was found maximum (0.77) when the respondents were aware of TB control programme of BRAC, received information on TB from the SSs, BRAC' TB office was situated within half kilometer, respondents were richest, and at least had secondary education. However, the probability of knowledge was only 14% when one never heard about BRAC's TB control programme, had not received information from the SSs, but received information from community people, BRAC TB office was situated more than half kilometer away from the community, when respondents were the poorest and had no education.

Table 18. Estimated probabilities of adequate knowledge of the respondents regarding TB by the combination of predictors

Combination of factors	Estimated probabilities of respondent's adequate knowledge
1. Aware about BRAC TB programme, receive information on TB from SS, situation of BRAC TB office within half kilometer, richest and at least having secondary education	0.77
2. Aware about BRAC TB programme, received information from SS, situation of BRAC TB office within half kilometer, richest in wealth quintiles and having no education	0.72
3. Aware about BRAC TB programme, receive information on TB from SS, situation of BRAC TB office within half kilometer, poorest and at least having secondary education	0.61
4. Aware about BRAC TB programme, receive information on TB from SS, situation of BRAC office/SS home within half kilometer, poorest and having no education	0.54
5. Not aware about BRAC TB programme, not receive information on TB from SS but from community people, situation of BRAC office/SS home more than half kilometer, richest and having secondary education	0.32
6. Not aware about BRAC TB programme, not receive information on TB from SS but from community people, situation of BRAC office/SS home more than half kilometer, richest and no education	0.26
7. Not aware about BRAC TB programme, not receive information on TB from SS but from community people, situation of BRAC office/SS home more than half kilometer, poorest and having secondary education	0.18
8. Not aware about BRAC TB programme, not receive information on TB from SS but from community people, situation of BRAC office/SS home more than half kilometer, poorest and having no education	0.14

Note: Above probabilities are calculated from the estimated coefficients of Table 17 by using the following equation: $P = \exp(a + \sum b_i x_i) / [1 + \exp(a + \sum b_i x_i)]$

Attitudes of the respondents towards TB

In both the areas a significant proportions of the respondents (41-47%) were afraid of TB and became sad if they got TB (Table 19). Half of the respondents were not willing to talk to TB patients, and the rest would be sympathized and helpful. The majority of the respondents would tell TB suspects to go to the government hospital (52-54%), and NGO clinics (47-52%) for taking treatment. Only one-third (29-30%) in both the areas would tell the TB suspects to take sputum examination. Almost two-third of the respondents perceived that TB treatment could be taken in front of community people. The study also explored the views of community people towards TB patients. The majority reported that community people would stay away from TB patients (52-56%), or community people would want TB patient to be isolated from community people (42%).

Table 19. Attitudes of study populations towards TB and its management by study areas (%)

	Hard-to-reach areas			Adjacent areas			P-value cvs. f
	Suspect a	Non- suspect b	All c	Suspect d	Non- suspect e	All f	
When someone has chronic cough							
I will ask to test sputum	30.3	30.1	30.2	27.7	29.6	28.6	0.294
Ask to go to hospital	52.1	56.8	54.4	50.2	54.2	52.2	0.176
Ask to go to NGOs	50.6	52.6	51.6	46.8	46.1	46.5	0.002
I perceived that TB treatment can be taken in front of people	63.4	68.2	65.8	69.9	73.3	71.6	0.000
If you have TB							
I get afraid	46.7	45.8	46.2	43.7	38.1	40.9	0.001
I become surprised	4.9	4.8	4.8	7.0	7.8	7.4	0.001
I become sad	33.0	35.4	34.2	31.7	35.7	33.7	0.734
I will be ashamed	2.7	3.6	3.1	3.4	3.7	3.6	0.456
I will be embarrassed	2.9	2.7	2.8	2.4	4.4	3.4	0.248
I will go to a doctor	9.1	9.4	9.3	10.8	9.3	10.1	0.427
Have willingness to talk to TB patients							
Yes	51.0	55.7	53.3	48.4	49.1	48.8	0.006
Your feelings towards TB patients							
I will be sympathized and helpful	52.0	53.0	52.5	47.6	50.6	49.1	0.040
I will be sympathized But keep distance	23.8	26.6	25.2	38.0	27.9	33.0	0.000
I will be simply stayed away from patients	7.1	4.4	5.8	7.6	6.8	7.2	0.001
I will be stayed away as it is infectious	19.9	18.7	19.3	14.9	15.0	15.0	0.090
Your community's views towards TB patients							
People want TB patient should be isolated	45.7	37.8	41.7	43.7	40.0	41.9	0.935
People want to stay away from patients	53.7	58.4	56.1	51.9	52.2	52.1	0.017
People are not interested to help	6.4	7.1	6.8	5.9	5.2	5.6	0.129
People want to help TB patients	11.3	11.4	11.4	5.9	8.4	7.2	0.000
N	900	900	1800	899	900	1799	

Health-seeking behaviour of TB suspects

20). About two-third (68%) of them received treatment for cough in both the areas. The first initiation time for treatment was 10 days. The older people (>45 years) delayed in initiating treatment (Annex Table 9). Those who perceived that TB could be treated in front of people, and who did not have problem to talk to TB patients they initiated treatment for cough early (<15days) (Annex Table 9). Further, early initiation was associated with income and well off families (Annex Table 9). The respondents already received treatment for cough at least three times in both areas. Most respondents (95%) received allopathic treatment mainly from village doctors (26-35%), drug shop attendants (35-36%) rather than government hospital (21%-27%) and MBBS doctors (17-20%) in both areas. Around 5% of the respondents reported death of households' members due to prolong cough in last year. Among the TB suspects, only one-third took sputum test before interview (Table 20). Two-third of them did not have sputum test as they considered nothing serious (36-44%), lack of money (15-20%), and did not like TB medicines (12-16%). Besides the health workers (60%), the respondents were influenced mainly by neighbours (32%) and family members (27-32%) for taking sputum test. They did it mainly at BRAC (64-76%), the proportion was higher in 'not hard-to-reach' areas.

Table 20. Health-seeking behaviour of TB suspects by sex and study areas (%)

	Hard-to-reach areas			Adjacent areas			P value cvs. f
	Male a	Female b	All c	Male d	Female e	All f	
Duration of cough (Median weeks)	6.4	5.7	6.0	6.4	5.7	6.3	0.734
Treatment taken for cough	67.7	68.5	68.1	68.2	69.3	68.8	0.80
N	433	467	900	446	450	896	
First treatment initiation (median days)	10.0	10.0	10.0	10.0	10.0	10.0	0.015
Treatment taken in times (mean times)	3.4	3.2	3.3	3.2	2.3	2.7	0.050
Nature of treatment taken							
Homeopath	6.8	6.9	6.9	6.2	7.4	6.8	0.982
Allopath	95.9	94.7	95.3	96.4	96.2	96.3	0.385
Traditional	2.7	3.4	3.1	3.0	1.6	2.3	0.370
Others	0.7	0.0	0.3	0.0	0.6	0.3	0.996
Places of treatment							
MBBS doctor	20.1	13.7	16.8	20.1	18.9	19.5	0.223
Village doctor	33.1	36.1	34.7	23.7	28.8	26.3	0.001
Drug shop	35.8	34.3	35.0	34.5	37.8	36.2	0.680
Government hospital	27.0	27.7	27.4	21.7	20.2	20.9	0.008
BRAC/ NGO clinic	10.6	12.1	11.4	19.4	11.2	15.3	0.039
n	293	320	613	304	312	616	
Took sputum test	30.0	30.6	30.3	31.4	27.6	29.5	0.718
N	433	467	900	446	450	896	
The time between symptom initiation and sputum test (median days)	25.0	25.0	25.0	30.0	27.5	30.0	0.171

(Table 20 continued----)

(---continued Table 20)

Place of sputum test							
Government hospital	41.5	32.2	36.6	23.6	25.8	24.6	0.003
BRAC/NGO	60.8	67.1	64.1	77.1	75.0	76.1	0.002
Private clinic	3.8	4.9	4.4	3.6	2.4	3.0	0.404
Spent money for test	19.2	18.2	18.7	11.4	12.1	11.7	0.025
Amount in Tk. (median)	100.0	200.0	180.	140.0	200.0	200.0	0.409
			0				
Distance to sputum centers							
<1 km	23.8	27.3	25.6	21.4	24.2	22.7	
1-2 km	10.8	12.6	11.7	30.0	32.3	31.1	0.000
2-3 km	16.9	11.9	14.3	22.1	15.3	18.9	
3-4 km	12.3	11.2	11.7	5.7	5.6	5.7	
>4 km	36.2	37.1	36.6	20.7	22.6		
Who influenced you to do sputum test							
<i>Shebika</i> /BRAC	53.8	63.6	59.0	61.4	58.9	60.2	0.702
Neighbours	41.5	23.8	32.2	32.2	29.8	31.1	0.077
Family	25.4	28.7	27.1	27.1	37.9	32.2	0.196
Self	12.3	7.3	9.9	14.3	8.9	11.7	0.489
How did you go there							
On foot	44.6	37.8	41.0	32.4	29.0	30.8	0.013
Public transport	28.5	30.1	29.3	29.5	35.5	32.3	0.468
Rickshaw	19.2	24.5	22.0	27.3	24.2	25.9	0.304
Van	5.4	4.9	5.1	10.1	9.7	9.9	0.037
Boat	6.9	7.7	7.3	1.4	1.6	1.5	0.001
TB germ was found	14.6	15.4	15.0	18.6	16.7	17.4	0.749
n	130	143	273	140	124	264	

Discussion

The national TB control programme in Bangladesh is performing well in recent times (NTP 2010, NTP 2011). However, BRAC, partner of NTP in community-based TB control programme through DOTS approach, is facing problems in effectively implementing the programme in hard-to-reach areas such as the fish-bow lakes, hill tracts and coastal areas. This study was conducted to investigate current status of knowledge, practice, health-seeking behaviour, etc. related to TB among the DOTS providers and the community people. Findings reveal poor state of knowledge among both the SSs and the community people. There exist substantial misperceptions among them regarding TB, and attitude of stigma against TB patients was widely prevalent. Health-seeking behaviour of patients with more than three weeks duration was poor. The geographical distance, treatment non-compliance, and lack of trust in SSs' management were identified as the major constraints in hard-to-reach areas for implementing TB programme efficiently. The implications of these for programme improvement are discussed and some relevant recommendations are made.

It is disheartening to observe that even after five years of programme implementation (under GFATM funding), various misperceptions regarding TB, its causation and prevention were widely prevalent not only among the community, but also the health workers. The most common misperception among them was that TB is 'a disease of only male' while in Afghanistan people perceived that it was a disease of female (Islam *et al.*

2008). Whatever the underlying reasons are, such misperception could halt the care-seeking of any person in time. Further, acquiring TB through sharing patients' used cutlery was another common misperception, as was also observed in Pakistan and Philippines (Mushtaq *et al.* 2010 and Navio *et al.* 2002). This could instigate social stigma among patients, families and communities. The TB IEC campaigns need to work more intensively to remove such misperceptions. Hence, health education might be a suitable way to fight the strong stigma attached to TB.

Again, the widely held perception in both the areas was that TB is primarily caused by smoking. Similar misperception was also reported from Ethiopia and Tanzania (Mesfin *et al.* 2005, Mangesho *et al.* 2007). They did not link TB germs to the causation of TB. The practical implication of this is that the non-smokers think themselves immune from TB and hence, would not seek appropriate care. Also, stigmatizing TB patients would have great impact on the social, psychological and mental well-being of the victim and also his/her family. This could have dire consequences in a society where informal social organizations play a pivotal role in the daily lives of individuals.

The SSs are involved in TB control activities for many years. It was surprising to find that many of them did not know the meaning of DOTS, like those in Nigeria (Dosumu 2008). This would limit SSs' ability to develop awareness among the community and motivate the suspects to seek appropriate care. Further, many of the SSs were found not to be optimally motivated to work in TB control and were not delivering TB messages in the community. In a study done in Ethiopia, the researchers found that health workers were fearful of encountering TB patients and did not want to deliver messages (Mesfin *et al.* 2005). The programme should try to find out the reasons; otherwise, it would be difficult for implementing TB control effectively by the SSs.

Even after five years of programme intervention, the knowledge of community people on TB was not of expected level. This is not surprising as knowledge is strongly rooted in tradition and culture. Similar low level of knowledge is also observed in many other TB burden countries (Sharma *et al.* 2007, Mangesho *et al.* 2007, Banerjee *et al.* 2000, Gelaw *et al.* 2001, Dong *et al.* 2001, Edgintonet *et al.* 2002). The people with traditional beliefs may not visit health facilities. Even, their lack of knowledge could hamper adherence to the standard duration of treatment and could increase the multidrug resistance TB. Plausibly, their knowledge was found to increase with education, assets, awareness of BRAC TB programme, exposure to doctors, and the BRAC TB office situated within half kilometer of respondents' house. Now, the programme should focus on those who lagged behind in knowledge and awareness for rapid tangible improvements.

Further, due to low level of knowledge and awareness, stigma against TB patients was found to be quite dominant in the study communities. The main reason of social rejection is fear of transmission of the disease within the community, and TB is considered highly infectious and incurable (Islam *et al.* 2009). Besides, stigma appeared to be important deterrent 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 activities. Social support can help patients overcome these barriers, with active intervention from the programme. Building local networks of cured or patients undergoing treatment to support new TB patients may be justified.

The healthcare-seeking behaviour of the study participants with more than three weeks of chronic cough was found to be poor. The majority of them did not seek help for their illness from formal place and did not do sputum test without delay as they thought that the disease was not serious. Similar thinking and inaction were also observed in Ethiopia (Yimer *et al.* 2009), Vietnam (Hoa *et al.* 2003), and China (Wang *et al.* 2008). Understandably, those who had school education perceived that TB treatment could be taken in front of people and could talk to TB patients face-to-face were more likely to initiate treatment early.

In conclusion, the society was constructed with widespread misperceptions regarding TB. Moreover, TB control is being implemented in hard-to-reach areas by health workers with having poor knowledge retention and with less motivated health workers. Poor health-seeking care of TB suspects goes against the program's objectives. Further TB programme has social, economical, and geographical challenges that health workers and community people mostly confront in providing and receiving services. Programme must address all the issues immediately to sustain the current achievement of TB control programme in such areas.

Recommendations

1. Training is the primary source of TB knowledge of the community health workers. Findings reveal poor level of knowledge among them and the community people. Thus, the form and content of training need a thorough revision in these hard-to-reach and adjacent areas. Misperceptions and stigma are widely prevalent among these communities. Sustained and culture-sensitive IEC campaign is needed to reverse this situation. These may take the form of folk songs, popular theatre, community/courtyard meetings, etc. Cured patients or patients under treatment may be used as motivators. Reasons for poor motivation of the SSs need to be explored by the programme. Performance-based incentive schemes could be introduced for increasing motivation of the SSs. They may be provided with extra travel allowances since distance is a major hindrance for routine home visits in these areas.
2. Advocacy, communication and social mobilization strategies should be tailored according to the socioeconomic characteristics of the population, with special focus on illiterate and poor for improving their knowledge and health-seeking behaviour.
3. Supportive supervision is needed to ensure early case detection and initiation of treatment. Community may also be involved in this process to reduce stigma and ensure early sputum test and initiate treatment.
4. Fostering collaboration between national TB control programme and other healthcare providers, such as in the private sectors (village doctors, drug sellers) and NGOs are also recommended so that they can refer patients to appropriate places for treatment.
5. A referral mechanism between the informal health providers and the public and NGO facilities should be developed and implemented.

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Annex

Annex Table 1. Number of health facilities and patients in study areas in last year

	Hard to reach areas	
	Hard-to-reach areas	Adjacent areas
Number of sputum examination facilities in government settings (Upazila Health Complex)	18	17
Number of sputum examination facilities in NGOs settings	23	25
Outreach smearing centres in study areas	368	368
TB patients died in last year in study areas		
Male	79	78
Female	26	34
TB patients did not complete treatment in last year in study areas		
Male	5	16
Female	7	15
TB patients were transferred out in last year in study areas		
Male	22	14
Female	13	4
TB patients with sputum negative in last year in study areas		
Male	297	1081
Female	364	555
TB patients with EPTB in last year in study areas		
Male		
Female	96	98
	123	93
Number of suspects came to facilities in last year in study areas		
Male		
Female		

Annex Table 2. Basic knowledge of *Shasthya Sebika* (SS) about TB by education and attendance
TB suspects in last month (%)

	School education			All	P-value
	No	Primary	Secondary and above		
Tuberculosis is common among					
Male	49.0	45.5	42.6	44.8	0.631
Female	5.9	4.5	2.3	3.7	
Both	45.1	50.0	55.0	51.5	
*Causes of TB					
Smoking	74.5	77.3	82.9	79.5	0.371
Cold weather	51.0	23.9	24.0	29.1	0.001
Unhygienic environment	45.1	53.4	54.3	52.2	0.521
From infected TB patients	29.4	23.9	18.6	22.4	0.270
TB germ	21.6	38.6	40.3	36.2	0.052
*Transmitting routes					
Respiration	47.1	46.6	34.1	40.7	0.108
Through sneezing and coughing	94.1	88.6	93.8	92.2	0.323
Through sputum	49.0	34.1	38.8	39.2	0.219
Through utensils	52.9	50.0	45.7	48.5	0.645
*Prevention of TB					
Vaccines	35.3	27.3	43.4	36.6	0.052
Keep away from patient	51.0	33.0	37.2	38.4	0.101
Avoid smoking	60.8	60.2	66.7	63.4	0.570
Avoid patients' utensils	54.9	52.3	46.5	50.0	0.522
Hygienic environment	62.7	60.2	46.5	54.1	0.053
*Meaning of DOTS					
Taking medicines in front of health workers regularly	68.6	63.6	86.8	75.7	0.000
Others	5.9	12.5	2.3	6.3	0.010
Do not know	25.5	25.0	11.6	18.7	0.017
N	51	88	129	268	
Attended TB suspects in last month					
	No	Yes	All	P-value	
Tuberculosis is common among					
Male	59.1	40.1	44.8	0.026	
Female	3.0	4.0	3.7		
Both	37.9	55.9	51.5		
*Causes of TB					
Smoking	84.8	77.7	79.5	0.213	
Cold weather	15.2	33.7	29.1	0.004	
Unhygienic environment	51.5	52.5	52.2	0.892	
From infected TB patients	16.7	24.3	22.4	0.199	
TB germ	39.4	35.1	36.2	0.533	
*Transmitting routes					
Respiration	40.9	40.6	40.7	0.964	
Through sneezing and coughing	87.9	93.6	92.2	0.136	
Through sputum	37.9	39.6	39.2	0.803	
Through utensils	51.5	47.5	48.5	0.573	
*Prevention of TB					
Vaccines	31.8	38.1	36.6	0.356	
Keep away from patient	27.3	42.1	38.4	0.032	
Avoid smoking	75.8	59.4	63.4	0.017	
Avoid patients' utensils	50.0	50.0	50.0	1.000	
Hygienic environment	51.5	55.0	54.1	0.627	
*Meaning of DOTS					
Taking medicines in front of health workers regularly	72.7	76.7	75.7	0.510	
Others	6.1	6.4	6.3	0.914	
Do not know	21.2	17.8	18.7	0.539	
N	66	202	268		

*multiple response

Annex Table 3. Basic knowledge of *Shasthya Sebika* (SS) about TB by burden of TB suspects (%)

	Number of suspects attended in last month			P-value
	≤4 Patients	More than 4 patients	All	
Tuberculosis is common among				
Male	41.8	36.8	40.1	
Female	3.7	4.4	4.0	0.783
Both	54.5	58.8	55.9	
*Causes of TB				
Smoking	78.4	76.5	77.7	0.761
Cold weather	33.6	33.8	33.7	0.973
Unhygienic environment	44.8	67.6	52.5	0.002
From infected TB patients	26.1	20.6	24.3	0.386
TB germ	32.1	41.2	35.1	0.201
*Transmitting routes				
Respiration	38.8	44.1	40.6	0.468
Through sneezing and coughing	93.3	94.1	93.6	0.819
Through sputum	38.1	42.6	39.6	0.529
Through utensils	44.0	54.4	47.5	0.163
*Prevention of TB				
Vaccines	38.1	38.2	38.1	0.981
Keep away from patient	45.5	35.3	42.1	0.164
Avoid smoking	56.0	66.2	59.4	0.163
Avoid patients' utensils	47.8	54.4	50.0	0.372
Hygienic environment	52.2	60.3	55.0	0.277
*Meaning of DOTS				
Taking medicines in front of health workers regularly	71.6	86.8	76.7	0.016
Others	6.7	5.9	6.4	0.819
Do not know	21.6	10.3	17.8	0.046
N	134	68	202	

*multiple response

Annex Table 4. Basic knowledge of community people on transmission of TB by socio demographic variables (%) (Row percentage)

Socio demographic variables	Routes of transmission				N
	Respiration	Sneezing-coughing	Patients' sputum	Patients' used utensils	
Age					
All	23.9	64.4	19.8	45.8	3599
15-29	22.6	67.8	20.5	42.4	991
30-44	28.2	67.5	20.3	44.8	1146
45+	21.4	59.6	18.8	48.8	1462
Sex					
All	23.9	64.4	19.8	45.8	3599
Male	24.2	67.0	20.4	44.7	1782
Female	23.6	61.8	19.1	46.8	1817
School education					
All	23.9	64.4	19.8	45.8	3599
No	23.1	59.5	16.7	47.1	1696
Primary	24.0	59.6	22.1	52.0	712
Secondary	25.0	74.1	22.8	40.2	1191
Perceived economy in last year					

(Annex Table 4 continued----

(---continued Annex Table 4)

All	23.9	64.4	19.8	45.8	3599
Surplus	28.6	69.8	19.2	44.2	391
Equal	25.5	66.6	16.5	49.7	1282
Deficit	21.9	61.7	22.1	43.5	1926
Income					
All	23.9	64.4	19.8	45.8	3599
No	23.3	61.6	18.6	47.0	1833
≤5000	22.4	66.6	21.5	45.3	1277
5000+	29.9	68.9	19.6	42.3	489
Wealth quintile					
All	23.9	64.4	19.8	45.8	3599
Poorest	22.3	57.4	15.6	49.4	719
Second	21.8	61.4	21.1	48.8	720
Middle	22.8	63.7	19.1	47.9	728
Fourth	22.6	65.4	20.9	44.9	731
Richest	30.2	74.0	22.1	37.7	701

Annex Table 5. Basic knowledge of community people on prevention of TB by socio demographic variables (%) (Row percentage)

Socio demographic variables	Prevention of TB					N
	BCG vaccine	Avoid TB patients	Avoid smoking	Avoid patient's utensils	Maintain hygiene	
Age						
All	25.6	24.0	57.8	32.4	31.3	3599
15-29	28.3	23.2	58.6	31.2	32.2	991
30-44	29.9	23.9	59.9	31.0	30.5	1146
45+	20.5	24.7	55.5	34.3	31.3	1462
Sex						
All	25.6	24.0	57.8	32.4	31.3	3599
Male	26.9	24.6	59.9	31.8	30.6	1782
Female	24.4	23.4	55.6	33.0	31.9	1817
School education						
All	25.6	24.0	57.8	32.4	31.3	3599
No	20.2	24.2	58.1	34.4	29.2	1696
Primary	19.9	25.8	58.4	35.4	32.6	712
Secondary	36.7	22.8	56.9	27.8	33.4	1191
Perceived economy in last year						
All	25.6	24.0	57.8	32.4	31.3	3599
Surplus	26.3	21.2	56.5	32.5	39.9	391
Equal	23.0	27.9	57.3	31.0	34.9	1282
Deficit	27.2	22.0	58.4	33.3	27.1	1926
Income						
All	25.6	24.0	57.8	32.4	31.3	3599
No	22.9	24.2	56.7	34.8	32.4	1833
≤5000	26.2	25.0	57.1	29.7	30.1	1277
5000+	34.2	20.9	63.6	30.7	30.3	489
Wealth quintile						
All	25.6	24.0	57.8	32.4	31.3	3599
Poorest	20.9	21.1	54.9	35.2	28.2	719
Second	17.6	24.7	59.0	33.9	32.5	720
Middle	22.1	25.7	59.5	34.1	33.2	728
Fourth	27.6	24.5	57.7	32.0	32.4	731
Richest	40.2	24.1	57.6	26.7	29.8	701

Annex Table 6. Basic knowledge of community people on duration of cough indicates TB by socio demographic variables (%) (Row percentage)

Socio demographic variables	Duration of cough indicates TB				N
	One week	Two weeks	Three weeks	Four weeks+	
Age					
All	6.9	14.3	49.0	29.8	3599
15-29	9.4	11.7	59.1	19.8	991
30-44	7.3	14.4	47.8	30.5	1146
45+	4.9	16.0	43.0	36.1	1462
Sex					
All	6.9	14.3	49.0	29.8	3599
Male	6.8	14.8	49.3	29.1	1782
Female	7.0	13.8	48.7	30.5	1817
School education					
All	6.9	14.3	49.0	29.8	3599
No	6.3	16.0	39.2	38.5	1696
Primary	8.0	14.3	51.1	26.5	712
Secondary	7.1	11.8	61.7	19.4	1191
Perceived economy in last year					
All	6.9	14.3	49.0	29.8	3599
Surplus	10.0	12.3	62.9	14.8	391
Equal	7.5	13.3	56.6	22.6	1282
Deficit	5.9	15.4	41.1	37.6	1926
Income					
All	6.9	14.3	49.0	29.8	3599
No	7.2	14.1	47.2	31.5	1833
≤5000	5.7	14.8	48.7	30.8	1277
5000+	8.8	13.9	56.4	20.9	489
Wealth quintile					
All	6.9	14.3	49.0	29.8	3599
Poorest	7.4	17.4	39.1	36.2	719
Second	7.8	15.1	42.2	34.9	720
Middle	6.3	16.5	48.8	28.4	728
Fourth	7.1	11.4	56.4	25.2	731
Richest	5.8	11.1	58.6	24.4	701

Annex Table 7. Basic knowledge of community people on cost of sputum test by socio demographic variables (%) (Row percentage)

Socio demographic variables	Sputum test cost			N
	Free	Have cost	Do not know	
Age				
All	71.2	18.9	9.9	3599
15-29	74.1	17.3	8.7	991
30-44	72.0	18.2	9.9	1146
45+	68.5	20.6	10.9	1462
Sex				
All	71.2	18.9	9.9	3599
Male	70.8	20.1	9.1	1782
Female	71.5	17.7	10.8	1817
School education				
All	71.2	18.9	9.9	3599
No	66.7	21.8	11.5	1696
Primary	70.1	19.8	10.1	712
Secondary	78.2	14.2	7.6	1191
Perceived economy in last year				
All	71.2	18.9	9.9	3599
Surplus	74.9	15.3	9.7	391
Equal	76.4	14.9	8.7	1282
Deficit	66.9	22.3	10.8	1926
Income				
All	71.2	18.9	9.9	3599
No	73.5	16.5	10.0	1833
≤5000	66.8	23.7	9.5	1277
5000+	73.6	15.3	11.0	489
Wealth quintile				
All	71.2	18.9	9.9	3599
Poorest	60.6	26.1	13.2	719
Second	67.2	22.4	10.4	720
Middle	70.3	20.3	9.3	728
Fourth	78.5	12.2	9.3	731
Richest	79.2	13.4	7.4	701

Annex Table 8. Basic knowledge of community people on cost of TB treatment by socio demographic variables (%) (Row percentage)

Socio demographic variables	TB treatment cost			N
	Free	Have cost	Do not know	
Age				
All	74.4	14.5	11.1	3599
15-29	77.7	13.2	9.1	991
30-44	74.4	13.7	11.9	1146
45+	72.2	16.0	11.8	1462
Sex				
All	74.4	14.5	11.1	3599
Male	74.9	14.6	10.5	1782
Female	73.9	14.4	11.7	1817
School education				
All	74.4	14.5	11.1	3599
No	68.9	17.9	13.3	1696
Primary	73.2	16.9	10.0	712
Secondary	83.0	8.3	8.6	1191
Perceived economy in last year				
All	74.4	14.5	11.1	3599
Surplus	79.3	13.3	7.4	391
Equal	79.3	9.9	10.8	1282
Deficit	70.1	17.8	12.0	1926
Income				
All	74.4	14.5	11.1	3599
No	75.3	13.9	10.7	1833
≤5000	71.7	16.6	11.7	1277
5000+	77.9	11.2	10.8	489
Wealth quintile				
All	74.4	14.5	11.1	3599
Poorest	65.5	19.3	15.2	719
Second	71.4	17.4	11.3	720
Middle	72.4	16.5	11.1	728
Fourth	81.0	9.8	9.2	731
Richest	81.9	9.4	8.7	701

Annex Table 9. The initiation time for treatment of cough by suspects of different sociodemographic groups (%)

Study variables	Initiation time for treatment of cough		N
	< 15 days	≥ 15 days	
Have adequate knowledge			
Yes	54.6	45.4	679
No	63.6	36.4	550
p		0.001	
Sex			
Male	59.1	40.9	597
Female	58.2	41.8	632
p		0.748	
Age			
15-29	66.4	33.6	268
30-44	64.8	35.2	332
45+	52.2	47.8	629
p		0.000	
Programme areas			
Hard to reach areas	63.1	36.9	613
Adjacent areas	54.2	45.8	616
p		0.002	
School education			
No	52.4	47.6	656
Primary	64.3	35.7	244
Secondary	66.9	33.1	329
p		0.000	
Income of the respondents (in Tk.)			
No	53.9	46.1	658
≤5000	60.6	39.4	437
5000+	75.4	24.6	134
p		0.000	
Perceived economy in last year			
Surplus	67.4	32.6	92
Equal	55.6	44.4	426
Deficit	59.4	40.6	711
p		0.098	
Wealth quintiles			
Poorest	52.2	47.8	293
Second	49.8	50.2	239
Middle	61.7	38.3	240
Fourth	62.8	37.2	253
Richest	69.6	30.4	204
p		0.000	
Awareness about BRAC TB control programme			
Yes	58.7	41.3	820
No	58.7	41.3	409
p		0.994	
TB Programme was informed by SS			
Yes	53.8	46.2	556
No	62.7	37.3	673
p		0.002	
Distance to BRAC health centre			
<half kilometer	57.7	42.3	267
>half kilometer	58.8	41.2	956
p		0.745	
TB is treated informing people			
Yes	61.1	38.9	841
No	53.4	46.6	388
p		0.010	

(Annex Table 9 continued-----)

(----continued Annex Table 9)

Talk with TB patients face to face			
Yes	61.9	38.1	638
No	55.2	44.8	591
p		0.016	
