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Economic Burden of Tuberculosis among Bangladeshi Population and Economic Evaluation of the Current Approaches of Tuberculosis Control in Bangladesh

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DEDICATION

I dedicate this dissertation to the Tuberculosis patients who participated in the interviews for this study- not for money, just for the betterment of future TB care in the country.

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Last but not least I would like to remember my family, especially my father whose relentless inspiration helped me to be what I am today, my mother for her monumental support, my siblings and my friends who were always there for me.

ABSTRACT

Introduction: Tuberculosis (TB) is major scourge for human history and causes profound economic burden. Bangladesh is a high burden TB country with 12% of its annual death is caused and 362 thousand people are infected by TB. DS-TB is the most prominent type of TB found in Bangladesh and a 6 month drug regimen (2 month intensive and 4 month continuation phase) is followed. But the directly observed treatment short-course (DOTS) differ in delivery through community health workers (CHW) and community members (CM). Bangladesh has also experienced surge in the number of MDR-TB cases with a 29% of MDR-TB cases were found among the re-treatment of pulmonary TB cases in 2015. In Bangladesh, two MDR-TB treatment regimens (9 month and 20-24 month) are practiced. This dissertation aims to estimates the economic burden of TB on the afflicted Bangladeshi population and conducts economic evaluation among different programs for DS-TB and MDR-TB in Bangladesh.

Methods: This study collects direct and indirect cost for TB care data from 1,000 drug sensitive TB (DS-TB) and 145 multi-drug resistant (MDR-TB) patients from all over Bangladesh. Provider cost for TB care was also collected from the health facilities. Costs for DS-TB and MDR-TB patients were estimated using Generalized Linear Model and summed up with per patient provider level costs to get the total costs per TB patients.

The incremental cost-effectiveness ratio (ICER) of treating DS-TB and MDR-TB patients, CM versus CHW model for DS-TB and 9-month vs. 20-24 month regimen for

MDR-TB were compared using a Markov model with life-time horizon. The measure of effectiveness, Quality adjusted life year (QALY) and cost of treatment was collected from 1,000 DS-TB and 145 MDR-TB patients (598 for CM model and 402 from CHW model; 58 undergone 9 month treatment and 87 from 20-24 month regimen) in Bangladesh. Transition probabilities between Markov states were estimated from quarterly outcomes report collected from health facilities and cost and QALY both were discounted at a rate of 3%. Both deterministic and probabilistic sensitivity analyses were conducted in a Monte Carlo Simulation using R.

Results: Mean age of DS-TB patients under the study was 45.2 years while mean age of MDR-TB patients were 35.5 years. In aggregate, DS-TB patients incurred total average costs of BDT 21,235 (USD 265) for TB illness; while MDR-TB patients' average costs were BDT 34,975 (USD 437). Including provider costs for each patient (USD 9 for DSTB and USD 2,006 for MDR-TB patients) total average costs for each DS-TB patient was BDT 22,003 (USD 275) and for each MDR-TB patient was BDT 1,95,449 (USD 2443).

Assuming 57% case notification rate, the actual costs for treating TB patients in 2015 was USD 55.6 million. If all DS-TB patients were treated the cost would have been 1 billion USD. For MDR-TB treatment, total cost was USD 12.5 million; treating all MDR-TB patients would have costed USD 23 million.

Results show that each DS-TB patient under CM treatment model gains 3.61 QALYs with a cost of BDT 131,555. For the DS-TB patients under the CHW model the cost is 81,650 and the QALY gain is 3.12. The Incremental Cost-Effectiveness Ratio

(ICER) is 103,454, i.e., the CM model is cost-effective if per QALY gain if willingness-to-pay is set to the per capita GDP of Bangladesh (BDT 107,360 in 2015).

Based on the study data, each patient under 9 month regimen gained 6.21 QALY with a total cost of BDT 987,418. Whereas, each patient under CHW model gained 5.74 QALY by incurring costs of BDT 1,501,221. Therefore, 9 month regimen is clearly dominating over the 20-24 month regimen because it costs less while it gains more QALY.

Conclusions: Results show that DS-TB patients incurred about 50% of their household annual income for treatment while that goes up to 66% for the MDR-TB patients. Pre-diagnosis cost constitutes about 63% of total costs for DS-TB patients and 42% of MDR-TB patient costs. This figures show the significant economic burden posed by TB and early diagnosis of the disease can reduce the burden in great extent.

Our study results demonstrate that community based model of DS-TB treatment is cost-effective even with changed costs and utility values in probabilistic sensitivity analysis. Community members as DOTS provider are more capable of reducing stigma related to TB, enhancing patient adherence and thereby reduce costs and increase utility from the treatment. Community members should also be involved in contact tracing and prevention activities to increase the effect of the involvement in TB control.

Our study results also suggest that shorter regimen remains cost-effective in Bangladesh setting with changing costs and utility parameters changed in the probabilistic sensitivity analysis. MDR-TB treatment is itself cost-effective in developed

countries and with cost-effective shorter regimen both treatment adherence and efficacy of the treatment will be improved.

PREFACE

American Psychological Association, 6th edition was used in the dissertation.

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LIST OF ABBREVIATIONS

AIDS ..... Acquired Immunodeficiency Syndrome

APHA ..... American Public Health Association

CEAC ..... Cost Effectiveness Acceptability Curve

CHW ..... Community Health Worker

DALY ..... Disability Adjusted Life Year

DF ..... Damien Foundation

DOTs ..... Directly Observed Treatment, Short-course

DS-TB ..... Drug Sensitive Tuberculosis

ERC ..... Ethical Review Committee

EVPI ..... Expected Value of Perfect Information

GFATM ..... Global Fund for Tuberculosis and Malaria

HCM ..... Human Capital Method

HIV ..... Human Immunodeficiency Virus

IHEA ..... International Health Economics Association

ICER ..... Incremental Cost-Effectiveness Ratio

IRB ..... Institutional Review Board

HRQoL ..... Health Related Quality of Life

LTBI ..... Latent Tuberculosis Infection

LMIC ..... Lower Middle-Income Countries

MCMC ..... Markov Chain Monte Carlo

MDR-TB ..... Multidrug Resistant Tuberculosis

MOHFW ..... Ministry of Health and Family Welfare

NGO ..... Non-Governmental Organization

NIDCH ..... National Institute of Diseases of the Chest and Hospital

NTP ..... National Tuberculosis Control Program

OOP ..... Out-Of-Pocket Payment

PMDT ..... Programmatic Management of Drug-resistant TB

PPP ..... Private-Public Partnership

QALY ..... Quality Adjusted Life Year

TB ..... Tuberculosis

TDR ..... The Special Programme for Research and Training in Tropical Diseases

UHC ..... Upazila Health Complex

UNDP ..... United Nations Development Porgram

UNICEF ..... United Nations Children Fund

VIF ..... Variance Inflation Factor

WHO ..... World Health Organization

WTP ..... Willingness to Pay

XDR-TB ..... Extensively Drug Resistant Tuberculosis

CHAPTER 1

INTRODUCTION

1.1 STATEMENT OF THE PROBLEM AND RATIONALE

In 2015, Tuberculosis (TB) ranked 18th among the highest burden diseases globally and it constituted 47% of the global burden attributable to communicable, maternal, neonatal, and nutritional disorders (Kassebaum et al., 2016). In 2015, 10 million new cases of TB were reported and almost two million people died from TB worldwide (World Health Organization (WHO), 2016a). In 2015, TB became the top infectious disease killer by claiming With the me1.1 million lives by matching the death tolls by HIV/AIDS (Kassebaum et al., 2016).

Almost 85% of all new cases of TB and multi-drug resistant TB (MDR-TB) occur in 30 high burden TB countries and Bangladesh is one them (World Health Organization (WHO), 2015b). In 2015, 362,000 Bangladeshis developed TB and 73,000 died from it. TB accounted for 12% of all deaths (609,800) that occurred in 2015 in Bangladesh (Institute for Health Metrics and Evaluation (IHME), 2016). Although case notification rate is only 57%, success of the treatment is high (93%) among DS-TB patients. However, the success rate is 75% among MDR-TB patients which signifies how difficult to treat drug resistant strains (World Health Organization (WHO), 2016a).

Despite having effective treatment, patient adherence to TB treatment remains poor because of long duration of the regimen (six months for newly diagnosed cases) and the need for daily dosing. Failure to adhere to the regimen results in MDR-TB (Gandy & Zumla, 2002). The emergence of drug resistant TB strains has slowed down the progress in global TB epidemic control over the last two decades. Bangladesh has also experienced surge in the number of MDR-TB cases with a 1.6% of new cases are drug resistant and 29% of MDR-TB cases were found among the re-treatment of pulmonary TB cases in 2015 (World Health Organization (WHO), 2016a).

World has experienced a slow progress in TB control. TB incidence has fallen by an average of 1.5% per year since 2000. However, this needs to accelerate to 4-5% annual reduction to reach 2035 milestones of "End TB Strategy" (World Health Organization (WHO), 2016b). End TB Strategy has set ambitious targets of 95% reduction in TB deaths and 90% reductions in TB incidence by 2035 (Uplekar et al., 2015).Bangladesh is also experiencing a slow reduction in TB incidence (360,000 in 2015 from 362,000 in 2014) and incidence rate (225 per 100,000 population in 2015 from 227 per 100,000 population in 2014) (World Health Organization (WHO), 2015a, 2016a).

Economic burden of TB in Bangladesh is a great concern, since it affects a sizable number of people each year and causes 12% of the total death. Both disability and death have grave economic implications in the form of lost income to the persons and their families and lost Gross Domestic Product (GDP) for the country. Expensive treatment of the disease also put burden on the patients, families, and the health system of the country. The most affected group is the working age group persons, that also increases the costs associated with the disease (World Health Organization (WHO), 2016b). Moreover,

almost half (43%) of the patients in Bangladesh is not reported under the national registries and goes untreated (World Health Organization (WHO), 2016a); this makes the control and elimination of the disease extremely hard and expensive. Emergence of drug resistant strain also contributes in escalating costs because of high death rates, costly treatments, and poor outcomes (Fitzpatrick & Floyd, 2012).

Directly Observed Treatment, Short Course (DOTS) strategy for treating drug sensitive TB (DS-TB) has been implemented in Bangladesh since 1993 and all the Upazila Health Complexes (UHCs) have been brought under the purview of the service from where TB detection and treatment services are given free of cost. The essence of the strategy is the diagnosed TB patient has to go to the facility every day for taking the drugs, thus treatment discontinuity and subsequently MDR-TB cases can be averted (World Health Organization (WHO), 2013b).

Menacing drug resistant strains is a growing concern as discontinuity in treatment often results into MDR-TB or XDR-TB. Treatment for both the conditions are costly and also more time consuming as the shortest effective MDR-TB treatment regimen spans over nine months (Deun et al., 2010). Therefore, this prolonged treatment schedule may result into more incidence of treatment discontinuation. WHO in partnership with STOP TB Partnership came up with the response plan in 2007-2008 and Bangladesh is one of the seven countries using the shorter treatment regimens for MDR-TB in June 2013 (World Health Organization (WHO), 2013b).

Given the extent of the incidence and death rate of TB patients worldwide and in Bangladesh, its overwhelming economic impact is of great importance. Few studies have

been conducted to elucidate the social and economic costs of TB (Murrat, Styblo, & Roullion, 1993). Recently few studies have been carried out in this regard (Muniyandi, Ramachandran, Balasubramanian, & Narayanan, 2006; Rajeswari et al., 1999; Russell, 2004) but very few in the context of Bangladesh (Croft & Croft, 1998; Gospodarevskaya et al., 2014; Islam, Wakai, Ishikawa, Chowdhury, & Vaughan, 2002). There is also paucity of evidence on cost-effectiveness of the TB programs. One study compared cost-effectiveness between an NGO and government intervention and found that NGO-driven program is more cost-effective (Islam et al., 2002), however, no study has been conducted after the advent of PPP model or using the cost-utility method.

The costs can be incurred on the patient directly (direct costs) or indirectly (indirect costs) and most of the studies do not capture the whole picture as they often concentrate on pre-diagnosis, pre-treatment or treatment costs (KNCV Tuberculosis Foundation, 2008) only. Besides this the study will also capture the provider's cost of delivery health care services to the TB patients which is often absent in other studies.

This research proposal intends to contribute to the body of TB literature by illustrating the cost associated with different types of TB and to estimate the total economic burden of tuberculosis in Bangladesh. This dissertation also covers the economic evaluation of ongoing treatments approaches for both DS-TB and MDR-TB.

1.2 Current TB Care Approaches in Bangladesh

Bangladesh National TB control program (NTP) adopted the Directly Observed Treatment, Short Course (DOTs) strategy in November 1993. By 2007 the DOTS services were available throughout the country including metropolitan areas (National Tuberculosis Control Program (NTP), 2015).

NTP follows a PPP model where NGOs are working in collaboration with the MOHFW. There are about 12 NGOs working in different areas of Bangladesh. Among these BRAC, the largest NGO in the world and Damien Foundation Bangladesh, an affiliate of the Belgian NGO running TB control programs worldwide is the principal NGOs who get fund from Global Fund for Tuberculosis and Malaria (GFTAM) directly. BRAC gives away the funds to number of NGOs as the sub-recipient to work in different areas in Bangladesh. MOHFW also gets funding from the same source and equip the National Institute of Diseases of the Chest and Hospital (NIDCH) and number of Medical College Hospitals with diagnostic and treatment facilities for TB patients infected with both drug sensitive and drug resistant strains(National Tuberculosis Control Program (NTP), 2015).

For the drug sensitive TB patients, standard 6 months' regimen is followed by all participating NGOs. However, the mode of delivery is different for different NGOs. BRAC has employed Community Health Workers (CHWs) besides the DOTs centers to ensure patient compliance, while Damien Foundation (DF) trained and employed influential community members to help the patients to be adhered to the treatment protocol. Another NGO, Salvation Army Bangladesh, is using drug sellers at the

pharmacies as the counselor and drug distributors for the TB patients. Since involving different people, e.g., family members, neighbors, pharmacists falls under common strategy of involving community members. This study will conduct economic evaluation between these two different modes of DS-TB treatment delivery.

National Tuberculosis Control Program (NTP) in Bangladesh follows the 20-24 months treatment regimen for MDR-TB patients. It follows the Programmatic Management of Drug-resistant TB (PMDT) guideline (Falzon et al., 2011). The patients are admitted in the hospitals for first 6-8 months, after the intensive phase they are released to go to their respective home. From then on their treatment is supervised and administered by assigned CHWs (MOHFW, 2012). Intensive phase treatment for MDR-TB patients are provided in NIDCH, which is situated in Dhaka, and Chest Disease Hospitals (CDH) in Chittagong, Sylhet and Khulna.

Damien Foundation (DF) runs shorter protocol of treatment for MDR-TB patients, which span over 9 months. DF generally admits the MDR-TB patients in one of their three hospitals situated at Jalchatra of Madhupur, Tangail, Shomvuganj, Mymensingh and at Netrakona for the intensive phase of treatment which spans over four months followed by five months of continuation phase for which drugs are administered at patients' home (Damien Foundation, 2008). Rajshahi Chest Disease Hospital also provides 9 months treatment. DF also follows the strategy of involving the community members (Sharma, 2002) while BRAC programs deploy community health workers (CHWs) to reach the patients (Liu, Sullivan, Khan, Sachs, & Singh, 2011). This study will assess the cost-effectiveness of the two MDR-TB programs run by NTP and DF in Bangladesh.

1.3 Research Objectives

The study will focus on the following general objective:

To assess economic burden of drug sensitive and drug resistant tuberculosis on the afflicted population of Bangladesh and to investigate economic evaluation of the current approaches of Tuberculosis control in Bangladesh.

The specific objectives of the study are as follows:

1. To analyze the direct and indirect cost of diagnosis and treatment of drug-sensitive TB and MDR-TB in Bangladesh.

2. To estimate the health system cost of diagnosis and treatment of drug-sensitive TB and MDR-TB in Bangladesh.

3. To measure effects as quality-adjusted life-years (QALYs) gained and disability-adjusted life-years (DALYs) averted.

4. To conduct a cost effectiveness analysis with QALYs and DALYs as the health outcomes.

1.4 Structure of the Dissertation

This dissertation proposal is divided into introduction, literature review, methods which are followed by three sections depicting the three studies conducted under the purview of the dissertation. Three studies are namely economic burden of TB in Bangladesh, economic evaluation of DS-TB treatment approaches and economic evaluation of MDR-TB treatment approaches in Bangladesh.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction and Scope of Review

This chapter reviews the theoretical concepts of illness with tuberculosis and its impact on individuals, families/households, and society as a whole. Following that the chapter includes literature review of existing studies on economic burden of tuberculosis studies as well as the studies on cost-effectiveness of both drug sensitive and drug resistant TB treatments all around the globe.

2.2 Economic Burden of Tuberculosis

2.2.1 Theoretical Concepts of Economic Burden of Tuberculosis

In cost analysis three types of costs are taken into account, direct costs, indirect costs and intangible costs due to illness. Direct costs include healthcare costs (hospital, medication, emergency transportation, outpatient visit charges) and family costs (out-of-pocket payment (OOP), medication, transportation of families etc.). Indirect costs include the opportunity costs of work-loss days, lost productivity/income on the part of both the patients and his/her relatives. Intangible costs can arise from the functional limitations, pains acquired in the process and cannot be quantified and highly subjective in nature (Centers for Disease Control and Prevention (CDC), 2013).

Besides these costs, there is another important cost incurred by the households through coping strategies, which includes sale of assets, taking up debt, saving on food or other items, taking a child out of school to care for the patient or taking up another job (Russell, 2004).

The costs of communicable diseases fall on the households in three distinct phases:

1. Pre-diagnosis
2. During Diagnosis/Pre-treatment
3. During Treatment

The causal linkages of these factors are depicted by Russell (2004):

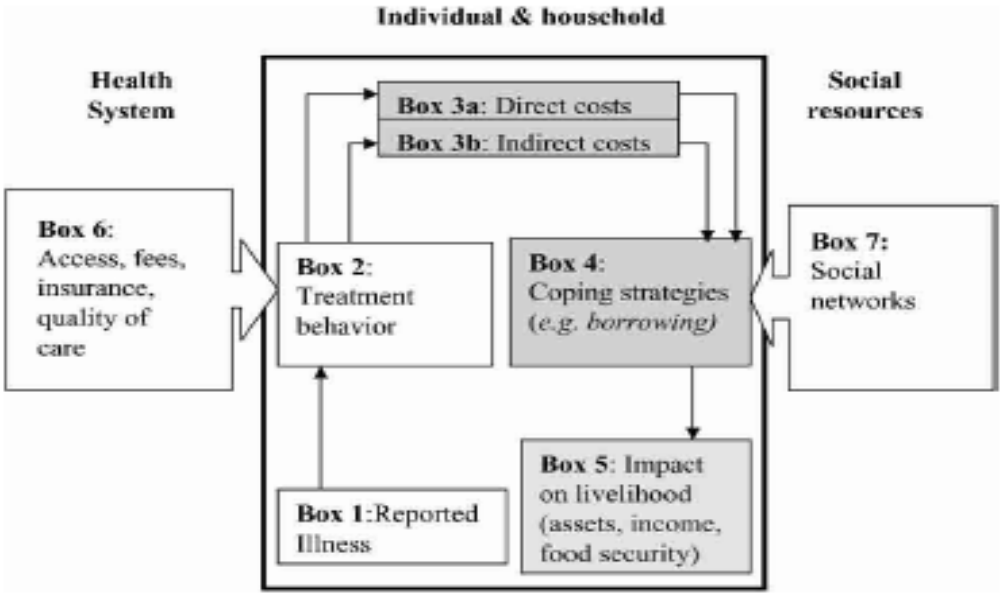

FIGURE 1. Conceptual framework for analyzing the economic burden of illness for households.

Figure 2.1 Conceptual Framework for analyzing the economic burden of illness for households (Russell, 2004)

At the stage of boxes 1 and 2, decisions are made whether and how treatment is sought as a response to the event of illness. The health system is captured in Box 6. Direct costs capture expenditures related to seeking treatment while indirect costs are loss of labor time for patients and their caregivers. The severity of illness and characteristics of health services affect direct and indirect costs and influence access to and choice of provider. The cost burden and coping strategies of struggling with this burden (mobilizing resources outside the household such as credit) determine household assets and impoverishing processes, hence the link between illness and poverty (Russell, 2014).

McIntyre et al. (McIntyre et al., 2006) provided a flow-chart on economic consequences of TB illness and payment for healthcare (Figure 2.2). According to McIntyre there are four stages of tuberculosis treatment, e.g., illness experience, treatment seeking behavior, economic consequences, and coping strategies and social resources. In preliminary stages, perception of illness and treatment seeking can be affected by the economic status of the person. If the patient with TB does not seek treatment then only indirect costs is incurred in form of lost productivity, while if the patient goes for treatment then direct costs also incurred on top of indirect costs. Indirect costs further subdivided into productivity loss of the patient and the caregiver, whereas direct cost is categorized into financial costs of healthcare (services and medicines) and other financial costs.

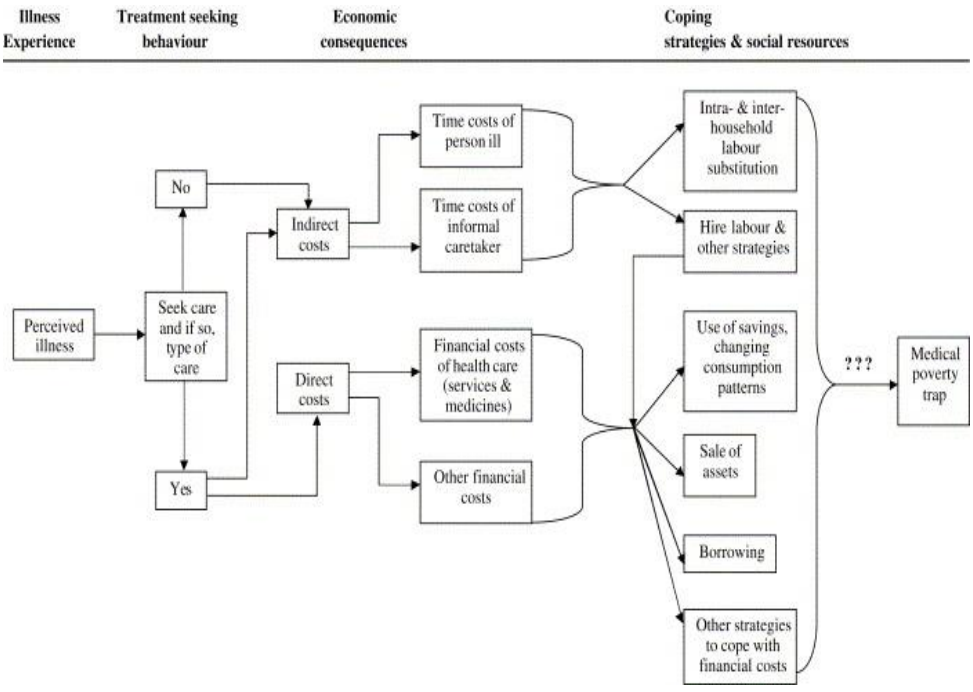

Figure 2.2 Simplified flow-chart of key issues relating to the economic consequences of illness (McIntyre, Thiede, Dahlgren, & Whitehead, 2006)

Based on conceptual model of McIntyre et al. (McIntyre et al., 2006) Laokri et al. (Laokri et al., 2014) (2014) provided an extended conceptual framework incorporating intangible costs, e.g., pain and suffering, and social stigma; elaborating coping costs and social burdens due to illness; and includes societal economic loss along with illness poverty trap ensued due to illness (Figure 2.3). This extended model also includes forgone activities of the informal caregivers as well as those of guardians accompanying the TB patients for treatment. These foregone activities can culminate into labor substitution, withdrawal of children from school, and informal caregiving activities of the family members. Guardians lose time and income. Direct costs have been subdivided into subsidized healthcare costs, non-subsidized healthcare costs, and non-healthcare costs. Non-subsidized healthcare costs and non-healthcare costs along with income loss of the guardian can result in (1) Financial resource mobilization, e.g., borrowing, selling assets,

pledging, extra-earnings etc.; (2) Resource reallocation, e.g., dissaving, budget cuts, deprivation, delayed investment etc. Non-subsidized healthcare costs and non-healthcare costs can also lead to erratic care pathways which include redundant care visits, alternative care seeking, diagnosis and treatment delays, and care interruption.

Intangible costs like pain and sufferings and social stigma can impose social consequences like (1) Low awareness: low awareness of disease, denial of illness status, bad living conditions, fear of losing position, social isolation, lack of family support, patient-related delays; (2) Social exclusion: exclusion from services including public healthcare services, from income and from participation.

Between McIntyre's and Laokri's conceptual frameworks, both of which are built upon the framework proposed by Russell (2004), simpler McIntyre's framework will be adopted for this study. Both frameworks are more or less similar, while Laokri's one is more detailed and includes pain and suffering, and social stigma. It is difficult to assign monetary value to intangible costs like pain and stigma. On the other hand, these intangible phenomena affect the quality of life of the patients. In our adopted quality of life measurement tool pain and stigma have included to offset their absence in the costs estimation. It also prevents double counting; once included in costs and again take into account while measuring quality of life.

There are four approaches to measure the cost of illness, e.g., human capital method, willingness to pay method, production cost and friction cost method (Jo, 2014; Malaney, 2003). Out of these human capital and willingness to pay methods are best suited for calculating the costs of illness from the patient perspective (KNCV

Tuberculosis Foundation, 2008). This study intends to employ both the method to capture different dimensions of costs. As Human Capital method (HCM) captures the valuation of forgone income and productivity and willingness to pay (WTP) captures the subjective reporting of actual costs accrued to the household and the perceived costs of the illness. It is argued that the HCM underestimates the total cost of illness than the WTP method, since it fails to capture the costs which are difficult to measure in numeric terms, e.g., costs associated with pains and sufferings.

The study will estimate the cost to society in the form of lost future productivity discounted to the present. The calculations aim at a sum of future earnings of the premature dead by looking at life expectancy, labor force participation and average salary data. This is sometimes called the 'top-down-approach'. It includes direct and indirect costs. Indirect costs are productivity losses, measured by estimating income foregone due to morbidity and mortality. The cost of morbidity is the value of lost workdays. Future earnings are discounted to assess the present value of lost income.

The study will measure the total cost of illness including the costs of illness in the past and present along with the future projection of the costs based on the collected data. The future projection of the costs is important in the sense that the debilitating disease may accrue a long-term costs burden on the family and the society as a whole and these costs can be quite high, even though often not considered explicitly in cost of illness analysis. As in the case of Measles vaccination, it is found that although measles vaccination prevents deaths within a short time frame (preventing measles death) it also has longer term impact on child survival. In other words, mortality rate among measles vaccinated children were lower than comparable children without vaccination (Koenig et

al., 1990). Productivity effect of malaria persists for many years after the control of malaria outbreaks in an area and imposes huge economic burden in the long run (Breman, Egan, & Keusch, 2001). It is also likely that TB has these indirect long-term effects and this study will try to get a handle on these longer-term outcomes.

From the institutions like DOTS centers, hospitals treating TB patients etc. data will be collected for the variable costs, which is the direct function of number of patients treated and includes costs such as drugs, reagents, and food during hospitalization. Then the fixed costs like personnel salaries, costs of vehicles and their maintenance and other administrative costs will also be enumerated to estimate programmatic costs (Murrat et al., 1993).

2.2.1 EXISTING EVIDENCE ON ECONOMIC BURDEN OF TUBERCULOSIS

Islam et al. (Islam et al., 2002) conducted a cost-effectiveness study comparing between community health workers (CHW) model adopted by BRAC and government run TB program which did not include CHWs. As part of the study the authors estimated the cost of delivering TB treatment from both patient and provider perspectives. From the study areas they collected the costs of all health workers and administrative staff, BRAC capital costs (including building costs) derived from accounting books and financial reports and in the absence of government report on capital costs those were estimated based on the local market price and current replacement costs. Capital costs were annuitized by using 10 years lifetime for furniture, 5 years for vehicles and equipment and were discounted at 5% per annum rate. Training costs were excluded assuming the costs equal across the two types of programs.

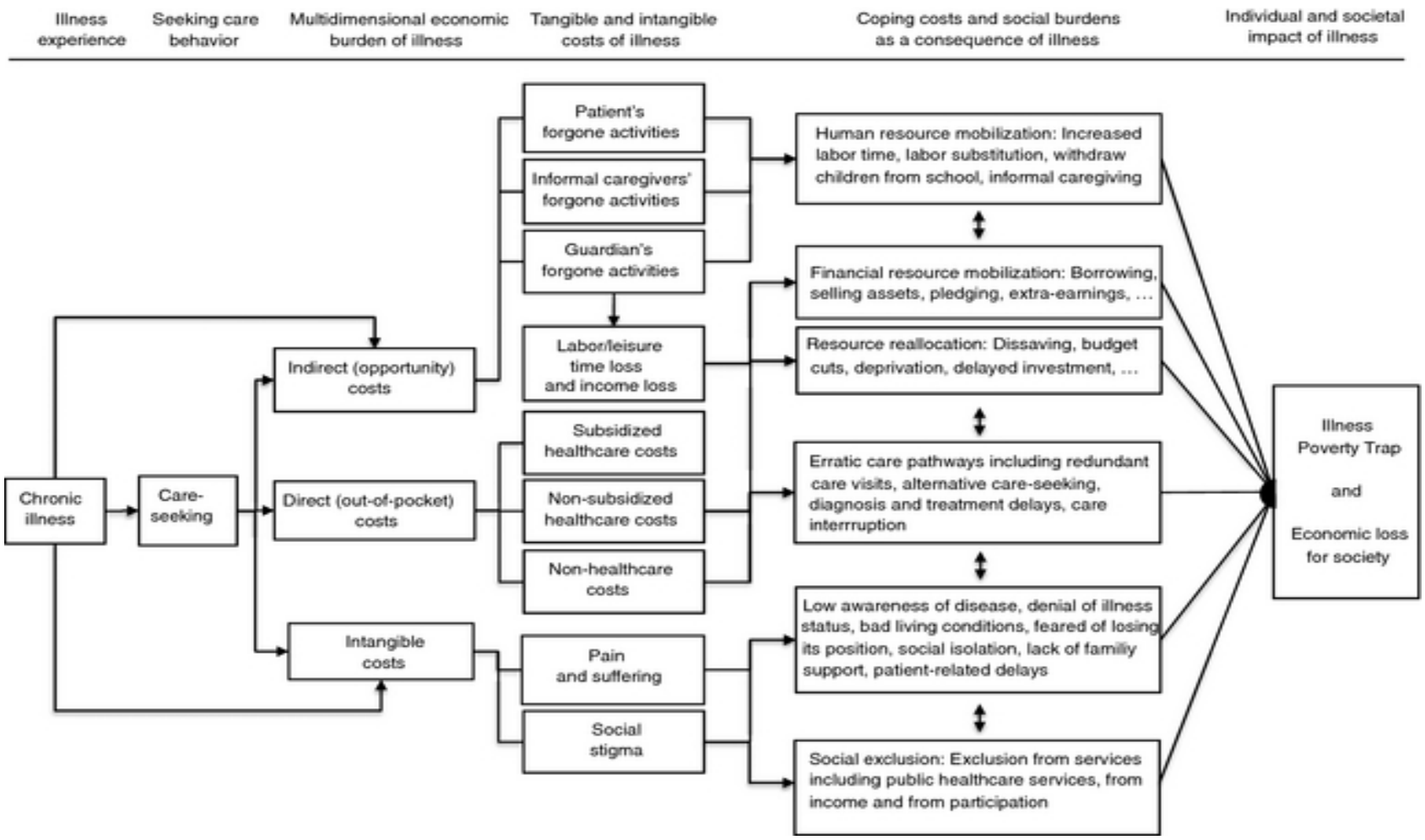

Figure 2.3 Conceptual framework to assess multidimensional economic burden of illness in a user's perspective (adapted from McIntyre et al., 2006) (Laokri, Dramaix-Wilmet, Kassa, Anagonou, & Dujardin, 2014)

Recurrent costs were collected from accounting books and financial reports from both programs and overhead costs for TB programs were calculated to be 10% in BRAC facilities and 5% in government run facilities. Patient's costs were elicited by interviewing 18 BRAC and 20 government patients. Time and travel costs associated with patients visits to health facilities for diagnosis, drug collection, and follow-up tests as well as costs of people accompanying the patients in each visit was included in patient's costs. It was calculated that the total cost was about $10 (422 BDT in 1996-1997) in BRAC areas while the cost was US$19 (802 BDT in 1996-1997) in government facilities (Islam et al., 2002). Using the Consumer Price Index (CPI) reported in the World Bank website we get that the costs was in 1,392 in 2015 BDT in BRAC areas, while the costs in government areas were 2,646 in 2015 BDT (The World Bank, 2017a).

Another study estimated the patient costs during TB treatment in Bangladesh and Tanzania (Gospodarevskaya et al., 2014). Total 96 patients were interviewed to find out the patient costs for six months DSTB treatment. The study sample includes 67 patients from BRAC, 22 from Damien Foundation, and 7 from Population Services and Training Centers. Total costs incurred during the six-month treatment regimen was estimated by combining the cost incurred during two months of intensive phase plus twice the costs incurred during two months of continuation phase. Total cost includes travel costs, guardian/accompanying person costs, caregiver cost, as well as treatment costs, e.g., laboratory tests, administration fees, hospital admission charges, medicines and supplements costs. Income lost due to TB for the patients and the guardians who would otherwise be paid through employment was calculated to determine the indirect costs. Indirect costs for students, prisoners, and those who were unemployed before the TB

illness were not estimated assuming that these groups of people had no foregone costs. But for those who do housework, their foregone wage at the rate paid for maid service was calculated and added to the patient costs. Total patient costs in Bangladesh was $224 in 2012, which is equivalent to 16,690 in 2012 BDT and 20,720 in 2015 BDT.

Interestingly both of these studies excluded the costs incurred by patients before reaching the treatment facilities. This constitutes a major source of costs for the patients. Since the TB treatment is almost free except for traveling, this cost constitutes a major portion of the total costs. A study conducted by Croft et al. (Croft & Croft, 1998) among TB patients in Nilphamari, Bangladesh showed that a mean financial cost to the patients due to foregone income and payments for doctors' consultation and medicines were $245 in 1996 which is equal to $808 in 2015 and BDT 64,663 in 2015 (1 Dollar=80 BDT).

There are several systematic reviews on TB patient and health system costs have been done. Laurence et al. (Laurence, Griffiths, & Vassall, 2015) searched for cost and economic evaluation studies on both DS-TB and MDR-TB between January 1990 and February 2015. The authors found mean DS-TB treatment costs were $273 in lower middle-income countries (LMICs) and $258 in low income countries (LICs), whereas the MDR-TB treatment costs were $6,313 and $1,218 respectively. Tanimura et al. (Tanimura, Jaramillo, Weil, Raviglione, & Lönnroth, 2014) focused only on LMICs and searched the database from inception to March 31, 2013. Mean total costs ranged from $55 to $8,198, with an unweighted average of $847. Half of the total costs were reported before treatment started, while the composition of costs was 20% to direct non-medical costs, 20% to direct medical care costs, 60% to income loss due to TB illness. In a study conducted with published literature on African countries showed that mean pre-

diagnostic costs were between $36 and $196, while post-diagnostic costs were between $17 and $448.

2.3 Health Related Quality of Life (HRQoL)

In this section studies on health related quality of life (HRQoL) of TB patients is reviewed. Main focus is on different measurements of HRQoL, e.g., Quality Adjusted Life Year (QALY) and Disability Adjusted Life Year (DALY). Then different measurement scales used for eliciting HRQoL measures for TB patients is explored.

Quality of life measurement uses utility theory to identify the degree of health concerns related to any disease or health conditions. Quality adjusted life year (QALY) and Disability adjusted life year (DALY) are the two summary estimates widely used in health economic evaluations. While QALY views health outcomes from the perspective of "healthiness", DALY views health outcomes in terms of loss of life years due to disabilities.

$$QALYs\ gained = Q^i \frac{1-e^{-rL^i}}{r} - Q \frac{1-e^{-rL}}{r} \quad (1)$$

where L^i and Q^i are, respectively, the period over which treatment affects the individual's quality of life, and the quality of life weight with treatment; while L and Q are the corresponding parameters without treatment.

The formula for calculating the number of QALYs gained through an intervention i is as follows:

$$QALYs\ gained = \sum_{p=1}^{p} Q_p^i \frac{e^{-r(t_p^i - a)} - e^{-r-r(t_{p-1}^i - a)}}{r} -$$

$$\sum_{m=1}^{N} Q_m^i \frac{e^{-r(t_m^i - a)} - e^{-r-r(t_{m-1}^i - a)}}{r} \quad (2)$$

here the life expectancy with the intervention (L_i) at age a is divided into P time periods n_p, and Q_p^i is a vector of health-related quality of life weights predicted (or observed) for each time period n_p following the intervention. While Q_m^i is weight associated with the health state before intervention and individual's residual life expectancy is divided into N time periods n_m. Here t_p *and* t_m are the of individual years within the life expectancy.

On the other hand, Disability Adjusted Life Year (DALY) is the sum of the Years of Life Lost (YLL) due to premature mortality and the Years Lost due to Disability (YLD) for people living with the health condition or its consequence (World Health Organization (WHO), 2013a).

DALY = YLL + YLD (3)

We can derive the formula for YLL and YLD as follows (Diel et al., 2014):

$$YLL = \frac{K \cdot C \cdot e^{r \cdot a}}{(r+\beta)^2} \cdot \left[\left[1 + (r+\beta) \cdot a \right] \cdot e^{-(r+\beta) \cdot a} - \left[1 + (r+\beta)(L+a) \right] \cdot e^{-(r+\beta)(L+a)} \right] + \frac{1-K}{r} \left(1 - e^{-r \cdot L} \right) \quad (4)$$

$$YLD = DW \cdot \left[\frac{K \cdot C \cdot e^{r \cdot \alpha}}{(r+\beta)^2} \cdot \left[\left[1 + (r+\beta) \cdot \alpha \right] \cdot e^{-(r+\beta) \cdot \alpha} - \left[1 + (r+\beta)(T+\alpha) \right] \cdot e^{-(r+\beta)(T+\alpha)} \right] + \frac{1-K}{r} \left(1 - e^{-r \cdot T} \right) \right] \quad (5)$$

Where, K = Age-weighting modulation constant (1.00), C= Age-weighting scaling constant, L= country-specific standard life expectancy at age of death (years),

DW = Disability Weight (0.333; 95% CI= 0.224-0.454) as per the Global Burden of Disease 2013 study weights (Salomon et al., 2015), T= treatment duration, and α = age of onset of disability.

2.3.1. Health Related Quality of Life of Tuberculosis Patients

Although several studies have been conducted to assess the health-related quality-of-life (HRQoL) for tuberculosis patients (Brown et al., 2015), there is no well-accepted tuberculosis-specific HRQoL measurement instrument available. Most studies use EQ-5D, SF-36, SF-6D and other generic HRQoL instruments (Guo, Marra, & Marra, 2009). Only one study conducted in India used a TB-specific tool named DR-12, which has 12 items each ranked on a scale of 1–3 (Dhingra & Rajpal, 2003). Recently a multidimensional TB-specific HRQoL instrument named Functional Assessment of Chronic Illness Therapy-Tuberculosis (FACIT-TB) was developed and psychometrically validated in Iraq (Dujaili et al., 2015). This FACIT-TB instrument includes physical, mental, social and economic, functional, as well as spiritual well-being of the TB patients. This instrument is unique in incorporating questions on adverse drug reaction (ADR), perception about social stigma, and spirituality related with TB.

The scale comprises 45 items: 17 items covering physical well-being (possible score range 0–68), seven items covering social and economic well-being (possible score: range 0–28), 11 items covering emotional well-being/living with TB (possible score range 0–44), seven items covering functional well-being (possible score range 0–28), and three items covering spiritual well-being (possible score range 0–12). A 5-point Likert type scale ranging from 0 (not at all) to 4 (very much) is assigned to each item.

2.4 Cost-Effectiveness of Tuberculosis Programs

Till date, to our best knowledge, the only cost-effectiveness analysis between two TB control programs run by BRAC and government was conducted by Islam et al. (2002). It showed that the government program was 50% more expensive for similar outcomes.

Many cost-effectiveness analyses have been done in order to determine the cost-effective diagnostic techniques, e.g., sputum examination (Walker et al., 2000), serological tests vs. other diagnostic tests (Dowdy, Steingart, & Pai, 2011), dual or single test for detection of latent tuberculosis infection (LTBI) (Pooran et al., 2010), . However, since the focus of this thesis is to compare between two TB control programs we restrict our review among those studies which conducted cost-effectiveness analyses between programs.

Using Denver General Hospital data Burman et al. showed that although DOT is costly at the outset it turns to be cost-effective than Self-administered Therapy (SAT) because of higher cure rates (Burman, Dalton, Cohn, Butler, & Reves, 1997). The outcome variable for this study was cure rate per cost unit.

Using published literature, records, and expert opinions Baltussen et al. showed that DOT as well as incremental programs like DOTS plus, Full combination of DS-TB and MDR-TB strategies all are cost-effective in terms of DALYs averted per cost unit in high burden TB countries in Africa and South-East Asia (Baltussen, Floyd, & Dye, 2005).

Several other studies have been conducted in different countries, e.g., Thailand (Hunchangsith, Barendregt, Vos, & Bertram, 2012), Egypt and Syria (Vassall, Bagdadi, Bashour, Zaher, & Maaren, 2002), Botswana (Moalosi et al., 2003), Haiti (Jacquet et al., 2006), Uganda (Okello, Floyd, Adatu, Odeke, & Gargioni, 2003), Brazil(Mohan, Bishai, Cavalcante, & Chaisson, 2007). These studies invariably documented that the DOTs strategy or involving the communities in the care process is cost-effective over SAT.

In two studies conducted in South Africa (Sinanovic et al., 2003), and in India (Pantoja et al., 2009) the authored showed that PPP models were more cost-effective by virtue of reducing costs to patients by 64-100%in South Africa; while the patient cost fell from US$154 to US$132 over four-years period in India.

A recent study shows that shortening of the DS-TB treatment from six-months to four-months remain cost-effective option for Brazil, South Africa, Bangladesh and Tanzania (Gomez et al., 2016). Another study results also support this finding in South Africa (Knight et al., 2015).

Several studies have also been conducted to assess the cost-effectiveness of different MDR-TB treatment regimens. Fitzpatrick et al. (2012) conducted a systemic review of studies which used primary data and outcome which eventually includes only four studies conducted in Estonia, Peru, the Philippines, and Tomsk, Russia. Cost per DALY averted were $598, $163, $143, $745 respectively. The cost per DALY averted was lower than GDP per capita in all 14 WHO sub-regions considered.

However, there was no study comparing between the shorter and longer regimen for MDR-TB treatment. Two separate studies conducted by DF scientists assessed the

effect of two regimes. One study which was conducted for the standardized regimen of 21-24 months published in 2004 (Van Deun, Salim, Kumar Das, Bastian, & Portaels, 2004)and another study on shorter regimen was published in 2010 (Deun et al., 2010). Both of the studies showed that both treatment strategies are successful in treating MDR-TB patients; however, in absence of any comparative cost-effectiveness analysis between them we cannot tell which one is better.

2.4.1 Methods of Cost-Effectiveness of Tuberculosis Programs

Cost-effectiveness analyses with DALY or QALY as outcome variable usually employs various models like population model PopMod (Baltussen et al., 2005), Monte Carlo simulation technique (Tupasi et al., 2003), dynamic state-transition model of TB (Resch, Salomon, Murray, & Weinstein, 2006) etc. In this study, to conduct the economic evaluations of different tuberculosis control programs, we shall use the Monte Carlo simulation technique. A probabilistic Markov Chain Monte Carlo (MCMC) simulation model will be fitted. The patient level data on treatment outcomes will help to get the transitional probabilities between states as well as we can use regression techniques to get the probabilities along with the uncertainties. That will help us to conduct the sensitivity analysis of the results. Finally, we will estimate the Incremental Cost-Effectiveness Ratio (ICER) between the different comparators and use the acceptability curves approach to find out the cost-effective TB control program in Bangladesh.

Markov model has some unique characteristics which fit the progression of TB well. For example, in Markov model states are mutually exclusive, states are complete (i.e. no people are lost) and people remain in that state for a fixed period of time. Also,

Markov model is preferred over the decision trees when health event repeats over time, or have longer term health effects, effect of treatment either stops quickly after initial treatment or continue at an earlier level, and the risk of different health events does not depend on patient's prior history (Briggs, Claxton, & Sculpher, 2006).

Here we can represent the Markov model for TB as below:

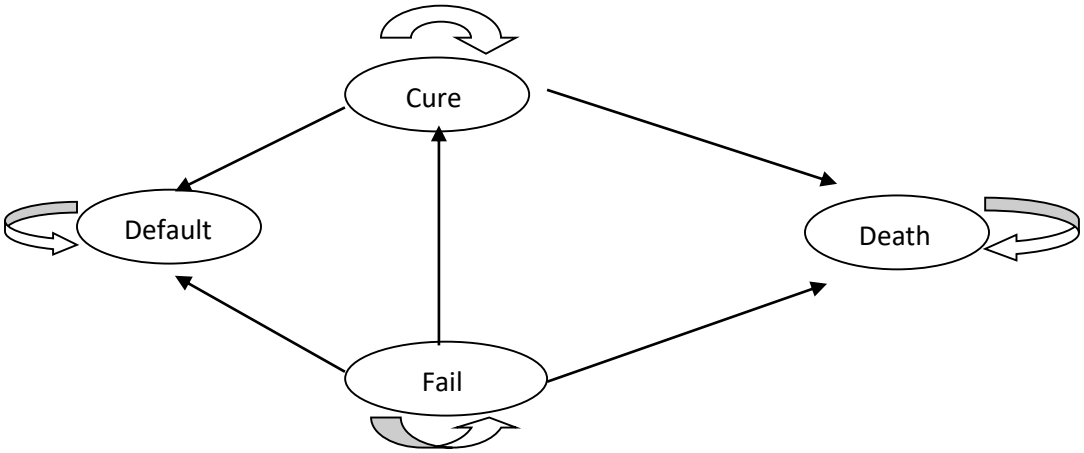

Figure 2.4 Simplified Markov Model for Outcomes of Illness with Tuberculosis

From the Markov model we can find that after starting of the treatment the MDR-TB patient can move to any of the four states, e.g., cure/treatment complete, failure/relapse, default, and death. Here default and death are the absorbing states. If any patient is cured he/she can remain cured, relapse/reinfection may occur, or can be dead. On the other hand, the failed/relapsed patients undergo another cycle of treatment and can culminate into cure, remain failed, can default, or can be dead as well.

Infectious disease often requires dynamic models which reflect the rate of transmission of disease among the population. The rate of infection is a function of the number of infected individuals in the community (Briggs et al., 2006). Epidemiology of an infectious disease is important to take into account because due to change in the

natural history of disease can affect the outcome of the disease and thereby, the cost-effectiveness analysis will be flawed (Jit & Brisson, 2011).

TB is an infectious disease and have latent period and many latent cases which does not turn into a full blown disease. But these latent TB infection (LTBI) can be activated upon proper stimuli or absence of immunity, as in the case of HIV/AIDS. Therefore, many researchers included these aspects in the infectious disease modeling (Jacquet et al., 2006; Menzies, Cohen, Lin, Murray, & Salomon, 2012; Oxlade, Piatek, Vincent, & Menzies, 2015; White & Abubakar, 2016). Dowdy et al. (2013) synthesized that a single model is unlikely meet all criteria for all studies and prepared a wish list for the TB modelers would love to have (Dowdy, Dye, & Cohen, 2013)

CHAPTER 3

METHODS

3.1 INTRODUCTION

Bangladesh National Tuberculosis control program (NTP) follows a PPP model where NGOs are working in collaboration with the MOHFW. There are about 12 NGOs working in different areas of Bangladesh. Among these the largest NGO in the world-BRAC and Damien Foundation Bangladesh, an affiliate of the Belgian NGO running TB control programs worldwide are the principal NGOs. These NGOs are recipients of the funds provided by Global Fund for Tuberculosis and Malaria (GFTAM) along with NTP being the principal recipient. BRAC gives away the funds to number of NGOs as the sub-recipient to work in different areas in Bangladesh. NTP uses the fund for equipping the National Institute of Diseases of the Chest and Hospital (NIDCH) and number of Medical College Hospitals with diagnostic and treatment facilities for tuberculosis (TB) patients infected with both drug sensitive and drug resistant strains (MOHFW, 2014).

For the drug sensitive TB patients standard 6 months regimen is followed by all participating NGOs. However, the mode of delivery is different for different NGOs. BRAC has employed Community Health Workers (CHWs) besides the DOTs centers to ensure patient compliance, while Damien Foundation (DF) trained and employed influential community members to help the patients to be adhered to the treatment protocol.

Another NGO, Salvation Army Bangladesh, is using drug sellers at the pharmacies as the counselor and drug distributors for the TB patients. This study will conduct economic evaluation between these two different programs.

NTP in Bangladesh follows the 20-24 months treatment regimen for Multi-Drug Resistant TB (MDR-TB) patients. It follows the Programmatic Management of Drug-resistant TB (PMDT) guideline (Falzon et al., 2011). Initially MDR-TB patients are admitted to designated hospitals for intensive phase of treatment which generally last for 6-8 months. Then the patients are released to community and their treatment is supervised and administered by CHWs for another 14-16 months (MOHFW, 2012). Damien Foundation (DF) runs their own protocol of treatment for MDR-TB patients, which span over 9 months and differs in mode of treatment. DF generally admits the MDR-TB patients in one of their three hospitals situated at Jalchatra of Madhupur, Tangail, Shomvuganj, Mymensingh and at Netrakona for the continuation phase of the treatment which spans over four months followed by five months of continuation phase for which drugs are administered at patients' home (Damien Foundation, 2008). DF also follows the strategy of involving the community members (Sharma, 2002) while BRAC programs deploy community health workers (CHWs) to reach the patients (Liu et al., 2011). This study will assess the cost-effectiveness of the two MDR-TB programs run by NTP and DF in Bangladesh.

3.2 Study Design

The study follows a stratified random sampling method. From the 64 districts of Bangladesh nine districts from the eight divisions (at least one from each division) were selected based on the high and low burden of TB cases. Then from each district two

upazilas (sub-districts) will be selected randomly. From the registry of the DOTS center of the UHCs of these eighteen upazilas lists of TB patients currently undergoing treatment or recently finished will be collected.

3.3 Study Site

3.3.1 Drug Sensitive TB (DS-TB)

For total representation at least one district from all eight divisions of Bangladesh was selected for the study. Since Dhaka division is bigger in size, three districts was selected from Dhaka division including an urban area of Dhaka city. Selection was made based upon the high and low TB burden among all districts. Therefore, five high burden and four low burden districts have been selected under the purview of the study. Two upazilas (sub-districts) from each of the selected districts was selected randomly. Following is the list of all districts and upazilas covered under the study. From each upazila 50 DS-TB patients were selected randomly for interview.

3.3.2 Multi-Drug Sensitive TB (MDR-TB)

For assessing economic burden of MDR-TB patients and the economic evaluation of comparator MDR-TB control programs about 175 MDR-TB patients will be selected purposively. According to the recent estimates in 2014 number of laboratory-confirmed MDR-TB patients was 994 in Bangladesh (World Health Organization (WHO), 2015a) and the prevalence of MDR-TB is 5,100 in 2015 (World Health Organization (WHO), 2016a). In our study areas the number will be clearly significantly lower. Therefore, we collected the information of the MDR-TB patients from the TB

control programs and reach those who (Brazier, Roberts, & Deverill, 2002) were accessible.

3.4 Study Participants

The inclusion criteria for the study participants will be as follows:

a) Older than 18 years of age,

b) Suffering or recently suffered from pulmonary TB (DS-TB/MDR-TB),

c) Undergoing treatment or finished treatment within last 6 months.

3.5 Sample Size

Glick (H. A. Glick, 2011) proposed a sample size formula for cost-effectiveness evaluation of clinical trials. Although our study is not a typical clinical trial, given the nature of the intervention and the study design we can apply the formula for calculating the required sample size for our study. The formula calculates the sample size for each of the two groups with similar standard deviation of costs and effect and same sample size:

$$n = \frac{2\left(Z_\alpha + Z_\beta\right)^2 [sd_c^2 + \left(W * sd_q^2\right)^2 - (2\,W\rho * sd_c * sd_q)}{(WQ - C)^2}$$

Where:

Z_α is the Z-statistic for the level of Type I error (set at 95%)

Z_β is the Z-statistic for the level of Type II error (set at 80%)

sd_q, sd_c are the std deviations for each group for treatment effect and cost respectively

W is the Maximum Willingness to Pay

Q is the expected mean difference in treatment effectiveness

C is the expected mean difference in treatment cost

ρ is the expected correlation of the difference in cost *(C)* and effect *(Q)*

This is a measure of the covariance of changes in effectiveness and changes in cost. Negative covariance, where cost decreases with increasing effectiveness result in a larger sample size. Positive covariance where cost increases with increasing effectiveness result in smaller sample sizes.

DSTB:

With 95% confidence interval and 80% power of the test, we assumed that the standard deviation of costs (sd_c) is 400 USD, standard deviation of effect ($sd_{q)}$ is 0.2 QALY, ρ, correlation of difference in cost (C) and effect (Q) is 0.4. The expected mean difference in treatment effectiveness (Q) is 0.4 QALY and expected mean difference in treatment cost (C) is 500 USD. We set the willingness-to-pay threshold (W) at the three times of GDP of Bangladesh which is 3942 USD (Macroeconomics, 2001). We found the sample size for both treatment groups is 405.

MDR-TB:

With 95% confidence interval and 80% power of the test, we assumed that the standard deviation of costs (sd_c) is 100 USD, standard deviation of effect ($sd_{q)}$ is 0.25 QALY, ρ, correlation of difference in cost (C) and effect (Q) is 0.5. The expected mean difference in treatment effectiveness (Q) is 0.15 QALY and expected mean difference in

treatment cost (C) is 1000 USD. We set the willingness-to-pay threshold (W) at the three times of GDP of Bangladesh which is 3942 USD (Macroeconomics, 2001). We found the sample size for one group is 70 and another is 104 with a 2:1 sample size ratio.

Table 3.1 List of Districts and Sub-districts where the survey among DS-TB patients was conducted

Division	**District**	**Sub-District**	**Number of Patients Surveyed**	**Treatment Delivery**
Barisal	Pirojpur	Pirojpur Sadar	50	Community Health Worker
		Najirpur	50	
Chittagong	Laxmipur	Laxmipur Sadar	50	Community Health Worker
		Ramganj	50	
Dhaka	Faridpur	Faridpur Sadar	50	Community Member
		Nagarkanda	50	
	Manikganj	Manikganj Sadar	50	Community Health Worker
		Shingair	50	
	Dhaka	Mirpur (Urban Area)	100	DOTs center, Pharmacists
Khulna	Kushtia	Kushtia Sadar	50	Community Health Worker
		Doulatpur	50	
Mymensingh	Netrokona	Netrokona Sadar	50	Community Member
		Kendua	50	
Rajshahi	ChapaiNawabganj	ChapaiNawabganj Sadar	50	Community Member
		Shibganj	50	
Rangpur	Panchangarh	Panchagarh Sadar	50	Community Member
		Debiganj	49	
Sylhet	Habiganj	Habiganj Sadar	50	Community Member
		Bahubal	51	
Total			**1,000**	

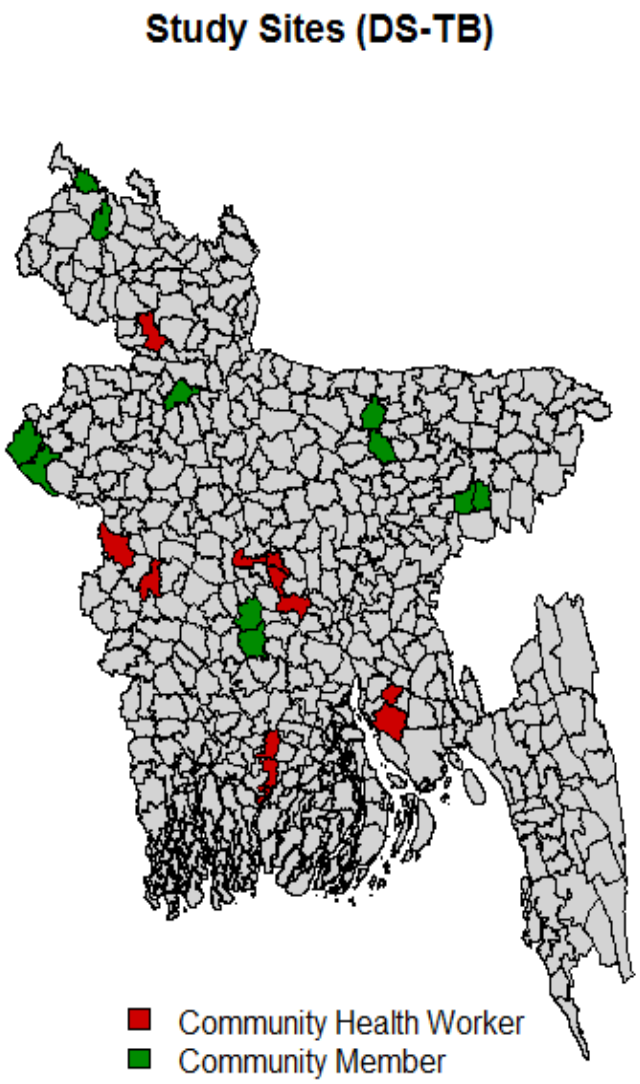

Figure 3.1 Study Sites (Sub-districts) where DS-TB patients were interviewed

Table 3.2 List of Districts where the survey among MDR-TB patients was conducted

Division	**District**	**Number of Patients Surveyed**	**Treatment Regimen**
Chittagong	Chittagong	78	20-24 Months Regimen
Dhaka	Dhaka	23	20-24 Months Regimen
Mymensingh	Mymensingh	17	9 Months Regimen
	Netrokona	32	9 Months Regimen
Rajshahi	Rajshahi	18	9 Months Regimen
Total		**168**	

3.6 ETHICAL CONSIDERATION

The study has already got ethics approval from University of South Carolina in the USA where the PI is a PhD student. Institutional Board Review (IRB) approval will also be taken from Jahangirnagar University in Bangladesh. A third and final approval was obtained from WHO Research Ethics Review Committee (WHO ERC).

The participants were approached at their households by the trained enumerators. At first the enumerators politely introduced themselves and asked pleasantries. After establishing rapport, the enumerators conveyed their purpose of the visit.

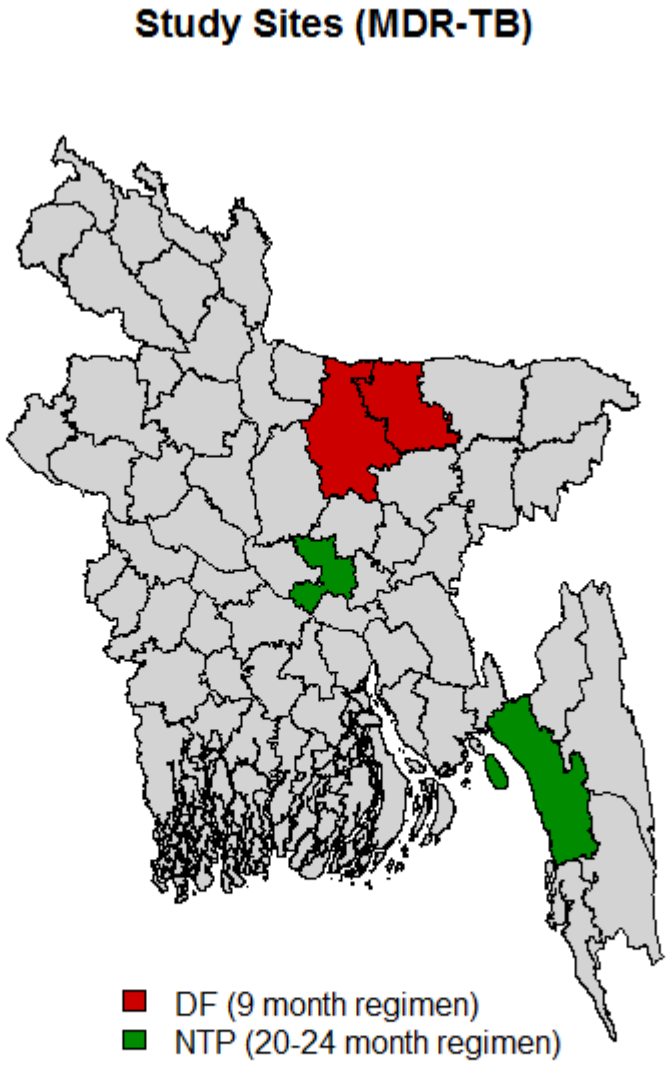

Figure 3.2 Study Sites (Districts) where MDR-TB patients were interviewed

An informed consent was obtained from each participants of the study. At the beginning the enumerator read the introduction in comprehensible manner to the patient. In the introduction the name and whereabouts of the investigators, name of the funding agency, and the purpose of the study are furnished. It also attests the right of the

respondent to withdraw any time during the interview. The benefit of participating in the study is also described in that part.

The data is kept in one laptop and under lock and key in the office of the principal investigator. No one except the investigator have access to the stored data. For data analysis the patient's information is de-identified. Thus the data analysis and presentation in the report is completely anonymous and in any circumstances it will be kept confidential.

3.7 Data Collection Instruments

3.7.1 Patient Questionnaire

Stop-TB questionnaire on patient's cost has been adopted for the study. The patient questionnaire includes questions on the previous TB treatment costs including number of visits, tests, drugs, travel, food, accommodation, and out-of-pocket and insurance costs etc. The questionnaire also includes questions on the current or recent treatment for TB, which comprises of treatment costs, follow-up costs, costs borne by family or friends, hospitalization costs, food costs, other comorbidities cost, insurance, coping costs. Therefore, the cost instrument is a comprehensive tool to capture all costs incurred by the patients and their families for TB. The questionnaire was field tested among the TB patients and changes were made accordingly to make the question understandable and answerable.

The patient questionnaire also includes the health-related quality of life questions. In this study Functional Assessment of Chronic Illness Therapy-TB (FACIT-TB) questionnaire (Dujaili et al., 2015), which includes 45 items under five sub-groups, will

be incorporated along with smaller generic instruments like EuroQol-5 Dimensions-5 Levels (EQ-5D-5L) with visual analogue scale (VAS), and SF-6D, which is an abridged well-validated version from SF-36 (Brazier et al., 2002). These generic instruments will be used to assign utility scores for various components of the FACIT-TB instruments. Mapping function will be used to predict the utility values. This approach involves estimating the relation between a non-preference-based measure (like FACIT-TB) and generic preference-based measure using statistical association and this approach requires overlap between the two measures applied on the same population (Young, Mukuria, Rowen, Brazier, & Longworth, 2015). Multinomial logistic regression models will be estimated for each dimension, and the estimates from these regressions will be used to categorize respondents into five levels of each of the EQ-5D dimensions and thus predict the EQ- 5D health state for each respondent. A total of 1000 Monte Carlo simulations will be run to estimate EQ-5D health states. The standard set of UK general population values will be then applied to each predicted health state to obtain EQ-5D values. Mapping is usually performed using regression analysis and often preferred regressions are OLS or tobit.

3.7.2 Provider Questionnaire

Institutional level data was also collected for assessing the direct health system costs associated with TB treatment. From this secondary source the data on the number of patients diagnosed and treated and the outcome of the diseases in terms of complete cure, remission, relapse or death was collected. Another questionnaire for the program managers was used in the study to collect data on the facility and personnel level costs for the TB control programs (included in the Annexure). Market values of the TB drugs was

collected for estimating the drug costs for patients under various programs. Those who are involved in the TB control programs on honorary basis, their opportunity costs of the time were calculated using the average wage rates for service holders using secondary sources.

3.8 Data Collection

Given the extent of household level primary data collection in 10 randomly selected districts a total of two survey teams consisting of sixteen data collectors were formed with one supervisor, one back checker and six enumerators in each team. The questionnaires were prepared in consultation with my supervisor and mentors at USC. The questionnaires were pre-tested at the field level by the selected survey teams before the actual data collection began.

3.8.1 Quality Assurance

The study employed multilevel quality assurance process for data collection. Researcher will execute a four-step scrutiny process to ensure the reliability and validity of the information. For each of the steps, certain team members will be given specific responsibility to manage the quality assurance process.

3.8.2 Cross Check

Enumerators collected quantitative data directly from households. Later, enumerators went to the households with filled questionnaire where other enumerators had collected the answers. This cross check by other enumerators helped to recover any primary mistakes in collecting data.

3.8.3 Accompany Check and Spot Check

Field team supervisor carried out next level data check through accompany check and spot check. Accompany check includes accompanying enumerators during data collection, validating the information provided by the respondents, throwing of questions, examining proper coding and collection of information. Field team supervisor also scrutinized the information through spot check by going to the households after the enumerators leave the households. Such meticulous checking system ensured the quality of data effectively.

3.8.4 Back Check

The third level quality assurance was carried out by the team supervisors. Team supervisors visited households randomly with filled up questionnaires to examine the accuracy and reliability of information. Three-layer cross checking in the field ensured high quality data collection.

3.8.5 Other Quality Check and Feedback

After data compilation, the data set was sent to the PI for his feedbacks and other quality measures. The Principal Investigator travelled intensely during the period of data collection and ensured the quality of the data collection.

3.9 Data Analysis

Data analysis is primarily performed in STATA 14.2. Patient and provider level costs data are being managed and analyzed. Regression modelling for finding important predictors for patient costs.

For cost-effectiveness analysis R will be used for the ease of estimation. Markov simulation modeling will be performed in Winbugs and Just Another Gibbs Sampler (JAGS). Both of these softwares are open source and can easily be used from within R. R is also an open source software for which many packages are found suitable for cost-effectiveness analysis (Sutton, Welton, Cooper, Ades, & Abrams, 2012). BCEA is one of those packages. It helps to analyze cost-effectiveness within a Bayesian framework (Baio, 2012)

3.10 Expected Outcome of the Study

Tuberculosis is a deadly tropical disease affecting the people of developing countries and incurring huge cost on the economy. Thus economic evaluation of this disease in a developing country setting will provide the researchers, policy makers an empirical evidence of the extent of the cost burden.

3.11 Dissemination of Results and Publication Policy

The results of the research will be disseminated to the global audience through presentations in conferences organized by World Health Organization (WHO), International Health Economics Association (iHEA), and American Public Health Association (APHA) etc.

The results will also be communicated with the policy makers and program managers of TB programs in Bangladesh and abroad. Scientific research articles will be prepared after analyzing the data and will be published in reputed peer-reviewed journal. The Principal Investigator of the study, Mohammad Rifat Haider, will take lead in analyzing the data and writing the article and will be the first author. The supervisor of

PhD Study, M Mahmud Khan, PhD, and the mentor, Zaina P. Qureshi, PhD, committee members James W. Hardin, PhD and Md. Abdul Hamid Salim, MBBS will also be co-authors for these studies.

Contribution of other contributors in preparing the papers will also be acknowledged. The sponsorship of TDR, WHO will be acknowledged by quoting: “This investigation received financial support from TDR, the Special Programme for Research and Training in Tropical Diseases, co-sponsored by UNICEF, UNDP, the World Bank and WHO”.

CHAPTER 4

STUDY I

4.1 Economic Burden of Tuberculosis in Bangladesh[1]

[1] Haider, M. R. To be submitted.

Abstract

Background: Tuberculosis (TB) is major scourge for human-kind and causes profound economic burden. Bangladesh is a high burden TB country by which 12% of its annual deaths are caused and 362,000 people are infected by TB. This study estimates the economic burden of TB on the afflicted Bangladeshi population.

Methods: Based on McIntyre's framework on economic consequences of illness, this study collects direct and indirect cost for TB care data from 1,000 drug sensitive TB (DS-TB) and 145 multi-drug resistant (MDR-TB) patients from all over Bangladesh. Provider cost for TB care was also collected from the health facilities. Costs for DS-TB and MDR-TB patients were estimated using a Generalized Linear Model and summed up with per patient provider level costs to get the total costs per TB patients.

Results: Mean age of DS-TB patients under the study was 45.2 years while mean age of MDR-TB patients were 35.5 years. In aggregate, DS-TB patients incurred total average costs of BDT 21,235 (USD 265) for TB illness; while MDR-TB patients' average costs were BDT 34,975 (USD 437). Including provider costs for each patient (USD 9 for DSTB and USD 2,006 for MDR-TB patients) total average costs for each DS-TB patient was BDT 22,003 (USD 275) and for each MDR-TB patient was BDT 1,95,449 (USD 2443).

Assuming 57% case notification rate, the actual costs for treating TB patients in 2015 was USD 55.6 million. If all DS-TB patients were treated the cost would have been 1

billion USD. For MDR-TB treatment, total cost was USD 12.5 million; treating all MDR-TB patients would have costed USD 23 million.

Conclusions: Results show that DS-TB patients incurred about 50% of their household annual income for treatment while that goes up to 66% for the MDR-TB patients. Pre-diagnosis cost constitutes about 63% of total costs for DS-TB patients and 42% of MDR-TB patient costs. This figures show the significant economic burden posed by TB and early diagnosis of the disease can reduce the burden in great extent.

Keywords: Economic Burden, Tuberculosis, Bangladesh, Patient Costs, Provider Costs

Background

Tuberculosis is an ancient disease and has claimed more life than any other microbial pathogens in human history (Daniel, 2006). Despite having effective treatment for TB for more than half a century and an effective vaccine for a century, TB still kills more people now than it ever has in the history of the world (McMillen, 2015). It is the human behavior, non-compliance to the relatively long regimen of drugs that provides the bacteria with opportunity of growing resistance against the anti-TB drugs. Tuberculosis is also a disease of poverty, that means the poor and congested living conditions facilitate the bacteria to strive (Davies, 2003, Gandy et al., 2002). Slow progress in control of a preventable and curable disease over last two decades calls for shift our focus from biomedical research of inventing new drugs with shorter regimen to community and patient-driven approach where a paradigm shift is urged for (Stop TB, 2015).

In 2015, Tuberculosis (TB) ranked 18th among the highest burden diseases globally and it constituted 47% of the global burden attributable to communicable, maternal, neonatal, and nutritional disorders (Kassebaum et al., 2016). In 2015, 10 million new cases of TB were reported and almost two million people died from TB worldwide (World Health Organization (WHO), 2016a). In 2015, TB became the top infectious disease killer by claiming 1.1 million lives by matching the death tolls by HIV/AIDS (Kassebaum et al., 2016).

Almost 85% of all new cases of Drug Sensitive TB (DS-TB) and multi-drug resistant TB (MDR-TB) occur in 30 high burden TB countries and Bangladesh is one them (World Health Organization (WHO), 2015b). In 2015, 362,000 Bangladeshis developed TB and 73,000 died from it. TB accounted for 12% of all deaths (609,800) that

occurred in 2015 in Bangladesh (Institute for Health Metrics and Evaluation (IHME), 2016).

The economic burden of TB in Bangladesh is a great concern, since it affects a sizable number of people each year and causes 12% of the total death. Both disability and death have grave economic implications in the form of lost income to the persons and their families and lost Gross Domestic Product (GDP) for the country. The working age group is more affected by the disease, that also increases the costs associated with the disease (World Health Organization (WHO), 2016b). Besides causing death TB causes significant disability among the afflicted population. Not only are older people more vulnerable to the disease, but their disease is more frequently complicated with adverse drug events which leads to reduced health related quality of life (Negin, Abimbola, & Marais, 2015).

Expensive treatment of the disease also put burden on the patients, families, and the health system of the country. (World Health Organization (WHO), 2016b). Moreover, almost half (43%) of the affected in Bangladesh are not reported under the national registries and go untreated (World Health Organization (WHO), 2016a); this makes the control and elimination of the disease extremely hard and expensive. Emergence of drug resistant strain also contributes in escalating costs because of high death rates, costly treatments, and poor outcomes (Fitzpatrick & Floyd, 2012).

This study intends to assess the patient-level costs for both DSTB and MDR-TB, and the provider-level costs for providing the TB diagnosis and treatment.

Methods

Conceptual Framework

In cost analysis three types of costs are taken into account, direct costs, indirect costs and intangible costs due to illness. Direct costs include healthcare costs (hospital, medication, emergency transportation, outpatient visit charges) and family costs (out-of-pocket payment (OOP), medication, transportation of families etc.). Indirect costs include the opportunity costs of work-loss days, lost productivity/income on the part of both the patients and his/her relatives. Intangible costs can arise from the functional limitations, pains acquired in the process and cannot be quantified and highly subjective in nature (Centers for Disease Control and Prevention (CDC), 2013). Besides these costs, there is another important cost incurred by the households through coping strategies, which includes sale of assets, taking up debt, saving on food or other items, taking a child out of school to care for the patient or taking up another job (Russell, 2004).

The costs of communicable diseases fall on the households in three distinct phases: Pre-diagnosis, During Diagnosis/Pre-treatment, and During Treatment. McIntyre et al. (McIntyre et al., 2006) provided a flow-chart on economic consequences of TB illness and payment for healthcare (Figure 2.2). According to McIntyre there are four stages of tuberculosis treatment, e.g., illness experience, treatment seeking behavior, economic consequences, and coping strategies and social resources. In preliminary stages, perception of illness and treatment seeking can be affected by the economic status of the person. If the patient with TB does not seek treatment then only indirect costs are incurred in form of lost productivity, while if the patient goes for treatment then direct

costs also incurred on top of indirect costs. Indirect costs further subdivided into productivity loss of the patient and the caregiver, whereas direct cost is categorized into financial costs of healthcare (services and medicines) and other financial costs.

Based on the conceptual model of McIntyre et al. (McIntyre et al., 2006) Laokri et al. (Laokri et al., 2014) provided an extended conceptual framework incorporating intangible costs, e.g., pain and suffering, and social stigma; elaborating coping costs and social burdens due to illness; and includes societal economic loss along with illness poverty trap ensued due to illness (Figure 2.3). This extended model also includes forgone activities of the informal caregivers as well as those of guardians accompanying the TB patients for treatment. These foregone activities culminate into labor substitution, withdrawal of children from school, and informal caregiving activities of the family members. Guardians lose time and income. Direct costs have been subdivided into subsidized healthcare costs, non-subsidized healthcare costs, and non-healthcare costs. Non-subsidized healthcare costs and non-healthcare costs along with income loss of the guardian can result in (1) Financial resource mobilization, e.g., borrowing, selling assets, pledging, extra-earnings etc.; (2) Resource reallocation, e.g., dissaving, budget cuts, deprivation, delayed investment etc. Non-subsidized healthcare costs and non-healthcare costs can also lead to erratic care pathways which include redundant care visits, alternative care seeking, diagnosis and treatment delays, and care interruption.

Intangible costs like pain and suffering and social stigma can impose social consequences like (1) Low awareness: low awareness of disease, denial of illness status, bad living conditions, fear of losing position, social isolation, lack of family support,

patient-related delays; (2) Social exclusion: exclusion from services including public healthcare services, from income and from participation.

Between McIntyre's and Laokri's conceptual frameworks, both of which are built upon the framework proposed by Russell (2004), simpler McIntyre's framework will be adopted for this study. Both frameworks are more or less similar, while Laokri's one is more detailed and includes pain and suffering, and social stigma. It is difficult to assign monetary value to intangible costs like pain and stigma. On the other hand, these intangible phenomena affect the quality of life of the patients. In our adopted quality of life measurement tool pain and stigma have included to offset their absence in the costs estimation. It also prevents double counting; once included in costs and again take into account while measuring quality of life.

Study Design

The study follows a stratified random sampling method. From the 64 districts of Bangladesh nine districts from the eight divisions (at least one from each division) were selected based on the high and low burden of TB cases. Then from each district two upazilas (sub-districts) were selected randomly. From the registry of the Directly Observed Treatment-Short-course (DOTS) center of the UHCs of these eighteen sub-districts lists of TB patients currently undergoing treatment or recently finished were collected. Following is the list of all districts and sub-districts covered under the study. From each sub-district 50 DS-TB patients were selected randomly for interview.

For assessing economic burden of MDR-TB patients and the economic evaluation of comparator MDR-TB control programs about 168 MDR-TB patients was selected purposively.

Study Participants

The inclusion criteria for the study participants were older than 18 years of age, suffering or recently suffered from pulmonary TB (DS-TB/MDR-TB), and undergoing treatment or finished treatment within the previous 6 months.

Sample Size

The sample size for estimation of the costs incurred by DS and MDR-TB treatment will be calculated using the following formula:

$$n = \left(\frac{Z * SD}{d}\right)^2$$

Where,

Z= 1.96, the right-tail quantile value of a standard normal variable Z at α =0.05

d= margin of error

SD= Standard Deviation of the mean costs

For DS TB in a recent study we find that the patient cost for the treatment was $224 (Tanzania). This cost does not include the cost for providing the treatment, i.e., health care delivery costs. If we guess that the total cost would be $400 including all other costs. We also assume that the standard deviation would be $400 and with the margin of error of $50 we get the sample size at 5% significance level is 246. However, 1,000 DS-TB patients were interviewed under the study; out of them 404 undergone treatment under CHW model and 598 got treatment under CM model.

NTP PMDT Expansion plan, Bangladesh (2013 – 2017) estimates the MDR-TB treatment cost is $6000. If we take the similar figure as the standard deviation and $1200 as the margin of error, we get the sample size for MDR-TB patients at 5% significance

level is 96. Under this study, 145 MDR-TB patients were interviewed; 58 patients were treated with 9 month regimen while 87 patients were under 20-24 month regimen.

Providers

Under the purview of the study 16 DOTs center managers and 3 representatives from MDR-TB care providing hospitals were interviewed for collecting cost of providing treatment to DS-TB patients. In each of the TB treatment facilities the facility manger was interviewed using a pre-set questionnaire.

Variables

Patient Costs	**Provider Costs**	**Patients' Socio-economic Characteristics**

❖ Direct costs
  ○ Medical costs
  ○ Non-medical costs
❖ Indirect (opportunity) costs
• Coping costs
• Costs made in the facility that were not obligatory to get the diagnosis and treatment (i.e., costs of food).
• Other costs: (in)direct costs made by or for accompanying persons (attendants)
	• Prevention and Promotion Costs
	• Contact Tracing Costs
	• Diagnosis Costs
	• Drugs Costs
	• Treatment Costs
	• Other TB activities Costs
	• Human Resources Costs
	• Capital Costs
		• Age
		• Sex
		• Education
		• Occupation
		• Religion
		• Current health status
		• Location (Rural, urban, urban slum)
		• Wealth (asset) index
		• Type of TB patient (New, relapse, failure, transfer in)
		• Household income/number of earning members

Data Analysis

Data analysis was performed by Stata 14.2 (StataCorp, 2015). Descriptive statistics like means, standard deviation, frequency, and percentages will be reported. Multivariable regression analysis will be performed for finding the important variables for treatment and access costs.

Measurement of Average Total Direct Costs

Average total direct costs will be measured by combining all the out-of-pocket medical and non-medical costs for TB treatment. Costs for DS-TB and MDR-TB patients will be separately calculated. These costs include drugs, diagnostic tests, fees, consultation fees, food costs, travel costs, accompanying person costs. That means direct costs include all costs incurred directly out-of-pocket for the treatment of TB patient.

Costs incurred by each patient, e.g., both DS-TB and MDR-TB, have been calculated. Patients were interviewed on each and every visits they made to any type of provider for the TB illness were tried to track down. For each visit the patients reported their (including their accompanying persons) incurred direct costs.

Measurement of Average Total Indirect Costs

Average total indirect costs will be measured by foregone income due to inability to do normal daily activities. These activities can be formal or informal. Valuation of productivity losses has been done using per capita gross domestic product (GDP) of Bangladesh (USD 1342/year that means 294 BDT/day). Valuation using GDP is preferred because this approach gives same weight to rich and poor people's income.

Regression Analysis

Multivariable regression analysis will be performed using socio-demographic variables as the predictors. The cost data for both DS-TB and MDR-TB patients were

skewed to the right with cost amounts concentrating near zero values. However, the costs are not exactly zeros because all TB patients incurred some costs. Given the distribution of the costs data, normality assumption for OLS regression has been checked using histogram and normal probability plot, and heteroscedasticity was tested using the Breusch-Pagan test. We found that the normality assumption was violated and there was evidence of heteroscedasticity (unequal variance).

Although log transformation of the cost variable is a common way to deal with this skewness, it still suffers from the problem of heteroscedasticity and the transformation and retransformation would lead to biased estimate of cost. Therefore, estimation of a Generalized Linear Model (GLM) has been preferred because it is particularly helpful in avoiding the log retransformation problem and it does not require the normality assumption to hold true. For GLM one has to specify the correct link and variance (family) function. The modified Park test was used for selecting family, while the Pregibon link test (checking linearity of response on scale of estimation) was used to assess the choice of link function, The large sample Pearson correlation test and Modified Hosmer-Lemeshow test (checks for systematic bias in fit on raw scale) were used for specifying link. Based on these tests, a GLM model with identity link and inverse Gaussian family, in which variance is proportional to the cube of mean, was found best suited for both DS-TB and MDR-TB cost models.

We can specify the model as below:

$$c_{i,j} = \beta_0 + \beta_1 x_{i,j1} + \beta_2 x_{i,j2} + \sum_{k}^{n} \alpha_k z_{i,j}$$

Here, $c_{i,j}$ is the patient cost patient (i=1 to N) and suffering from DS-TB or MDR-TB (j=0 or 1). $x_{i,j1}$, $x_{i,j2}$ are dummy variables for treatment through CHW model and CM model for DS-TB treatment costs respectively; while these two represents 20-24 month regimen and 9 month regimen for MDR-TB treatment model, $z_{i,j}$ represents different covariates to control for across individuals.

Provider Costs

These costs can be called as health system costs as it contains the costs from the health system perspective. It includes capital costs, personnel costs, drugs cost, laboratory costs, and programmatic costs. Total cost for each facility has been summed up and then was divided by the number of total TB patients served by each facilities to come up with the per patient costs incurred by the provider. In other words, the health system cost will be described as the cost from the provider side to treat each patient under each type of treatment modality.

Estimating Economic Burden of TB in Bangladesh

Finally, the total economic burden of TB in Bangladesh has been calculated using the TB prevalence data. This data was obtained from Global Tuberculosis Report 2015 published by World Health Organization (WHO). Recently a TB prevalence survey has been conducted by Institute of Epidemiology, Disease Control, and Research (IEDCR) in Bangladesh. The preliminary findings of that survey found that the prevalence rate was lower (295 per 100,000 population) than WHO estimate of 362 per 100,000 in 2015. This rate has also been used to estimate a comparative economic burden of TB in Bangladesh.

Results

Patient Characteristics

Mean age of DS-TB patients under the study was 45.2 years while mean age of MDR-TB patients were 35.5 years. Most MDR-TB patients were under the age of 45 years, whereas DS-TB patients were more dispersed among the age groups. In both DS-TB and MDR-TB samples majority of the patients were male, had no education, did informal work or did not work before occurrence of TB, of Islamic faith, and resided in rural areas. Most of the DS-TB patients were newly diagnosed, while most MDR-TB patients suffered from relapse or treatment failure. In the same vein, most of the DS-TB patients had no previous history of TB treatment, but almost two-third of the MDR-TB patients had previous history of TB treatment and almost one-fifth of the total sample did not complete the treatment. Since, wealth index was calculated separately among two samples, one-fifth (20%) of each population belonged to each quintile except the poorest quintile contained more (22.4%) patient than the poorest one (17.6%) (Table 4.1).

Table 4.1 DSTB and MDR-TB Patient characteristics under the study

Characteristics	**DS-TB Patients**	**MDR-TB Patients**
N	**1,000**	**145**
	% (n)	**%(n)**
Age		
18-25 Years	14.9 (149)	29.0 (42)
26-35 Years	18.4 (184)	33.8 (49)
36-45 Years	17.5 (175)	13.8 (20)
46-55 Years	20.6 (206)	9.6 (14)
56-65 Years	17.5 (175)	9.0 (13)
66+ Years	11.1 (111)	4.8 (7)
Sex		
Female	37.5 (375)	42.1 (61)
Male	62.5 (625)	57.9 (84)
Education		
No Education	42.1 (421)	33.1 (48)
Primary	31.7 (317)	31.0 (45)

Secondary	20.6 (206)	29.0 (42)
Higher Secondary and Higher	5.6 (56)	6.9 (10)
Occupation before TB		
Formal	11.6 (116)	21.4 (31)
Agriculture or Household Jobs	13.4 (134)	8.3 (12)
Informal	37.6 (376)	33.1 (48)
Did not work	37.4 (374)	37.2 (54)
Religion		
Other	10.6 (106)	7.6 (11)
Islam	89.4 (894)	92.4 (134)
Current Health Status (VAS)		
0.-50	23.2 (232)	34.5 (50)
51-65	16.9 (169)	11.0 (16)
66-80	37.9 (379)	30.3 (44)
81-100	22.0 (220)	24.1 (35)
Location		
Urban	18.2 (182)	37.9 (55)
Rural	77.2 (772)	47.6 (69)
Urban Slum	4.6 (46)	14.5 (21)
Type of TB Patient*		
New	94.2 (909)	4.6 (6)
Relapse/Failure	4.9 (47)	87.7 (114)
Loss to Follow Up	0.9 (9)	7.7 (10)
Household Income Before TB	15,282 [24,916]	17,355 [11,307]
Previous TB Treatment		
No Previous Treatment	94.0 (940)	35.2 (51)
Not Completed	1.0 (10)	17.9 (26)
Completed	5.0 (50)	46.9 (68)
DS-TB Program Model		
Community Health Worker	40.3 (404)	-
Community Member	59.7 (598)	-
MDR-TB Program Regimen		
9 Month Regimen	-	40.0 (58)
24 Month Regimen	-	60.0 (87)
Wealth Index		
Poorest	22.4 (224)	20.0 (29)
Poorer	17.6 (176)	20.0 (29)
Middle	20.0 (200)	20.0 (29)
Richer	20.0 (200)	20.0 (29)
Richest	20.0 (200)	20.0 (29)

Total	100 (1,000)	100.0 (145)

* 15 missing for MDR-TB

Patient Level Average Costs

Direct Costs

In Table 4.2, average direct costs borne by DS-TB and MDR-TB patients have been illustrated. Direct costs include all the out-of-pocket medical and non-medical costs for TB treatment. Total average direct costs for DS-TB patients were BDT 20,154 (USD 252) and for MDR-TB the amount was BDT 30,858 (USD 386). The highest costs were incurred by the patients during the pre-diagnosis phase of the illness. DS-TB patients spent BDT 13,287 (USD 166) and MDR-TB patients incurred BDT 14844 (USD 186) before the diagnosis of TB disease was confirmed. TB diagnosis was costly for DS-TB patients (BDT 1,107; USD 14) than MDR-TB patients (BDT 685; USD 9). Hospital costs were way higher for the MDR-TB patients (BDT 7,669; USD 96) than DS-TB patients (BDT 2,515; USD 31). Additional food costs were more or less same for both DS-TB and MDR-TB patients. Accompanying person's costs was higher for MDR-TB patients (BDT 2,114.70; USD 26) than DS-TB patients (BDT 380; USD 5). Costs for side-effects of TB drugs were higher for the MDR-TB patients (BDT 1,647; USD 21) than DS-TB patients (BDT 435; USD 5). Relocation costs was incurred by only the MDR-TB patients during hospitalization (initial incentive phase of treatment). On an average, the relocation cost was BDT 341.24/USD 4.

Indirect Costs

In table 4.2, average indirect costs borne by DS-TB and MDR-TB patients have also been shown. Indirect costs include the income loss by the patients as well as their accompanying persons. MDR-TB patients incurred more indirect costs (BDT 1,523; USD

19) than DS-TB patients (BDT 407; USD 5). Similarly, the persons accompanied MDR-TB patients lost more income (BDT 2,594; USD 32) than persons accompanied DS-TB patients (BDT 674; USD 8). In total, MDR-TB patients incurred more indirect costs (BDT 4,117; USD 51) than DS-TB patients (BDT 1,081; USD 14).

Total Average Patient Level Costs

In aggregate, DS-TB patients incurred total average costs of BDT 21,235 (USD 265) for TB illness; while MDR-TB patients' average costs were BDT 34,975 (USD 437).

Table 4.2 Patient Level Average Costs (BDT)

Costs	**DS-TB Patients**	**MDR-TB Patients**
N	**1,000**	**145**
	Mean [SD]	**Mean [SD]**
Direct Costs		
Before Diagnosis Costs	13,287.16 [55002.53]	14,844.23 [25589.24]
TB Diagnosis Costs	1,106.69 [5725.75]	684.63 [2177.10]
Follow-up Costs	172.16 [640.63]	877.17 [1825.46]
Drug Collection Costs	14.6 [195.91]	1.17 [6.18]
Hospital Costs	2,515.23 [14813.86]	7,669.40 [10521.34]
Additional Food Costs	2,244.01 [1915.92]	2,678.39 [1595.63]
Accompanying Person Costs	380.03 [739.85]	2,114.70 [5309.25]
MDR-TB Relocation Costs	-	341.24 [1386.08]
Drug Side-effects Costs	4,34.58 [2998.73]	1,647.28 [5463.01]
Sub-Total (Direct Costs)	20,154.43 [60241.68]	30,858.22 [39964.31]
Indirect Costs		
Patient Opportunity Costs (Income Loss)	407.07 [378.39]	1,522.86 [942.80]
Accompanying Person Opportunity Costs	673.57 [1952.26]	2,593.91 [6765.72]
Sub-Total (Indirect Costs)	1,080.64 [2004.40]	4,116.76 [6887.64]
Total Costs	21,235.10 [60841.03]	34,974.098 [43635.95]

Provider Level Average Costs

In Table 4.3, facility level data was used to illustrate the average per person health system costs to provide TB treatment. DS-TB treatment facilities did not report any costs

for prevention and promotional activities, e.g., contact tracing, health promotional activities, vaccination activities etc. In treating each DS-TB patients the health system incurred only BDT 768 (USD 9.60), for MDR-TB patients the cost rose to BDT 160,474 (USD 2006). Drugs (BDT 59276; USD 741), human resources (BDT 51826; USD 648), and diagnostic (BDT 35554; USD 444) were the highest cost incurring areas for MDR-TB patients. Similarly, for DS-TB patients the highest cost-incurring areas were drugs (BDT 439; USD 5), diagnostics cost (BDT 184; USD 2), and human resources (BDT 70; USD 1).

Table 4.3 Provider Level Average Costs (Per Patient)

Costs	**DS-TB Facilities**	**MDR-TB Facilities**
N	**5648**	**576**
	BDT	**BDT**
Prevention and Promotion Costs	0.00	524.78
Diagnostic Costs	183.51	35,554.08
Drug Costs	438.79	59,275.55
Training Costs	10.63	1,014.58
Meeting Costs	1.34	874.64
Incentive Payment	31.28	3,100.00
Human Resources Costs	69.86	51,825.73
Capital Costs	29.37	8,211.78
Other Costs	2.92	92.73
Total Costs (BDT)	767.69	16,0473.86
Total Costs (USD)	9.60	2,005.92

Per Patient Total Average Costs

Average per patient total costs including patient and provider level costs have been shown in Table 4.4. On an average, each DS-TB patient incurs BDT 22,003 (USD 275) and each MDR-TB patient incurs BDT 1,95,449 (USD 2443).

Table 4.4 Per Patient total average cost (Including patient and provider level costs)

Costs	**DS-TB**	**MDR-TB**
	BDT	**BDT**

Patient Level Costs (BDT)	21,235.10	27,809.67
Provider Level Costs (BDT)	767.69	16,0473.86
Total Costs (BDT)	22,002.79	19,5448.84
Total Costs (USD)	275.03	2,443.11

Bivariate Analysis of Patient Level Cost Data

Table 4.5 shows the results from bivariate analysis of patient level cost for both DS-TB and MDR-TB patients. For DS-TB costs only mean total costs of different wealth quintiles were significantly different. In case of MDR-TB patients, categories of previous history of TB treatment and MDR-TB regimen had significantly different mean total costs.

Table 4.5 Bivariate Analysis of Patient Level Cost for DS-TB and MDR-TB patients

Characteristics	**DS-TB Patients**			**MDR-TB Patients**		
N	**1,000**			**145**		
	Mean	**Median**	**p-Value**	**Mean**	**Median**	**p-Value**
Age			0.056[a]			0.438
18-25 Years	15,178	9,529	0.813 (kwallis)	43,3348	26,616	0.269
26-35 Years	17,788	8,806		31,536	18,732	
36-45 Years	23,763	8430		23,988	16,135	
46-55 Years	22,795	8,887		25,703	14,609	
56-65 Years	15,993	8,802		47,734	19,504	
66+ Years	36,463	9,378		35,049	16,476	
Sex			0.206			0.179
Female	18,092	8,802	0.812	40,703	24,217	0.239
Male	23,121	8,849		30,816	17,816	
Education			0.107			0.289
No Education	16,888	7,130	0.000	25,946	14,923	0.075
Primary	21,531	8,646		36,153	27,196	
Secondary	26,083	12,830		40,912	18,467	
Higher Secondary and higher	34,404	21,196		48,076	25,419	
Occupation			0.079			0.097
Did not work	2320	10,095	0.001	46,270	26,431	0.133
Formal	31,086	10,478		32,054	26,898	
Agriculture or Household Jobs	22,693	7,552		30,992	16,102	

Informal	15,602	7,533		25,150	16,201	
Religion			0.168			0.210
Other	13,532	7,234	0.110	19,083	14,428	0.058
Islam	22,148	9,194		36,280	18,665	
Location			0.205			0.141
Urban	26,814	10,416	0.0015	44,143	29,782	0.003
Rural	20,585	8,494		29,566	14,127	
Urban Slum	10,071	8,319		28,737	17,709	
Previous TB Treatment			0.108			0.041
No	20,453	8,515	0.001	45,025	35,200	0.004
Yes	33,484	11,988	0.021	29,523	16,377	
DS-TB Program Model			0.069			
Community Health Worker	16,971	7,574	0.000	-	-	
Community Member	24,102	9,519		-	-	
MDR-TB Program Regimen						0.006
9 Month Regimen	-	-		22,975	13,406	0.000
20-24 Month Regimen	-	-		42,975	28,261	
Wealth Index			0.015			0.120
Poorest	12,375	7,267	0.000	30,846	16,542	0.071
Poorer	27,450	7,072		30,180	16,476	
Middle	18,483	8,340		27,372	16,147	
Richer	19,175	9,972		32,204	21,801	
Richest	30,776	12,826		54,273	30,770	
Comorbidity			0.238			0.927
No	19,610	8,180	0.006	35,146	18,012	0.693
Yes	24,404	9,752		34,319	20,607	

[a] p-values are obtained from univariate analysis

Multivariable Analysis of Patient Level Cost Data

Two separate GLMs were estimated with the patient level cost data for DS-TB and MDR-TB patients (Table 4.6). The modified Park test showed that best the GLM model for DS-TB costs belonged utilized the inverse Gaussian family, but for MDR-TB costs the Gamma family was best suited. The log link was best for both models. Results from the GLM post-estimation for selecting best model are shown in table 4.7.

Results show that education is a significant cost driver for both DS-TB and MDR-TB patients. With higher education the costs tend to become higher in both cases. Improved health status (measured by VAS) was associated with decreased expense on TB care for DS-TB patients. This effect of better health status did not hold true for MDR-TB patients. Similarly, while location of the patient had no effect in case of MDR-TB patients, DS-TB patients resided in the urban slums incurred less cost than their urban counterparts.

Previous TB treatment had a negative effect on MDR-TB patients cost, but it had no effect on costs of DS-TB patients. Community member model incurred more cost than the community health care model in case of DS-TB treatment. On the other hand, 20-24 month regimen incurred more cost on MDR-TB patients than 9 month regimen.

Wealth has no effect on cost of MDR-TB patients, while DS-TB patients belonged to middle, richer, richest quintiles incurred more costs than the poorest patients.

Table 4.6 Multivariable Analysis of Patient Level Cost with Generalized Linear Model

Characteristics	**DS-TB Patients**		**MDR-TB Patients**	
N	**1,000**		**145**	
	Log Link Inverse Gaussian Family		**Log Link Gamma Family**	
	Coefficient	**95% CI**	**Coefficient**	**95% CI**
Age				
18-25 Years	Ref.	-	Ref.	-
26-35 Years	0.25	-0.19-0.68	0.05	-0.39-0.48
36-45 Years	0.30	-0.15-0.76	-0.30	-0.79-0.23
46-55 Years	0.42	-0.03-0.86	0.20	-0.46-0.87
56-65 Years	0.36	-0.14-0.85	0.28	-0.34-0.90
66+ Years	0.41	-0.18-1.00	0.16	-0.68-0.99
Sex				
Female	Ref.	-	Ref.	-
Male	0.18	-0.15-0.52	-0.10	-0.48-0.27
Education				
No Education	Ref.	-	Ref.	-
Primary	0.39*	0.08-0.70	0.57**	0.15-0.99

Secondary	0.45*	0.07-0.84	0.59**	0.15-1.02
Higher Secondary and higher	0.93*	0.07-1.80	0.30	-0.41-1.01
Occupation				
Did not work	Ref.	-	Ref.	-
Formal	0.09	-0.42-0.60	-0.33	-0.80-0.14
Agriculture or Household Jobs	0.02	-0.50-0.54	0.28	-0.44-1.00
Informal	-0.31	-0.68- -0.07	-0.49	-0.92-0.07
Religion				
Other	Ref.		Ref.	-
Islam	0.28	-0.07-0.62	0.43	-0.20-1.05
Current Health Status (VAS)	-0.01*	-0.02- -0.002	-0.004	-0.01-0.005
Location				
Urban	Ref.	-	Ref.	-
Rural	-0.02	-0.46-0.41	0.42	-0.19-1.04
Urban Slum	-1.07**	-1.74- -0.40	-0.004	-0.58-0.58
Previous TB Treatment				
No	Ref.	-	Ref.	-
Yes	0.40	-0.23-1.03	-0.49**	-0.83- -0.15
DS-TB Program Model				
Community Health Worker	Ref.	-	-	-
Community Member	0.43**	0.18-0.69	-	-
MDR-TB Program Regimen				
9 Month Regimen	-	-	Ref.	-
20-24 Month Regimen	-	-	1.17***	0.60- 1.74
Wealth Index				
Poorest	Ref.	-	Ref.	-
Poorer	0.15	-0.18-0.48	-0.03	-0.52-0.46
Middle	0.38*	0.04-0.72	-0.37	-0.93-0.20
Richer	0.41*	0.04-0.78	-0.32	-0.95-0.31
Richest	0.54*	0.03-1.05	0.10	-0.63- 0.82
Comorbidity				
No	Ref.	-	Ref.	-
Yes	0.15	-0.13-0.44	0.02	-0.40-0.44
AIC	29.30		22.91	
BIC	-5958.78		-515.46	
Log Likelihood	-13159.45		-1636.64	

Table 4.7 Results from GLM post-estimation for selecting best model

Test	DS-TB Patients		MDR-TB Patients	
	Test Statistic p-Value	Decision	Test Statistic p-Value	Decision
Modified Park Test	0.27	Inverse Gaussian Family	0.15	Gamma Family
Pearson Correlation Test	0.83	Log Link	0.15	Log Link
Pregibon Link Test	0.21	Log Link	0.12	Log Link
Modified Hosmer-Lemeshow Test	0.57	Log Link	0.66	Log Link

Economic Burden of TB Care in Bangladesh

Based on the World TB Report 2016, total 209,438 DS-TB patients were under treatment in Bangladesh. Assuming 57% case notification rate, we get the actual number of TB patients in Bangladesh in 2015 was 367,435. Therefore, the actual costs incurred by Bangladesh have been calculated as USD 55.6 million. Whereas, if all DS-TB patients were treated the cost would have been 1 billion USD.

For MDR-TB treatment, total USD 12.5 million was incurred in Bangladesh in 2015. If all MDR-TB patients were treated the total cost would have been USD 23 million (Table 4.8).

Table 4.8 Economic Burden of TB care in Bangladesh in 2015

Type of TB Patients	Average cost	Total TB patients under treatment in 2015	Total actual costs for TB Care		Total TB patients in 2015	Total costs required for TB Care	
			BDT	USD		BDT	USD
DS-TB	22,003	209,438	4.45 Billion	55.59 Million	367,435	8.08 Billion	101.06 Million
MDR-TB	195,449	5,100	0.18 Billion	12.46 Million	9,700	1.90 Billion	23.70 Million
Total			**4.63 Billion**	**68.05 Million**		**9.98 Billion**	**124.76 Million**

Discussions

Study results show that average per DS-TB patient costs were BDT 21,235 (USD 265), which is almost similar to the findings of a recent study (BDT 20,720; USD 224) (Gospodarevskaya et al., 2014). However, the study reported only treatment cost and excluded the pre-diagnosis cost incurred by TB patients. Excluding the whooping $166 for pre-diagnosis cost, the actual treatment level costs for DS-TB in Bangladesh from our study comes to $100. The main difference between the study and our result stems from the estimation of productivity losses by patients and guardians. That study used the household level income but we used per capita GDP as the basis for calculation of lost productivity. Given our sample size of 1,000 in comparison to their 96, we can confidently claim that our result is more authentic and does not differ significantly between different types of providers.

Both types of delivery modalities for DS-TB patients in Bangladesh, e.g., CHW and CM models, ensure patients can get their medicines at their doorsteps or very near to their houses supervised by community health workers and community members. MDR-TB patients also get their medicines from assigned community DOTS providers. Yet, TB patients incur considerable expenditure for TB treatment. From the results we can see that a significant portion of the expenditure is incurred before TB diagnosis. It constitutes about 63% of total costs for DS-TB patients and 42% of MDR-TB patient costs. This shows that once the patient is diagnosed and under the treatment stream, patient level costs and health system costs constitute only one-third of the total cost. Delay in TB diagnosis is the major cost driver for the patients. Patients may visit number of providers from informal to formal, even are hospitalized in the course, and incur a great loss in

terms of medical and non-medical costs. This finding is similar to other studies where pre-diagnosis cost of TB treatment constituted more than half of the total costs (Tanimura et al., 2014). High pre-diagnosis cost of TB care is a phenomenon ubiquitous in LMICs, e.g., in Malawi the patients incur a significant pre-diagnosis cost which offset the free TB care and make the TB treatment unaffordable (Kemp, Mann, Simwaka, Salaniponi, & Squire, 2007).

The study results slightly differ with the findings from a systematic review done by Laurence et al. The average provider level cost was $273 in that study (Laurence et al., 2015) in comparison to $9 per DS-TB patient in ours, since they included hospitalization cost ($215). But in Bangladesh, the DS-TB treatment protocol does not require hospitalization, therefore, our results do not include any hospitalization costs and that makes the two estimates very close. For MDR-TB costs, provider level costs were calculated $6313 in LMICs and $1218 in LICs, and patient level costs were calculated $1616 total direct costs in LMICs and $1662 total costs in LICs (Laurence et al., 2015). In our study we found different results- provider level costs were $2006 and patient level costs were $437. It may be due to their estimation of life-time productivity loss, which we confined within the period of illness only.

We found that health system costs for providing treatment costs is nominal ($9 per patient) in Bangladesh. But the high number of patients make the total burden high. For treating DS-TB patients Bangladesh incurred 55.6 million USD in 2015, and for MDR-TB patients USD 12.5 million. In total, expenditure for TB treatment in Bangladesh was 68 million USD. In Bangladesh, total health expenditure was 325,094 million BDT (4,063 million USD) in 2012. Therefore, in 2015 the amount would have

been 4,545 million USD. So, TB care expenditure constitutes about 1.67% of total healthcare expenditure in Bangladesh. This figure does not look so ominous, but the potential of TB treatment is very high in terms of future benefits. In a recent study commissioned by the Copenhagen Consensus Group, Vassal showed that TB treatment was ranked first among all priorities because its huge potential in future befits. If one taka is spent for TB treatment, the economic return would be in the range of 29 to over 162 BDT (Anna Vassal, 2016).

TB also poses great financial hardship on the afflicted population. Often times poor people are the sufferer and their economic condition does not help them either. In our study results we see that DS-TB patients incurred about 50% of their household annual income for TB treatment while that goes up to 66% for the MDR-TB patients. This catastrophic health expenditure is multiplied in severity due to the absence of any health insurance or other healthcare financing mechanism in Bangladesh (Nazmul, Abul Quasem, Howlader, & Kabir, 2015). People tend to resort to sale of assets or savings and borrowing with or without interest to cope with this catastrophic cost, which, in the long run, make the household poorer (Khan, Ahmed, & Evans, 2017; Rahman, Gilmour, Saito, Sultana, & Shibuya, 2013).

Data collected from the DS-TB health facilities show that no cost was incurred for health promotional and preventive activities in past year. That means there was no such activities in place. But contact tracing, promotional activities like making people aware of the signs and symptoms of TB illness, informing the people on the treatment availability and the successful cure is possible upon completion of treatment, the place where TB treatment is available etc. are deemed to be instrumental in combating TB in LMICs like

Bangladesh. There are some top-down promotional activities done from the central level, but that may not reach the grass-root level. Different means of behavioral change communication should be introduced; otherwise the ambitious target of reducing TB deaths by 95% and curbing new cases by 90% from 2015 to 2035 (World Health Organization (WHO), 2017) would not be achieved.

Urban slum is another hot spot which can serve as the new foci of TB in Bangladesh. With highest urbanization rate in the world (6.5%) the capital Dhaka city experiencing a burgeoning urban slum population. This population often resides in the most inhuman condition and lack basic needs like health, education, and proper housing. This close proximity of people (200,000.people in 1 square kilometer in Bangladeshi slums (Angeles et al., 2009)) and poor living conditions facilitate transmission of the TB bacillus and containment of the disease makes so challenging. We find from our results that slum dwellers can spend much lower than their urban counterparts and still that lower spending leaves them as poverty-stricken for rest of their lives due to the long term effect on their income generating potentials.

Conclusions

Since the lion share of the total costs was incurred before diagnosis, it is imperative to strengthen the early diagnosis and treatment of TB disease in Bangladesh. CHW or CM who are involved with the DOTS treatment and act as a DOTS provider should also act as the counselor for the patients and their family members. DOTS supporter should also keep eyes open to find any potential TB cases and refer them to the nearest facility.

Contract tracing can be another useful way for detecting TB patients. Although it was a regular activity in the past, during the survey we did not find any such activities performed nowadays. It is a reminder that we should not move away from the basic prevention techniques of the public health.

Although, treating DS-TB patients is more beneficial in the long-run, proper treatment of MDR-TB patient is very important in further spread of the deadly disease. MDR-TB needs special attention, because of the length of the treatment and potential for loss to follow up and relapse. Therefore, MDR-TB patients should also be given proper treatment and special arrangements, like tracking patients uptake of drugs by novel means, can be thought of.

TB has been cited as the most effective health intervention in terms of cost-benefit ratio (Anna Vassal, 2014). It is high time to get all TB patients under treatment and thereby improve the economy of the country. It will also help us to reach the ambitious goal of the WHO End TB strategy by 2035.

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CHAPTER 5

STUDY II

5.1 Economic Evaluation of Drug-Sensitive Tuberculosis (DS-TB) Treatment Approaches in Bangladesh[2]

[2] Haider, M. R. To be submitted.

Abstract

Introduction: Bangladesh is a high burden Tuberculosis (TB) country that experienced 362,000 new TB patients and 73,000 TB deaths in 2015. Drug sensitive TB (DS-TB) is the most prominent type of TB found in Bangladesh and a 6-month drug regimen (2 month intensive and 4 month continuation phase) is prescribed. However, the directly observed treatment short-course (DOTS) differs in delivery through community health workers (CHWs) and community members (CMs). This study compares these two delivery models and conducts a cost-effectiveness analysis.

Methods: The incremental cost-effectiveness ratio (ICER) of treating DS-TB patients, 45 years old on average, through CM versus CHW delivery was compared using a Markov model with life-time horizon (27 years). The measure of effectiveness, Quality adjusted life year (QALY) and cost of treatment was collected from 1,000 MDR-TB patients (598 for CM model and 402 from CHW model) in Bangladesh. Transition probabilities between Markov states were estimated from quarterly outcomes report collected from health facilities and cost and QALY both were discounted at a rate of 3%. Both deterministic and probabilistic sensitivity analyses were conducted in a Monte Carlo Simulation using the R programming language.

Results: Results show that each DS-TB patient under CM treatment model gains 3.61 QALYs with a cost of BDT 131,555. For the DS-TB patients under the CHW model the cost is 81,650 and the QALY gain is 3.12. The Incremental Cost-Effectiveness Ratio (ICER) is 103,454, i.e., the CM model is cost-effective if per QALY gain if willingness-to-pay is set to the per capita GDP of Bangladesh (BDT 107,360 in 2015).

Conclusions: Our study results suggest that a community-based model of DS-TB treatment is cost-effective even with changed costs and utility values in probabilistic sensitivity analysis. Community members as DOTS provider are more capable of reducing stigma related to TB, enhancing patient adherence and thereby reduce costs and increase utility from the treatment. Community members should also be involved in contact tracing and prevention activities to increase the effect of the involvement in TB control.

Keywords: Economic Evaluation, Drug Sensitive Tuberculosis, Cost-effectiveness, Cost, QALY, Community Based Treatment, Bangladesh

Introduction

In 2015, tuberculosis (TB) ranked 18th among the highest burden diseases globally and it constituted 47% of the global burden attributable to communicable, maternal, neonatal, and nutritional disorders (Kassebaum et al., 2016). During that year, 10 million new cases of TB were reported and almost two million people died from TB worldwide (World Health Organization (WHO), 2016a). In the same year, TB became the joint top infectious disease killer by claiming 1.1 million lives and matching the death tolls by HIV/AIDS (Kassebaum et al., 2016).

Almost 85% of all new cases of TB and multi-drug resistant TB (MDR-TB) occur in 30 high burden TB countries including Bangladesh (World Health Organization (WHO), 2015b). According to one estimate in Bangladesh during the whole year of 2015, approximately 362,000 people developed TB and 73,000 died from it. In Bangladesh, TB accounted for 12% of all deaths (609,800) that occurred in 2015 (Institute for Health Metrics and Evaluation (IHME), 2016). Although case notification rate is only 57%, success of the treatment is high (93%) among DS-TB patients. However, the success rate is 75% among MDR-TB patients which signifies how difficult to treat drug resistant strains (World Health Organization (WHO), 2016a). Despite having effective treatment, patient adherence to TB treatment remains poor because of the long duration of the regimen (six months for newly diagnosed cases) and the need for daily dosing. Failure to adhere to the regimen results in MDR-TB (Gandy & Zumla, 2002).

The predominant method of detecting TB at the community level is examining the sputum sample with Acid Fast Bacilli (AFB) technique. In the case of detection of MDR-TB, culture and sensitivity analyses are done in laboratories. Directly Observed

Treatment Short-Course (DOTS) strategy has been implemented in Bangladesh since 1993 and all the Upazila Health Complexes (UHCs) have been brought under the purview of the service from where TB detection and treatment services are given free of cost. The essence of the strategy is the diagnosed TB patient has to go to the facility every day for taking the drugs, thus treatment discontinuity and subsequently MDR-TB cases can be averted (World Health Organization (WHO), 2013d).

The vibrant presence of Non-governmental organizations (NGOs) in the health sector and TB control endeavor compels the National Tuberculosis Control Program (NTP) under Ministry of Health and Family Welfare (MoHFW) of Bangladesh to incorporate them into the public-private partnership (PPP) model of combating TB since 2003. In the recent guideline the role of government and private sector partnership was reiterated again (Guideline). It was also found in different studies that this PPP model in TB control was effective in achieving relatively high case detection (Ullah et al., 2012; Ullah, Newell, Ahmed, Hyder, & Islam, 2006).

For the drug sensitive TB patients, a standard 6-month regimen is followed by all participating NGOs. However, the mode of delivery is different for different NGOs. BRAC has employed Community Health Workers (CHWs) besides the DOTS centers to ensure patient compliance, while Damien Foundation (DF) trained and employed influential community members to help the patients to be adhered to the treatment protocol. Another NGO, Salvation Army Bangladesh, is using drug sellers at the pharmacies as the counselor and drug distributors for the TB patients. Since involving different people, e.g., family members, neighbors, pharmacists falls under common strategy of involving community members.

Using Denver General Hospital data Burman et al. showed that although DOTS is costly at the outset it turns to be cost-effective than Self-administered Therapy (SAT) because of higher cure rates (Burman et al., 1997). The outcome variable for this study was cure rate per cost unit. Using published literature, records, and expert opinions Baltussen et al. showed that DOTS as well as incremental programs like DOTS plus, Full combination of DS-TB and MDR-TB strategies all are cost-effective in terms of DALYs averted per cost unit in high burden TB countries in Africa and South-East Asia (Baltussen et al., 2005).

A recent study shows that shortening of the DS-TB treatment from six-months to four-months remain cost-effective option for Brazil, South Africa, Bangladesh and Tanzania (Gomez et al., 2016). Another study results also support this finding in South Africa (Knight et al., 2015).

Although several studies conducted economic evaluation between different types of treatment model or regimen, economic evaluation between CHW and CM models has not been performed. The two methods of delivering DS-TB care in Bangladesh based on the service area of particular NGOs provide us with the opportunity to evaluate the cost-effectiveness of two methods of delivering DOTS to DS-TB patients. This study aims to conduct an economic evaluation between CHW and CM models of delivering DS-TB care with a societal perspective and Quality Adjusted Life Years (QALY) as the outcome.

Methods

Study Design and Data Sources

The study follows a stratified random sampling method. From the 64 districts of Bangladesh nine districts from the eight divisions (at least one from each division) were selected based on the high and low burden of TB cases. Then from each district two upazilas (sub-districts) will be selected randomly. From the registry of the DOTS center of the UHCs of these eighteen upazilas, lists of TB patients currently undergoing treatment or recently completed treatment will be collected. From each upazila 50 DS-TB patients were selected randomly for interview. The list of all districts and upazilas covered under the study is shown in Table 3.1.

Institutional level data was also collected for assessing the provider level costs associated with TB treatment using a pre-set and pre-tested provider questionnaire. We interviewed the healthcare facility manager to get the annual human resources costs, costs for training, meeting, incentive payments, capital costs, and other costs. Drug costs and diagnostic costs are assumed to be equal for both treatment model since both model follows the same guidelines published by NTP (National Tuberculosis Control Program (NTP), 2014). Capital costs were annuitized to get the annual costs. Facility quarterly reports from the year 2015 was used for estimating the total number of patients treated in each facility. Finally, average per patient costs were calculated for each type of treatment model.

The DS-TB patients were interviewed using a pre-tested questionnaire adopted from the Stop-TB questionnaire on patient's cost (Stop TB Partnership DOTS Expansion Working Group (TB and Poverty subgroup), 2008).The variables of interest are the

duration of illness, time elapsed before diagnosis, present status of the illness, how many healthcare providers has been consulted, the direct costs incurred in each encounter, duration of DOTS treatment, transportation cost to DOTS center, any friend/relative accompanying with and the opportunity cost of their time, and the lost work days and income of the patients among others.

Target Population and Study Sample

This study covers pulmonary form of DS-TB patients aged 18 years or more from all administrative divisions of Bangladesh. Total 1,000 DS-TB patients' data was collected for patient level cost and outcomes (QALY) estimation under this study. Out of these 1,000 patients, 402 were under CHW treatment model and 598 were under CM treatment model. Study locations are shown in the Appendix Figure 1A.

Glick (H. A. Glick, 2011) proposed a sample size formula for cost-effectiveness evaluation of clinical trials. Although our study is not a typical clinical trial, given the nature of the intervention and the study design we can apply the formula for calculating the required sample size for our study. The formula calculates the sample size for each of the two groups with similar standard deviation of costs and effect and same sample size:

$$n = \frac{2\left(Z_\alpha + Z_\beta\right)^2 [sd_c^2 + \left(W * sd_q^2\right)^2 - \left(2\, W\rho * sd_c * sd_q\right)}{(WQ - C)^2}$$

Where:

Z_α is the Z-statistic for the level of Type I error (set at 95%)

Z_β is the Z-statistic for the level of Type II error (set at 80%)

sd_q, sd_c are the std deviations for each group for treatment effect and cost respectively

W is the Maximum Willingness to Pay

Q is the expected mean difference in treatment effectiveness

C is the expected mean difference in treatment cost

ρ is the expected correlation of the difference in cost *(C)* and effect *(Q)*

This is a measure of the covariance of changes in effectiveness and changes in cost. Negative covariance, where cost decreases with increasing effectiveness result in a larger sample size. Positive covariance where cost increases with increasing effectiveness result in smaller sample sizes.

With 95% confidence interval and 80% power of the test, we assumed that the standard deviation of costs (sd_c) is 400 USD, standard deviation of effect ($sd_{q)}$ is 0.2 QALY, ρ, correlation of difference in cost (C) and effect (Q) is 0.4. The expected mean difference in treatment effectiveness (Q) is 0.4 QALY and expected mean difference in treatment cost (C) is 500 USD. We set the willingness-to-pay threshold (W) at the three times of GDP of Bangladesh which is 3942 USD (BDT 315,360) (Macroeconomics, 2001). We found the sample size for both treatment groups is 405 which is equal to our study sample size.

Ethical Consideration

The study has already got ethics approval from University of South Carolina in the USA where the PI is a PhD student. Institutional Board Review (IRB) approval was

also obtained from Jahangirnagar University in Bangladesh. A third and final approval was obtained from WHO Research Ethics Review Committee (WHO ERC).

Settings and Locations

DF implements their DS-TB program in 22 districts in the North-Western part of Bangladesh. The DS-TB patients detected in these areas are treated following same regimen but the delivery of the DOTS is done by the community members. Whereas, in rest of the 42 districts all over Bangladesh follows the treatment delivery method by community health workers. This study collected data from districts of all eight divisions of Bangladesh.

Study Perspective

The study will be conducted form the societal perspective, which will encompass all costs incurred by the health care providers, patients, and community.

Comparators

For the DS-TB patients standard 6 months regimen is followed by all participating NGOs. However, the mode of delivery is different for different NGOs. BRAC has employed Community Health Workers (CHWs) besides the DOTS centers to ensure patient compliance, while Damien Foundation (DF) trained and employed influential community members to help the patients to be adhered to the treatment protocol. Another NGO, Salvation Army Bangladesh, is using drug sellers at the pharmacies as the counselor and drug distributors for the TB patients. We treated drug sellers under the community model. This study will conduct economic evaluation between this two DS-TB treatment delivery models.

Time Horizon

The study will take a life-time horizon to capture all costs and outcomes according to WHO guideline (Edejer, 2003). Since this study includes patients 18 years and older, we assume they will live through to their life expectancy (72 years in 2015). Mean age of the patient interviewed was 45 years. Therefore, we repeated the cycle for 27 times to include their whole lifespan.

Discount Rate

The study will follow the WHO discount rate of 3% for both costs and outcomes (Edejer, 2003).

Choice of Outcome

Quality Adjusted Life Year (QALY) is the chosen outcome for this study.

Measurement of Effectiveness

QALY has been modeled using patient-level EuroQol-5 Dimensions-5 Levels (EQ-5D-5L) measure of health related quality of life (EuroQol Research Foundation, 2017). We used Zimbabwe score sets for EQ-5D, since Zimbabwe is another developing country like Bangladesh and we assume the EQ-5D score sets would have been similar between populations of these two countries. Finally, the QALY measure was estimated after controlling for patient's socio-economic factors. Lognormal (log value of QALY as dependent variable) has been found more suitable model. Recycled prediction has been used to find out the estimated QALY for each type of patient outcome (e.g., cure, failure, and default) for both regimens (Glick Book). For death state utility has been assumed zero.

Measurement of Costs

Health systems costs were collected from different sources. Prevention and promotion costs, training costs, meeting costs, human resources costs, capital costs, and other costs were collected from DS-TB treatment facilities under the purview of the study using a pre-set provider questionnaire. Heath facility managers, personnel responsible for financial transactions were interviewed using the questionnaire and relevant costs were collected. Capital costs were annuitized using 5% interest rate and 10-year lifetime for Microscopes and Gene Xpert machines, and vehicles. Costs for drugs and diagnostic tests were assumed to be equal across two treatment modalities since both follows the same drug regimen and treatment protocol. Per patient cost of delivering DS-TB treatment for both types of regimen have been estimated dividing costs among the number of treated patients in one year in those facilities using total number of patients got treatment in 2015. Patient costs were collected through interviews of DS-TB patients using a pre-set and pre-tested questionnaire prepared on the basis of Stop-TB questionnaire on patient's cost (Stop TB Partnership DOTS Expansion Working Group (TB and Poverty subgroup), 2008). The questionnaire was translated in Bengali and the retranslated in English to validate the translation. Both patient and provider questionnaires were pre-tested and changes were incorporated before using those in the survey. Total costs of treating a patient under each regimen was calculated by summing up the patient and provider level costs. Then the cost was estimated using a Generalized Linear Model with Gamma variance and log link using data from 1,000 interviewed DS-TB patients who had complete information on disease outcomes. GLM diagnostics were used to validate the GLM variance and link. Recycled prediction was used to estimate the costs for each type

of patient outcome (e.g., cure, failure, default) for both regimens (H. Glick, Doshi, Sonnad, & Polsky, 2007). For death state costs were assumed to be zero.

Models and Analysis

A dynamic, stochastic, Markov simulation model was used to model the cost-effectiveness of the two comparison regimens. Markov models have unique characteristics which fit the progression of TB well. For example, in a Markov model states are mutually exclusive, states are complete (i.e. no people are lost) and people remain in each state for a fixed period of time. Also, a Markov model is preferred over the decision trees when health event repeats over time, or have longer term health effects, effect of treatment either stops quickly after initial treatment or continue at an earlier level, and the risk of different health events does not depend on patient's prior history.

We can represent the Markov model for DS-TB as Figure 2.4. A more simplistic decision tree model can be shown as in Figure 5.1:

From the Markov model and decision tree we can find that after starting of the treatment the DS-TB patient can move to either of the four states, e.g., cure/treatment complete, failure/relapse, default, and death. Cure state has been defined as those who had completed treatment protocol without any evidence of failure and had at least three consecutive negative cultures from samples collected at least 30 days apart in the final 12 month of treatment, or "Treatment Completed", those who completed treatment according to treatment protocol but did not meet the definition for cure because of lack of bacteriological results.

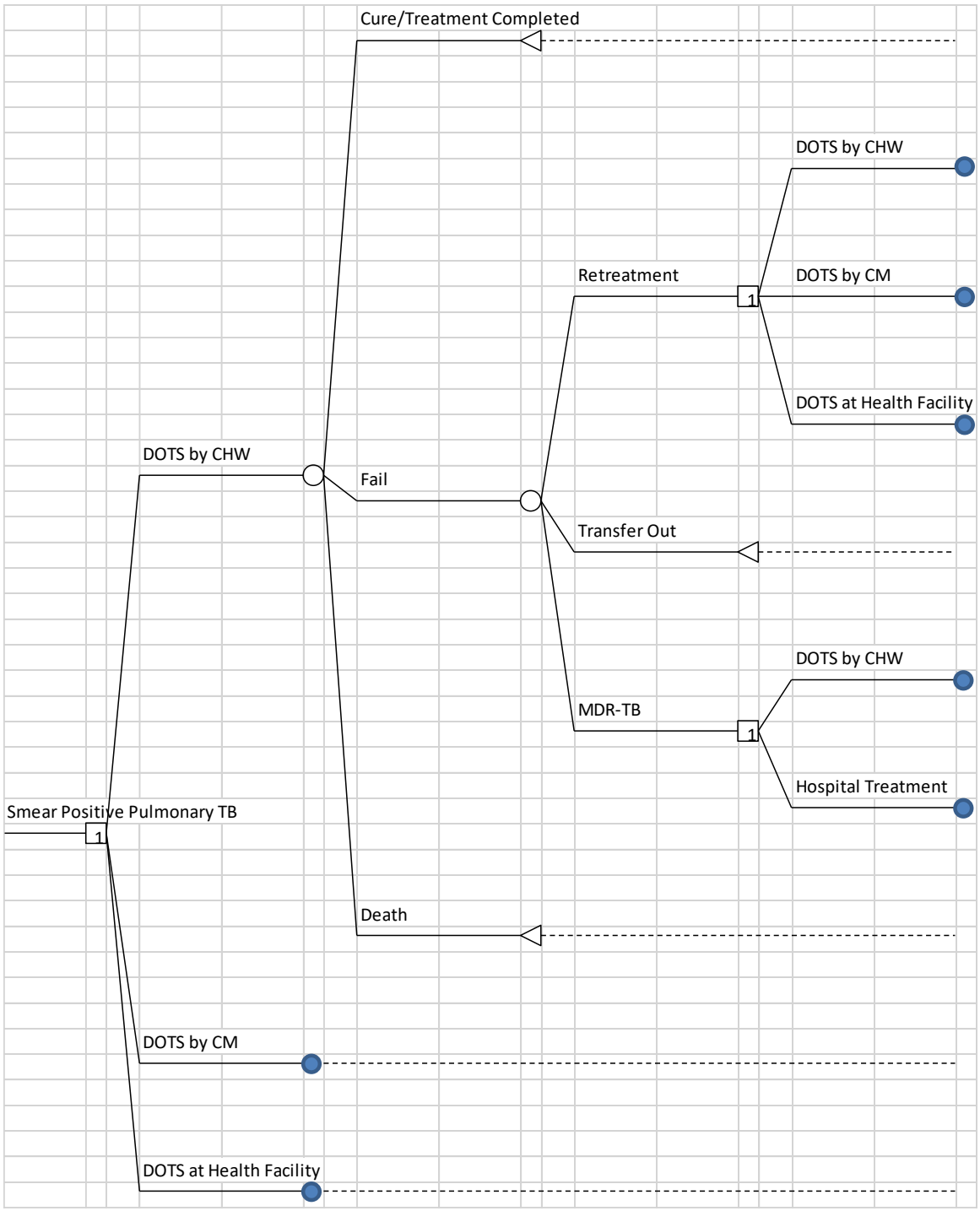

Figure 5.1 Decision Tree of two comparison treatment strategies for DS-TB

Failure/relapse cases were defined as those who had been treated for DS-TB, were declared cure or treatment completed at the end of their most recent course of treatment, and later diagnosed with a recurrent episode of DS-TB. Lost to follow up/ default cases were defined as those DS-TB patients whose treatment was interrupted for two or more consecutive months for any reason (National Tuberculosis Control Program (NTP), 2013, 2014).

Here death is the absorbing state, i.e., if a patient is dead he/she can move from that state to another. If any patient is cured he/she can remain cured, relapse/reinfection may occur, lost to follow-up (default) or can be dead. On the other hand, the failed/relapsed patients undergo another cycle of treatment and can culminate into cure, remain failed, can default, or can be dead as well. Similarly, from default state one can move over to other three states.

Cost-effectiveness evaluation was performed using *heemod* package in R (Filipović-Pierucci, Zarca, & Durand-Zaleski, 2017). The BCEA package was also used to validate the results form analysis with *heemod* package (Filipović-Pierucci et al., 2017). Cost and utility data was modeled using STATA 14.2 (StataCorp, 2015).

Measurement of Transition Probabilities

As mentioned earlier, cost-effectiveness analysis of these two regimens has not been undertaken yet. However, the programmatic outcome for the two treatment strategies has been derived from the quarterly reports on the health outcomes after 12-15 months of completion of treatment, which were collected from the health facilities. Using the reports from 2015, total number of patients and their transition between different

states have been calculated. Transitional probabilities were estimated from these numbers of DS-TB patients in different states using Markov simulation as an evidence synthesis technique (Sutton, Welton, & Cooper, 2012). R has been used for the analysis along with *r2jags* package for estimating the transitional probabilities for two treatment regimens (Su & Yajima, 2012).

From these two studies the transitional probabilities for first two cycles were estimated and furnished in Table 5.1.

Table 5.1 Transitional Probabilities of DS--TB Treatment Regimens

Input variable	**CM**	**CHW**
Cure to Cure (tpC2C)	0.609	0.529
Cure to Failure (tpC2F)	0.126	0.133
Cure to Default (tpC2Def)	0.127	0.170
Cure to Death (tpC2Death)	0.138	0.168
Failure to Cure (tpF2C)	0.354	0.268
Failure to Failure (tpF2F)	0.209	0.244
Failure to Default (tpF2Def)	0.209	0.240
Failure to Death (tpF2Death)	0.228	0.248
Default to Cure (tpDef2C)	0.250	0.245
Default to Failure (tpDef2F)	0.252	0.255
Default to Default (tpDef2Def)	0.250	0.250
Default to Death (tpDef2Death)	0.248	0.250

Parameters

Patient level cost for each regimen as well as the per patient provider costs are shown in Table 5.2.

Table 5.3 shows parameters for the cost-effectiveness analysis along with their distributions. Parameters mainly consist of transitional probabilities for transition between different states, costs for treating each type of states, and the utility of each states. Apart from this initial age was determined as the mean age of the interviewed

population (45 years). Time horizon was therefore fixed at 27 years, accounting for the rest of the general life expectancy of Bangladeshi people (life expectancy at birth in Bangladesh is 72 years (The World Bank, 2017b)). Both age and cycle parameters were kept fixed for the model.

Costs parameters follow gamma distribution as mentioned earlier and measured in 2015 Bangladeshi Taka (BDT). Utility values are measured in QALY and their distributions were lognormal.

Table 5.2 Patient, Provider and Total Costs for two regimens of DS-TB treatment in Bangladesh

Costs	**CHW**	**CM**
A. Patient Level Costs	**Mean (BDT)**	**Mean (BDT)**
Direct Costs		
Before Diagnosis Costs	10,894.24	14,895.78
TB Diagnosis Costs	777.37	1,328.08
Follow-up Costs	213.55	144.33
Drug Collection Costs	2.81	22.49
Hospital Costs	1,421.63	3,250.39
Additional Food Costs	1,926.06	2,457.74
Accompanying Person Costs	365.7	389.66
MDR-TB Relocation Costs		
Drug Side-effects Costs	438.33	432.11
Total Direct Costs	16,039.69	22,920.58
Indirect Costs		
Patient Opportunity Costs (Income Loss)	432.8	396.63
Accompanying Person Opportunity Costs	508.28	784.68
Total Indirect Costs	941.08	1,181.31
Total Patient Level Costs	16,980.77	24,101.89
B. Provider Level Costs		
Prevention and Promotion Costs	Not reported	Not reported
Diagnostic Costs	Same	Same
Drug Costs	Same	Same
Training Costs	6.23	44.02

Meeting Costs	0.70	5.67
Incentive Payment	100.99	13.21
Human Resources Costs	1,827.20	1,592.01
Capital Costs	36.56	94.41
Other Costs	2.29	11.26
Total Provider Level Costs	19,73.97	1,760.56
Total Costs	**18,954.74**	**25,862.45**

Table 5.3 Input Parameters for Cost-Effectiveness Analysis of DS-TB Treatments

Variable Category	**Distribution[a]**	**Value**	**Low**	**High**	**Reference**
Starting age of cohort (mean)	Fixed	45 Years	-	-	Study Data
Time horizon	Fixed	27 Years	-	-	World Bank
Cost of Cure (CM)	Gamma	BDT 25,095	BDT 20,076	BDT 30,114	Study Data
Cost of Failure (CM)	Gamma	BDT 31,849	BDT 25,479	BDT 38,219	Study Data
Cost of Default (CM)	Gamma	BDT 34,132	BDT 27,306	BDT 40,958	Study Data
Cost of Cure (CHW)	Gamma	BDT 17,719	BDT 14,175	BDT 21,263	Study Data
Cost of Failure (CHW)	Gamma	BDT 22,488	BDT 17,990	BDT 26,985	Study Data
Cost of Default (CHW)	Gamma	BDT 24,100	BDT 19,280	BDT 28,920	Study Data
Utility of Cure (CM)	Lognormal	0.783	0.626	0.940	Study Data
Utility of Failure (CM)	Lognormal	0.738	0.590	0.886	Study Data
Utility of Default (CM)	Lognormal	0.742	0.594	0.890	Study Data
Utility of Cure (CHW)	Lognormal	0.776	0.621	0.931	Study Data
Utility of Failure (CHW)	Lognormal	0.732	0.586	0.878	Study Data
Utility of Default (CHW)	Lognormal	0.736	0.589	0.883	Study Data
Discount Rate	Fixed	3%	0%	6%	Edejer, 2003

[a] In Probabilistic Sensitivity Analysis

Results

Base Case Results

Base case results show that over the 27 cycles each DS-TB patient under CM treatment model gains 3.61 QALYs with a cost of BDT 131,555. For the DS-TB patients under the CHW model the cost is 81,650 and the QALY gain is 3.12. The Incremental Cost-Effectiveness Ratio (ICER) is 103,454, i.e., the CM model is cost-effective if per QALY gain one can afford more than BDT 131,454 (Table 5.4).

Table 5.4 Base Case Results

Treatment Model	Cost Per Patient (BDT)	QALY Gained	ICER
CM	131,555	3.61	103,454
CHW	81,650	3.12	

Deterministic Sensitivity Analysis

Parameters were varied on different scales for high and low values and univariate sensitivity analysis was performed to assess the robustness of the findings. A tornado plot has been prepared to illustrate the effect of change in each variable. Based on the findings in one-way sensitivity analysis, input parameters were varied accordingly to see their impact in probabilistic sensitivity analysis.

In the tornado plot, shown in the Figure 5.2, we find that the most influential parameters were utility of cure state for CM model, followed by utility of cure state of CHW model, costs of cure state of CM model, utility of loss to follow-up state of CHW model, and utility of loss to follow-up state of CM model. according to the more effects on the results.

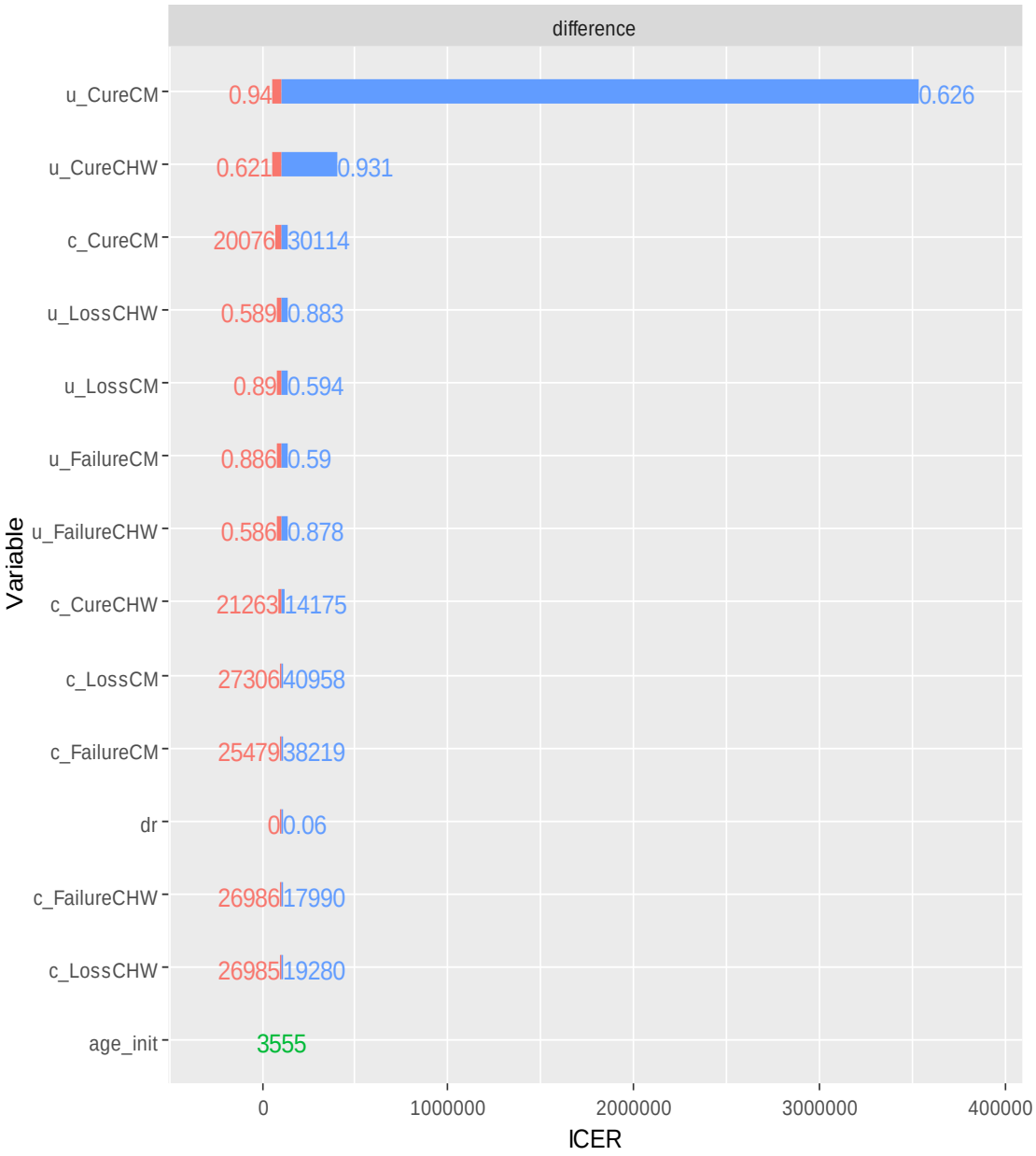

Figure 5.2 Tornado Plot of Deterministic Sensitivity Analysis

Probabilistic Sensitivity Analysis

In probabilistic sensitivity analysis, the costs values and utility values for each state were varied by 20%. Initially, the base case Markov model with all parameters with their values and distribution was run for 1000 iterations and the base case results were assessed using incremental cost effectiveness ratio (ICER), Cost-effectiveness Acceptability Curve (CEAC), and Expected Value of Perfect Information (EVPI).

Incremental Cost-effectiveness Ratio (ICER)

From the results reported in the Table 6 shows that over life-time the CM method costs BDT 197,680; while CHW model costs BDT 76,836. At the same time QALY gained by CM model is 6.13 whereas in CHW model QALY gain is 2.91. Therefore, the resultant ICER is BDT 37,487 per QALY gained. It shows that CM method is cost-effective if willingness to pay is more than BDT 37,487 (Table 5.5). Results shown in the cost effectiveness plane also shows that the ICER is in the North-East Quadrant (Figure 5.4).

Table 5.5 ICER from Probabilistic Model

Treatment Model	Cost Per Patient (BDT)	QALY Gained	ICER	EVPI
CM	197,680	6.13	37,487	18,388
CHW	76,836	2.91		

Cost-Effectiveness Acceptability Curve (CEAC)

Since the ICER for each QALY gain is BDT 37,480, cost-effectiveness acceptability curve for CM and CHW crosses over at that point. After the value CM becomes more cost-effective and thereby acceptable (Figure 5.5).

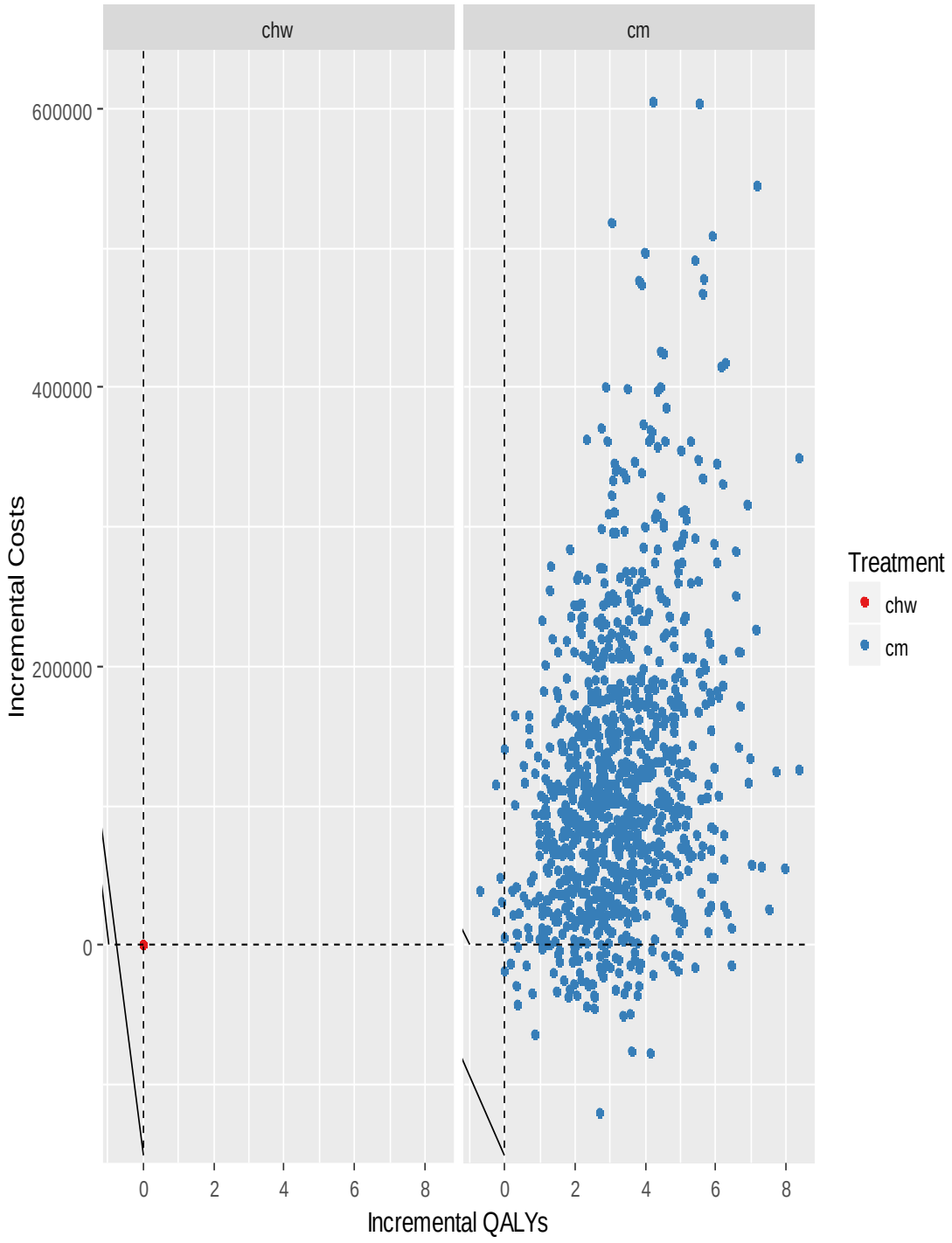

Figure 5.4 Cost-Effectiveness Plane

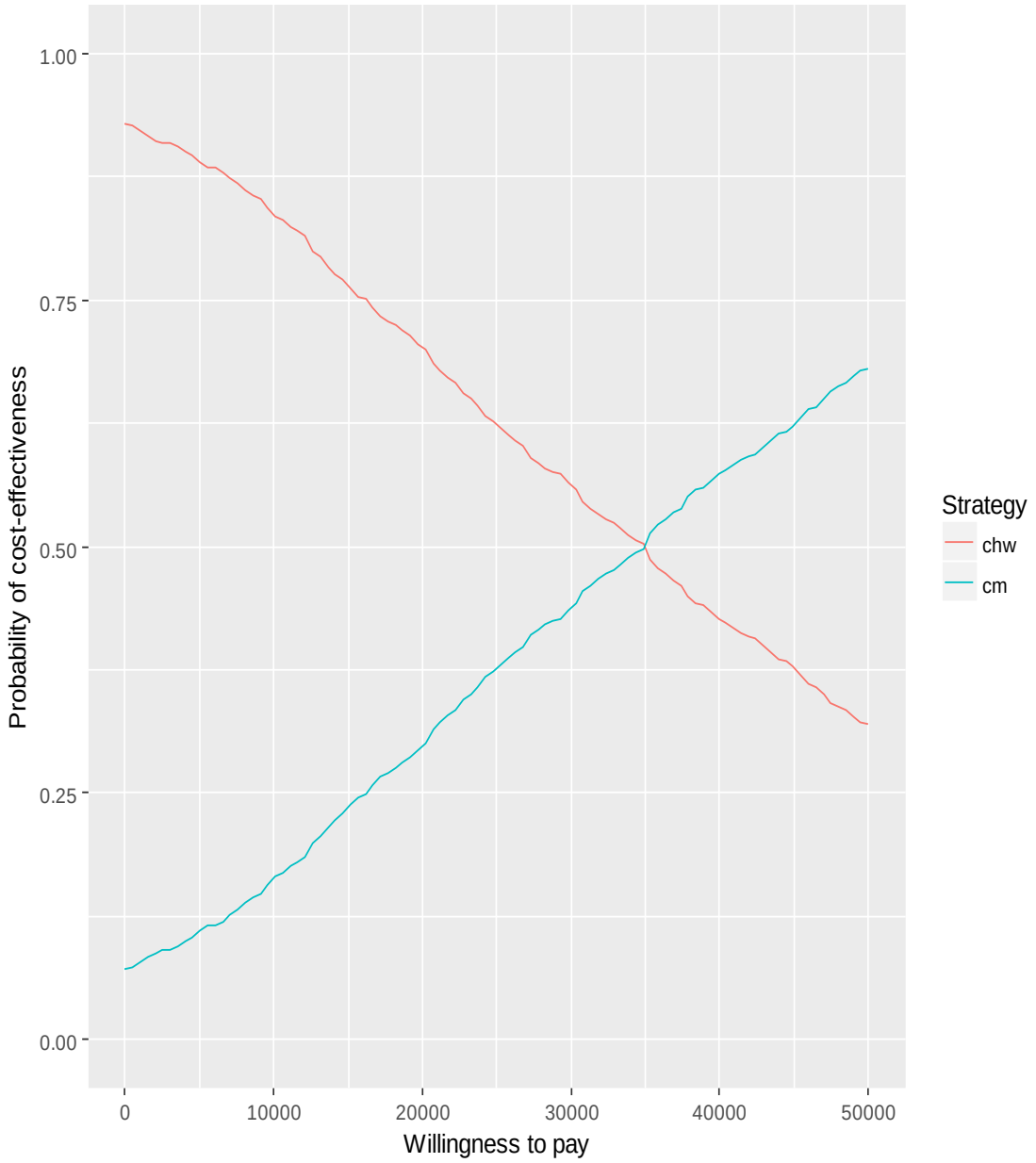

Figure 5.5 Cost-Effectiveness Acceptability Curve

Expected Value of Perfect Information (EVPI)

EVPI is the absolute limit of the value of further research that would completely eliminate the uncertainty around the parameters in the model. EVPI value of BDT 18,388 shows that with reducing uncertainty around the parameters would require only BDT 18,388. It is also evident from the figure 6 that with EVPI peaks between BDT 300,00

and BDT 400,000. It signifies that with increasing willingness-to-pay EVPI also increases till certain value, then it declines.

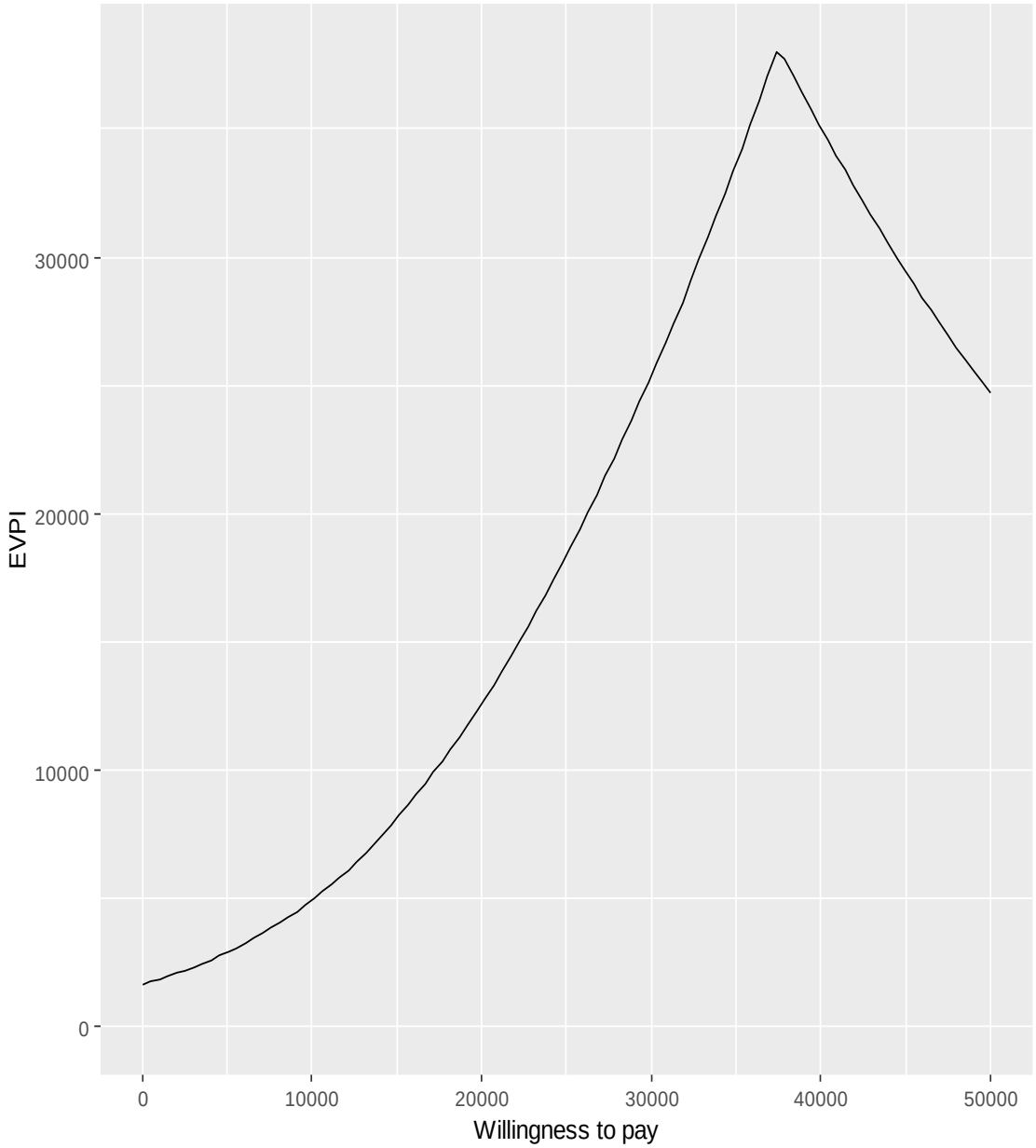

Figure 5.6 Expected Value of Perfect Information (EVPI) Curve

Discussions

The study results show that the CM method of DS-TB treatment is cost-effective in Bangladesh from a societal perspective. ICER form base case analysis is BDT 103,454 (USD 1293) which is even lower than per capita GDP of Bangladesh in 2015, which is USD 1342. The deterministic sensitivity analysis shows that the utility garnered from the cure status of CM method is the principal factor behind the result. Even when we changed the utility value by 20% (within a range of 0 and 1), we found that the CM method remains cost-effective.

Several studies have also been conducted to assess the cost-effectiveness of DOTS program itself. DOTS was found cost-effective in developing country settings, Thailand (Hunchangsith et al., 2012), Egypt and Syria (Vassall et al., 2002), Botswana (Moalosi et al., 2003), Haiti (Jacquet et al., 2006), Uganda (Okello et al., 2003), Brazil (Mohan et al., 2007). These studies invariably documented that the DOTS strategy or involving the communities in the care process is cost-effective over SAT. In Malawi it was shown that community based DOTS was cost-effective than the usual hospital-based model (Floyd, Skeva, Nyirenda, Gausi, & Salaniponi, 2003).

Very few studies compared between community member DOTS model and community health worker DOTS model. In a study conducted in Thailand, the results show that community member model is dominant, while ICER was USD 1,100 for each DALY gained in health worker model (Hunchangsith et al., 2012). In some countries, randomized controlled trials (RCT) were conducted to find the efficacy of DOTS model. In Nepal, both family based DOTS and Community based DOTS were found to be capable of attaining international targets for treatment success (Newell, Baral, Pande,

Bam, & Malla, 2006). In Senegal, it was found that the package based on improved patient counseling and communication, decentralization of treatment, patient choice of DOT supporter, and reinforcement of supervision led to improved patient outcomes (Thiam et al., 2007).

Community members can be anyone in the community. Neighbors are mostly selected by DF to cater drugs daily to the DS-TB patients. Salvation Army in Dhaka city deployed drug sellers in the vicinity to provide anti-TB drugs to the DS-TB patients on regular basis. This idea of involving community is not novel; The Union prefers the integration of community members in the treatment procedure (Aït-Khaled et al., 2010). Most important objective of the DOTS model was to enhance the adherence to the TB drug regimen (World Health Organization & Stop TB Initiative, 2010). In Bangladesh, it has been found that community based models works better than the hospital-based model (Islam et al., 2002). But comparison between community member model and community health workers have not been done to move forward with the best and cost-effective model.

From costs figures for the two methods, we see that patients incur more costs for DS-TB treatment in case of CM model. Patients' costs were higher for before diagnosis costs, diagnosis costs, hospital costs, and additional food costs. On the other hand, providers with CM model spend more on training, while CHW model spend more on incentives to the CHWS. Each CHW gets a remuneration of BDT 500 for successful completion of the DS-TB regimen. Interestingly, no facility reported any costs for prevention activities. Also note that, present treatment guidelines for DS-TB does not

require any hospitalization. These show that CM model lacks in early diagnosis of the patients which leads to undue hospitalization and more costs.

However, CM model is successful in reducing stigma related to TB disease. It has been documented in several studies that effective stigma reducing strategies are focused on individual and community levels (Heijnders & Van Der Meij, 2006). Stigma related to TB disease and its care is widespread in Bangladesh and women are the worst sufferer (Somma et al., 2008). Community member's involvement reduce the chance of spread of the news of TB infection and thereof avoid gossiping, undue fear of transmitting the disease and potential discrimination. If community health workers do not divulge the news of TB disease, her daily presence in a particular house is a telltale sign for neighbors which leads to discrimination for the TB patient. Therefore, CHW models are not adequate to ensure the adherence and proper treatment which is evident in the utility value of CM method.

This study has several limitations. Although for transitional probabilities we used quarterly reports from 18 facilities under the survey, the reported outcomes were not verified like controlled trial settings. This can make the results biased. Cost and effectiveness data from the patients may suffer from the recall bias, although we included only those patients who completed their treatment not more than six months.

Despite these limitations, this study tried to collect the patient and provider level data comprehensively using pre-set questionnaires. To our best knowledge, it is also the first study to conduct economic evaluation between CHW and CM model of DS-TB treatment in developing country setting.

Community based DOTS is getting acceptance worldwide due to its proven efficacy. However, early diagnosis and treatment of TB cases is still a far cry due to lack of knowledge about TB in general population and absence of any proper prevention programs. This indicates the importance of deploying community members in disseminating the knowledge about TB signs and symptoms which may facilitate early diagnosis of the disease as well as reduce the stigma associated with TB disease.

In conclusion, the evidence of cost-effectiveness of CM method encourages us to adopt this model all over Bangladesh. More involvement of the community members of all sort will help prevent the transmission of the disease, early diagnosis will lead to early cure at low costs, and treatment adherence will help us to attain the End TB strategy by 2035.

Acknowledgements

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CHAPTER 6

STUDY III

6.1 Economic Evaluation of Multi Drug-Resistant Tuberculosis (MDR-TB) Treatment Approaches in Bangladesh[3]

[3] Haider, M. R. To be submitted.

Introduction: Worldwide Tuberculosis (TB) control has been halted by the emergence of multi-drug resistant TB (MDR-TB). Bangladesh has also experienced surge in the number of MDR-TB cases with a 29% of MDR-TB cases were found among the re-treatment of pulmonary TB cases in 2015. In Bangladesh, two MDR-TB treatment regimens (9-month and 20-24 month) are practiced and this study intends to conduct economic evaluation between those two.

Methods: The incremental cost-effectiveness ratio (ICER) of treating MDR-TB patients, 35 years old on average, by the 9-month regimen versus the 20-24-month regimen was compared using a Markov model with life-time horizon (37 years). The measure of effectiveness, Quality adjusted life year (QALY) and cost of treatment was collected from 145 MDR-TB patients (58 undergone the 9-month treatment and 87 from the 20-24-month regimen) in Bangladesh. Transition probabilities between Markov states were estimated from two published studies and cost and QALY both were discounted at a rate of 3%. Deterministic and probabilistic sensitivity analyses were conducted in a Monte Carlo Simulation using R.

Results: Based on the study data, each patient under the 9-month regimen gained 6.21 QALY with a total cost of BDT 987,418. Whereas, each patient under CHW model gained 5.74 QALY by incurring costs of BDT 1,501,221. Therefore, the 9-month regimen is clearly dominating over the 20-24-month regimen because it costs less while it gains more QALY.

Conclusions: Our study results suggest that the shorter 9-month regimen remains cost-effective in Bangladesh setting with changing costs and utility parameters varied in the

probabilistic sensitivity analysis. MDR-TB treatment is itself cost-effective in developed countries and with cost-effective shorter regimen both treatment adherence and efficacy of the treatment will be improved.

Keywords: Economic Evaluation, Multi Drug Resistant Tuberculosis, Cost-effectiveness, Cost, QALY, Bangladesh Regimen, Bangladesh

Introduction

Tuberculosis (TB) is a deadly tropical disease caused by *Mycobacterium tuberculosis*, a bacillus which typically affects lungs (pulmonary tuberculosis) in addition to other parts of the human body. Tuberculosis is prevalent in the temperate region of the world and this tropical disease is endemic in South-East Asian and African countries. India and China, the two largest countries in terms of population, had the highest number of cases (26% and 12% respectively) in 2012. Bangladesh, a South Asian country with hot tropical weather, also harbors the disease in huge numbers of afflicted people. Bangladesh is a high burden TB country and its number of Multi-Drug Resistant TB (MDR-TB) patients is on the rise (World Health Organization (WHO), 2016a).

The world has experienced a slow gain in TB control in recent years and that progress has been halted by the emergence of MDR-TB and Extremely Drug Resistant TB (XDR-TB) strains. Bangladesh has also experienced a surge in the number of MDR-TB cases with a 29% of MDR-TB cases found among the re-treatment of pulmonary TB cases in 2015 (World Health Organization (WHO), 2016a).

Bangladesh follows a model involving community health workers or community members to provide drugs regularly to the patients undergoing drug sensitive TB (DSTB). Under the public private partnership models different Non-governmental organizations (NGOs) are responsible for directly observed treatment short-course (DOTs). Any lack of adherence may result in menacing drug resistant strains, MDR or XDR TB; treatment for both the conditions are costly and time consuming. The current WHO guidelines prescribed treatment regimen is of 20-24 months, while the shortest effective MDR-TB treatment regimen spans over nine months (Deun et al., 2010). The

prolonged treatment schedule may result in more incidence of treatment discontinuation. WHO in cooperation with STOP TB Partnership came up with a response plan in 2007-2008 and Bangladesh is one of the seven countries using shorter treatment regimens for MDR-TB in June 2013 (World Health Organization (WHO), 2013c).

National Tuberculosis Control Program (NTP) in Bangladesh follows the 20-24-month treatment regimen for MDR-TB patients. The NTP follows the Programmatic Management of Drug-resistant TB (PMDT) guideline (Falzon et al., 2011) and the treatment is supervised and administered by DOTS providers (National Tuberculosis Control Program (NTP), 2013)

Damien Foundation (DF) runs their own protocol of treatment for MDR-TB patients, which span over 9 months and differs in drug composition as well. DF generally admits the MDR-TB patients in one of their three hospitals located in Jalchatra of Madhupur in Tangail district, Shomvuganj in Mymensingh district and at Anantapur in Netrakona district for four months of intensive phase; which is followed by the continuation phase of five months for which drugs are administered at patients' home by DOTs providers (Damien Foundation Bangladesh, 2015). DF has initiated a shorter regimen treatment of 9 months in 1997 (Van Deun et al., 2010), which eventually came to known as "Bangladesh" regimen (Aung et al., 2014). In a recent publication in 2014, DF researchers presented their findings from their observation study that 84.4% of the patients undergone the shorter regimen had bacteriologically favorable outcomes up to two years after treatment completion (Aung et al., 2014). This success of Bangladesh regimen inspired United Sates Agency for International Development (USAID), the International Union Against Tuberculosis and Lung Disease (the Union), and Janssen

Research & Development, LLC to commission a clinical trial to find out the effectiveness of the regimen in other countries like Ethiopia, Mongolia, South Africa, and Vietnam (International Union Against Tuberculosis and Lung Disease (The Union), 2017).

Although several studies showed the cost-effectiveness of MDR-TB treatment as a whole in developed and developing country settings (Diel, Nienhaus, Lampenius, Rüsch-Gerdes, & Richter, 2014; Diel, Vandeputte, et al., 2014; Fitzpatrick & Floyd, 2012), no study was conducted to perform economic evaluation of two regimens, the 9-month regimen (shorter) and current WHO recommended the 20-24-month regimen (current). This study aims to fill the void in conducting the cost-effectiveness evaluation of these two treatment regimens from a societal perspective (including both patients and payer perspectives) using Quality Adjusted Life Years (QALYs) as the outcome for effectiveness, which qualifies this as a cost-utility study in health economics parlance (Drummond, Sculpher, Claxton, Stoddart, & Torrance, 2015).

Methods

Study Design and Data Sources

The study follows a purposive sampling method for interviewing MDR-TB patients. According to the recent estimates in 2014 number of laboratory-confirmed MDR-TB patients was 954 in Bangladesh and the prevalence of MDR-TB is 5,100 in 2015 (World Health Organization (WHO), 2016a). In our study area, it is understandable that the number will be significantly lower. Therefore, we collected the information of the MDR-TB patients from the TB control programs and reach those who were accessible (Brazier et al., 2002).

Institution-level data has been collected for assessing the provider level costs associated with TB treatment. Number of patients diagnosed and treated in 2015 has been collected from the secondary sources such as the World TB report published by WHO and the Annual TB report of NTP, Bangladesh. Drug costs have been collected from the STOP TB Global Drug Facility website. Costs for diagnostic tests have been estimated after consulting with local experts who are knowledgeable of the MDR-TB programs in Bangladesh and also know the market price of different tests.

Cost Of Illness (COI) includes direct, indirect and tangibles costs incurred by the patients (Centers for Disease Control and Prevention (CDC), 2013) and in this study the TB patients will be traced and interviewed for the detail cost descriptions. The variables of interest are the duration of illness, time elapsed before diagnosis, present status of the illness, how many healthcare providers has been consulted, the direct costs incurred in each encounter, duration of DOTS treatment, transportation cost to DOTS center, any friend/relative accompanying with and the opportunity cost of their time, and the lost work days and income of the patients among others. The programmatic cost has been collected using a pre-set questionnaire and using annuitization for capital costs per patient costs were calculated for each regimen.

The study will seek data on tuberculosis burden on the population of Bangladesh from different sources, e.g., published reports, program documentations and various surveys and the incidence of TB will be extracted from those sources. To find the QALYs gained through the program we interviewed patients using EuroQoL 5D-5L questionnaire and used the tariff provided by EuroQol.

Target Population and Study Sample

This study covers the adult (more than 18 years old) MDR-TB patients all over Bangladesh. 145 MDR-TB patients' data was used for patient level cost and outcomes (QALY) estimation for this study. Out of these 145 patients, 58 were under the 9-month regimen and 87 were under the 20-24-month regimen, who were under treatment in four MDR-TB treatment facilities (two for each regimens). Table 1 shows the number of patients interviewed under each regimen and the districts to which they belonged. In the Appendix Figure 1 the geographic location of the study districts is shown.

Glick (H. A. Glick, 2011) proposed a sample size formula for cost-effectiveness evaluation of clinical trials. Although our study is not a typical clinical trial, given the nature of the intervention and the study design we can apply the formula for calculating the required sample size for our study. The formula calculates the sample size for each of the two groups with similar standard deviation of costs and effect and same sample size:

$$n = \frac{2\left(Z_\alpha + Z_\beta\right)^2 [sd_c^2 + \left(W * sd_q^2\right)^2 - \left(2\,W\rho * sd_c * sd_q\right)}{(WQ - C)^2}$$

Where:

Z_α is the standard normal quantile for the level of Type I error (set at 95%)

Z_β is the standard normal quantile for the level of Type II error (set at 80%)

sd_q, sd_c are the std deviations for each group for treatment effect and cost respectively

W is the Maximum Willingness to Pay

Q is the expected mean difference in treatment effectiveness

C is the expected mean difference in treatment cost

ρ is the expected correlation of the difference in cost *(C)* and effect *(Q)*

This is a measure of the covariance of changes in effectiveness and changes in cost. Negative covariance, where cost decreases with increasing effectiveness result in a larger sample size. Positive covariance where cost increases with increasing effectiveness result in smaller sample sizes.

With 95% confidence interval and 80% power of the test, we assumed that the standard deviation of costs (sd_c) is 100 USD, standard deviation of effect (sd_q) is 0.25 QALY, ρ, correlation of difference in cost (C) and effect (Q) is 0.5. The expected mean difference in treatment effectiveness (Q) is 0.15 QALY and expected mean difference in treatment cost (C) is 1000 USD. We set the willingness-to-pay threshold (W) at the three times of GDP of Bangladesh which is 3942 USD (BDT 315,360) (Macroeconomics, 2001). We found the sample size for one group is 70 and another is 104 with a 2:1 sample size ratio.

Settings and Locations

DF implements their MDR program in 22 districts in the North-west part of Bangladesh. The MDR-TB patients detected in these areas are treated following the 9-month regimen. Whereas, in rest of the 42 districts all over Bangladesh follows the 20-24-month regimen. Thus this study covers the whole country.

Ethical consideration

The study has already got ethics approval from University of South Carolina in the USA where the PI is a PhD student. Institutional Board Review (IRB) approval will also be taken from Jahangirnagar University in Bangladesh. A third and final approval was obtained from WHO Research Ethics Review Committee (WHO ERC).

Study Perspective

The study will be conducted form the societal perspective, which will encompass all costs incurred by the health care providers, patients, and community.

Comparators

The two distinct programs carried out by NTP and DF will be the comparators in this study. DF runs a 9-month regimen which administers high-dose Gatifloxacin (GFX), Ethambutol (EMB), Pyrazinamide (PZA), and Clofazimine (CFZ) throughout, supplemented during the minimum 4-month intensive phase by Kanamycin (KM), Prothionamide (PTH), and Isoniazide (INH) (Aung et al., 2014).

NTP follows the 20-24-month regimen which includes Kanamycin (KM), Ofloxacin (OFX), Pyrazinamide (PZA), Ethonamide (ETO), and Cycloserine (CS) in 6-10 months (on average 8 month) long intensive phase and Ofloxacin (OFX), Pyrazinamide (PZA), Ethonamide (ETO), and Cycloserine (CS) in 13-18 months (on average 12 months) of continuation phase of treatment (National Tuberculosis Control Program (NTP), 2013).

Time Horizon

The study will take a life-time horizon to capture all costs and outcomes according to WHO guideline (Edejer, 2003). Since this study includes patients 18 years and older, we assume they will live through to their life expectancy (72 years in 2015). Mean age of the patient interviewed was 35 years. Therefore, we repeated the cycle for 37 times to include their whole lifespan.

Discount Rate

The study will follow the WHO discount rate of 3% for both costs and outcomes (Edejer, 2003).

Choice of Outcome

Quality Adjusted Life Year (QALY) is the chosen outcome for this study.

Measurement of Effectiveness

QALY has been modeled using patient-level EuroQol-5 Dimensions-5 Levels (EQ-5D-5L) measure of health related quality of life (EuroQol Research Foundation, 2017). We used Zimbabwe score sets for EQ-5D, since Zimbabwe is another developing country like Bangladesh and we assume the EQ-5D score sets would have been similar between populations of these two countries. Finally, the QALY measure was estimated after controlling for patient's socio-economic factors. Lognormal (log value of QALY as dependent variable) has been found more suitable model. Recycled prediction has been used to find out the estimated QALY for each type of patient outcome (e.g., cure, failure, and default) for both regimens (Glick Book). For death state utility has been assumed zero.

Measurement of Costs

Health systems costs were collected from different sources. Prevention and promotion costs, training costs, meeting costs, human resources costs, capital costs, and other costs were collected from MDR-TB treatment facilities under the purview of the study using a pre-set provider questionnaire. Heath facility managers, personnel responsible for financial transactions were interviewed using the questionnaire and relevant costs were collected. Capital costs were annuitized using 5% interest rate and 10-year lifetime for Microscopes and Gene Xpert machines, and vehicles. Costs for drugs were derived from the Stop TB Global Drug Repository (Stop TB Partnership, 2017) and per patient drug costs were calculated for each regimen (Appendix Table 1 and Table 2). Diagnostic tests costs were derived from expert knowledge from the officials working in MDR-TB program in Bangladesh (Appendix Table 3 and Table 4). Per patient cost of delivering MDR-TB treatment for both types of regimen have been estimated dividing costs among the number of treated patients in one year in those facilities using Annual Tuberculosis Report by NTP, Bangladesh (National Tuberculosis Control Program (NTP), 2015). Patient costs were collected through interviews of MDR-TB patients using a pre-set questionnaire prepared on the basis of Stop-TB questionnaire on patient's cost (Stop TB Partnership DOTS Expansion Working Group (TB and Poverty subgroup), 2008). The questionnaire was translated English to Bengali and then retranslated back into English to validate the translation. Both patient and provider questionnaires were pre-tested and changes were incorporated before using those in the survey. Total costs of treating a patient under each regimen was calculated by summing up the patient and provider level costs. Then the cost was modeled using a Generalized Linear Model with

Gamma family and log link using data from 145 interviewed MDR-TB patients who had complete information on disease outcomes. GLM diagnostics were used to validate the GLM family and link. Recycled prediction was used to estimate the costs for each type of patient outcome (e.g., cure, failure, default) for both regimens (H. Glick et al., 2007). For death state costs were calculated as zero.

Models and Analysis

A dynamic, stochastic, Markov simulation model was used to estimate the cost-effectiveness of the two comparison regimens. Markov model has some unique characteristics which fit the progression of TB well. For example, in Markov model states are mutually exclusive, states are complete (i.e. no people are lost) and people remain in that state for a fixed period of time. Also, Markov model is preferred over the decision trees when health event repeats over time, or have longer term health effects, effect of treatment either stops quickly after initial treatment or continue at an earlier level, and the risk of different health events does not depend on patient's prior history.

A simplistic decision tree model can be shown in Figure 6.1:

From the Markov model and decision tree we find that after starting of the treatment the MDR-TB patient can move to either of the four states, e.g., cure/treatment complete, failure/relapse, default, and death. Cure state has been defined as those who had completed treatment protocol without any evidence of failure and had at least three consecutive negative cultures from samples collected at least 30 days apart in the final 12 month of treatment, or "Treatment Completed", those who completed treatment according to treatment protocol but did not meet the definition for cure because of lack of bacteriological results.

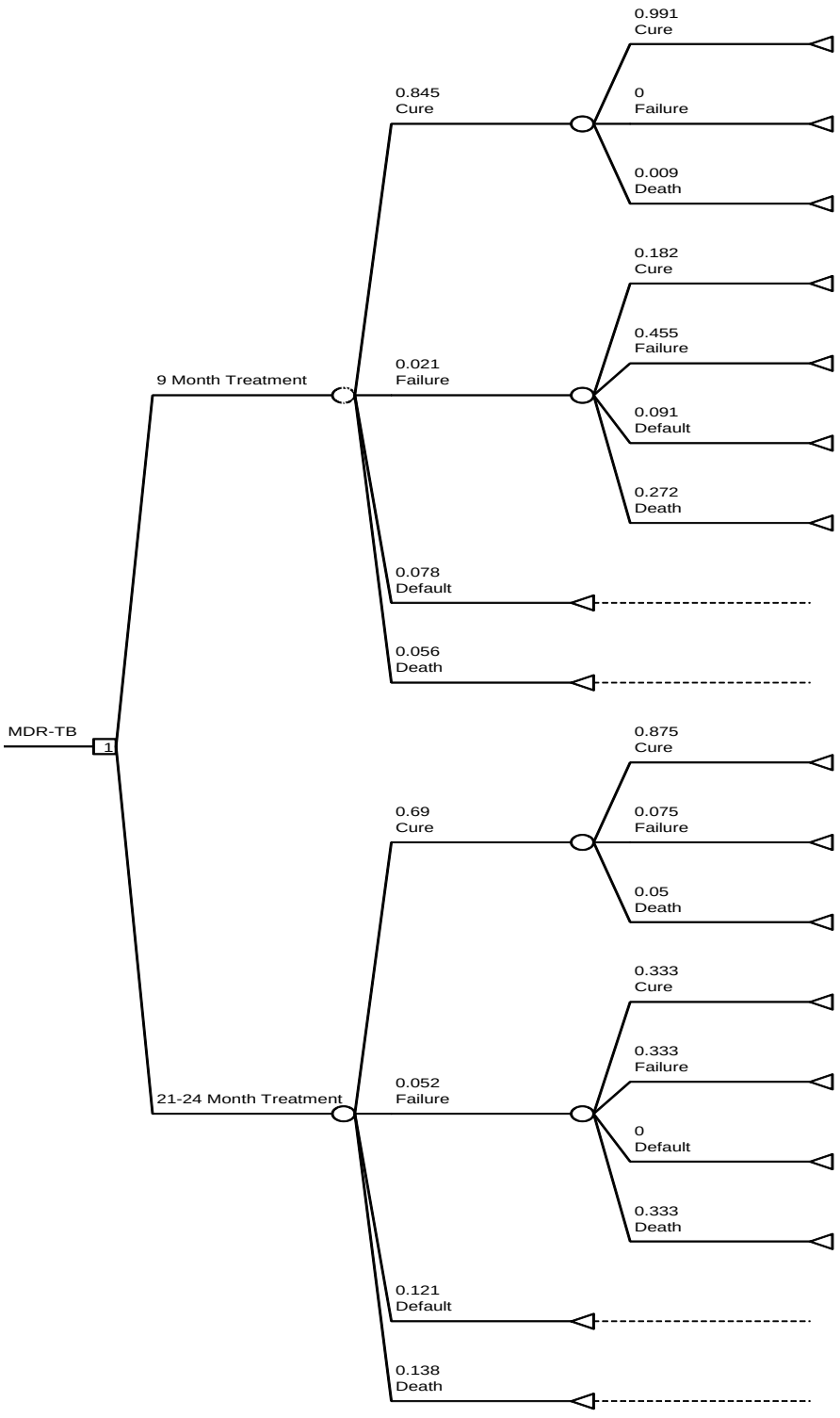

Figure 6.1 Decision Tree of two comparison treatment strategies for MDR-TB

Failure/relapse cases were defined as those whose treatment was needed to be terminated or at least change of two anti-TB drugs due to lack of conversion, bacteriological reversion in the continuation phase, evidence of additional acquired resistance, or adverse drug reaction. Lost to follow up/ default cases were defined as those MDR-TB patients whose treatment was interrupted for two or more consecutive months for any reason (National Tuberculosis Control Program (NTP), 2013).

Here death is the absorbing state, i.e., if a patient is dead he/she can move from that state to another. If any patient is cured he/she can remain cured, relapse/reinfection may occur, lost to follow-up (default) or can be dead. On the other hand, the failed/relapsed patients undergo another cycle of treatment and can culminate into cure, remain failed, can default, or can be dead as well. Similarly, from default state one can move over to other three states.

Cost-effectiveness evaluation was performed using *heemod* package in R (Filipović-Pierucci et al., 2017). BCEA package was also used to validate the results form analysis with *heemod* package (Filipović-Pierucci et al., 2017). Cost and utility data was modeled using STATA 14.2 (StataCorp, 2015).

Measurement of Transition Probabilities

As mentioned earlier, cost-effectiveness analysis of these two regimens has not been undertaken yet. However, the programmatic outcome for the two treatment strategies has been derived from two papers. One paper reported the results of the standardized treatment spanning 20-24 month (Van Deun et al., 2004). Another paper published recently reported the results of the alternative regimens of 9 month (Aung et

al., 2014). Both studies were conducted in Bangladesh. Transitional probabilities were estimated from these two studies using Markov simulation as an evidence synthesis technique (Sutton, Welton, & Cooper, 2012). R has been used for the analysis along with *r2jags* packages for estimating the transitional probabilities for two treatment regimens (Su & Yajima, 2012).

From these two studies the transitional probabilities for first two cycles were estimated and furnished in Table 6.1.

Table 6.1 Transition Probabilities of MDR-TB Treatment Regimens

Input variable	**20-24-Month Regimen[a]**	**9-Month Regimen[b]**
Cure to Cure (tpC2C)	0.813	0.846
Cure to Failure (tpC2F)	0.071	0.043
Cure to Default (tpC2Def)	0.024	0.080
Cure to Death (tpC2Death)	0.092	0.031
Failure to Cure (tpF2C)	0.143	0.119
Failure to Failure (tpF2F)	0.431	0.486
Failure to Default (tpF2Def)	0.139	0.040
Failure to Death (tpF2Death)	0.287	0.355
Default to Cure (tpDef2C)	0.088	0.023
Default to Failure (tpDef2F)	0.087	0.499
Default to Default (tpDef2Def)	0.637	0.365
Default to Death (tpDef2Death)	0.188	0.113

[a] Source: (Aung et al., 2014)
[b] Source: (Van Deun et al., 2004)

Parameters

Patient level cost for each regimen as well as the per patient provider costs are shown in Table 6.2.

Table 6.3 shows parameters for the cost-effectiveness analysis along with their distributions. Parameters mainly consist of transitional probabilities for transition between different states, costs for treating each type of states, and the utility of each states. Apart from this initial age was determined as the mean age of the interviewed

population (35 years). Time horizon was therefore fixed at 37 years, accounting for the rest of the general life expectancy of Bangladeshi people (life expectancy at birth in Bangladesh is 72 years (The World Bank, 2017b)). Both age and cycle parameters were kept fixed for the model. Transmission of secondary infection was assumed to be .003 annually based on the findings of a study that 0.03 new secondary cases may develop among the MDR-TB population (Sloot, Schim van der Loeff, Kouw, & Borgdorff, 2014).

Costs parameters follow a gamma distribution as mentioned earlier and are measured in 2015 Bangladeshi Taka (BDT). Utility values are measured in QALY and their distributions were lognormal.

Table 6.2 Patient, Provider and Total Costs for two regimens of MDR-TB treatment in Bangladesh

Costs	**DS-TB Patients**	**MDR-TB Patients**
A. Patient Level Costs	**Mean**	**Mean**
Direct Costs		
Before Diagnosis Costs	13287.16	14844.23
TB Diagnosis Costs	1106.69	684.63
Follow-up Costs	172.16	877.17
Drug Collection Costs	14.6	1.17
Hospital Costs	2515.23	7669.4
Additional Food Costs	2244.01	2678.39
Accompanying Person Costs	380.03	2114.7
MDR-TB Relocation Costs	0	341.24
Drug Side-effects Costs	434.58	1647.28
Total Direct Costs	20154.46	30858.21
Indirect Costs		
Patient Opportunity Costs (Income Loss)	407.07	1522.86
Accompanying Person Opportunity Costs	673.57	2593.91
Total Indirect Costs	1080.64	4116.77
Total Patient Level Costs	**21235.10**	**34974.98**
B. Provider Level Costs		
Prevention and Promotion Costs	652.17	202.02

Diagnostic Costs	17825.00	38300.00
Drug Costs	42761.50	61833.27
Training Costs	2608.70	767.68
Meeting Costs	2608.70	808.08
Incentive Payment	3100.00	3100.00
Human Resources Costs	23728.70	28267.15
Capital Costs	22100.92	10101.01
Other Costs	345.73	101.01
Total Provider Level Costs	**115731.41**	**143480.23**
Total Costs	**136966.51**	**178455.21**

Table 6.3 Input Parameters for Cost-Effectiveness Analysis

Variable Category	**Distribution[a]**	**Value**	**Low**	**High**	**Reference**
Starting age of cohort (mean)	Fixed	35 Years	-	-	Study Data
Time horizon	Fixed	37 Years	-	-	(LE Data)
Cost of Cure (20-24 Month)	Gamma	BDT 194893	BDT 151740	BDT 238046	Study Data
Cost of Failure (20-24 Month)	Gamma	BDT 204155	BDT 149920	BDT 258390	Study Data
Cost of Default (20-24 Month)	Gamma	BDT 206983	BDT 162744	BDT 251222	Study Data
Cost of Cure (9 Month)	Gamma	BDT 125977	BDT 98084	BDT 153870	Study Data
Cost of Failure (9 Month)	Gamma	BDT 131964	BDT 96905	BDT 167023	Study Data
Cost of Default (9 Month)	Gamma	BDT 133972	BDT 105376	BDT 162568	Study Data
Utility of Cure (20-24 Month)	Lognormal	0.777	0.524	1.00	Study Data
Utility of Failure (20-24 Month)	Lognormal	0.710	0.428	0.99	Study Data
Utility of Default (20-24 Month)	Lognormal	0.757	0.543	0.971	Study Data
Utility of Cure (9 Month)	Lognormal	0.813	0.560	1.00	Study Data
Utility of Failure (9 Month)	Lognormal	0.746	0.464	1.00	Study Data
Utility of Default (9 Month)	Lognormal	0.793	0.579	1.00	Study Data

Discount Rate	Fixed	3%	0%	6%	Edejer, 2003
Probability of Secondary transmission (per year)	Binomial	0.03	0	0.06	Germany Paper

[a] In Probabilistic Sensitivity Analysis

Results

Base Case Results

The base case results show that after 37 cycles (years) each patient under the 9-month regimen gained 6.21 QALY with a total cost of BDT 987,418. Whereas, each patient under CHW model gained 5.74 QALY by incurring costs of BDT 1,501,221 (Table 5). Therefore, the 9-month regimen is clearly dominating the 20-24-month regimen because it costs less while it gains more QALY.

Table 6.5 Base Case Results

Regimen	**Cost Per Patient (BDT)**	**QALY Gained**	**ICER**
9 Month (DF)	987,418	6.21	-1,086,095 (Dominates)
20-24 Month (NTP)	1,501,221	5.74	

Deterministic Sensitivity Analysis

Parameters were varied on different scales for high and low values and univariate sensitivity analysis was performed to see the robustness of the findings. A tornado plot has been prepared to see the effect of change in each variable. Based on the findings in one-way sensitivity analysis, input parameters were varied accordingly to see their impact in probabilistic sensitivity analysis.

In tornado plot, shown in the Figure 6.2, we find that the most influential parameters were costs of cure state of the 20-24-month regimen, cost of cure state of the

9-month regimen, costs of failure state of 9 month regimen, cost of failure state of the 20-24-month regimen according to the more effects on the results. Among the utility values utility of cure state of the 9-month regimen has more effect than utilities of other states.

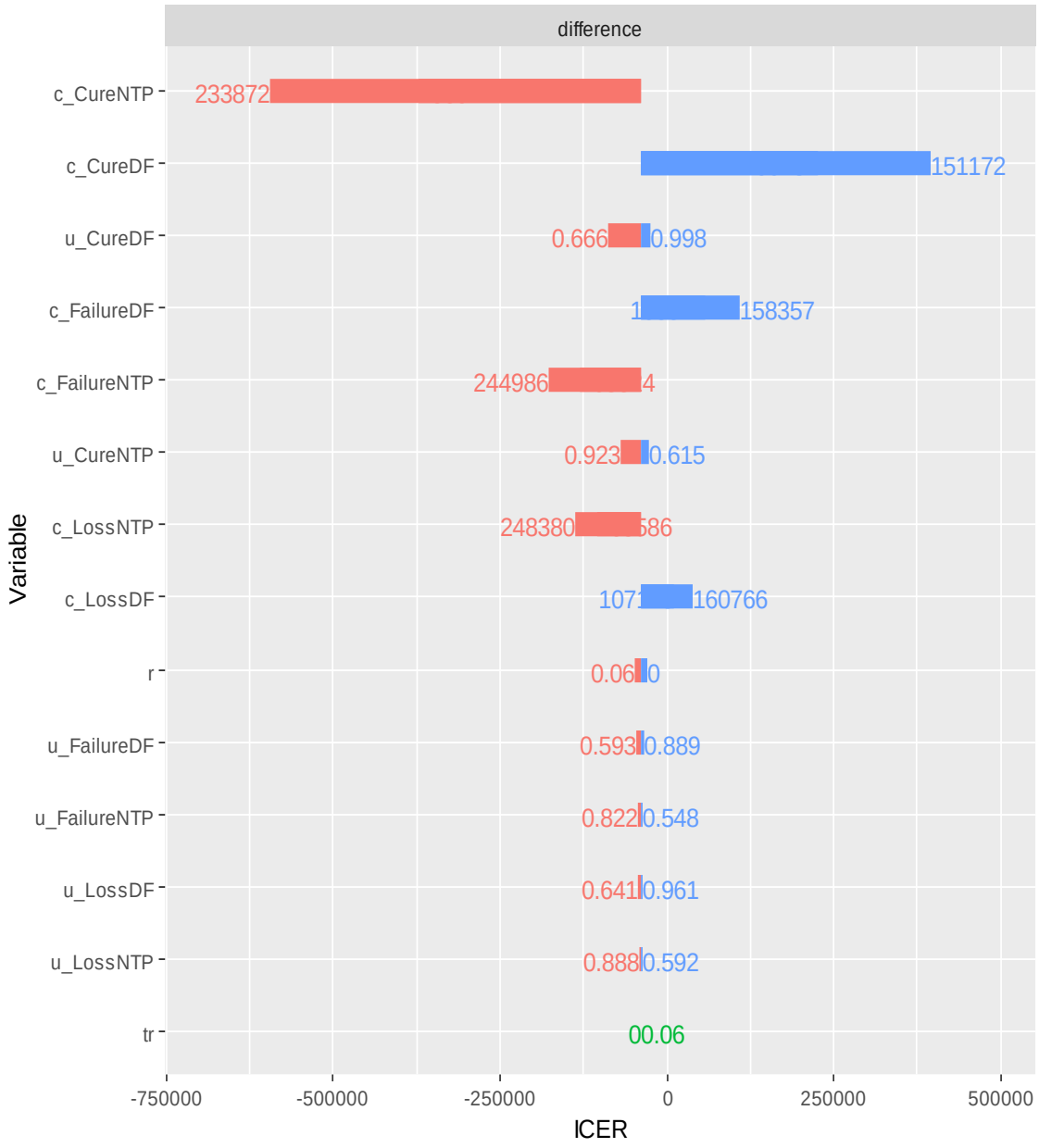

Figure 6.2 Tornado Plot of Deterministic Sensitivity Analysis

Probabilistic Sensitivity Analysis

In probabilistic sensitivity analysis, the costs values and utility values for each state were varied by 20%. At first the base case Markov model with all parameters with their values and distribution was run for 1000 iterations and the base case results were assessed in the form of incremental cost effectiveness ratio (ICER), Cost-effectiveness Acceptability Curve (CEAC), and Expected Value of Perfect Information (EVPI).

Incremental Cost-effectiveness Ratio (ICER)

From the results reported in the Table 5 shows that over life-time the 9-month regimen costs about BDT 942,315 while the 20-24-month standard regimen costs BDT 1,434,254. At the same time QALY gained by the 9-month regimen is 6.00 whereas in the 20-24-month regimen QALY is gained 5.51. Therefore, the resultant ICER is -BDT 997,257 per QALY gained. It shows that 9 month regimen dominates the 20-24-month regimen (Table 5). Results shown in the cost effectiveness plane also shows that the ICER is in the North-West Quadrant which makes the 9-month regimen dominant over the 20-24-month regimen (Figure 6.4).

Table 6.5 ICER from Probabilistic Model

Regimen	Cost Per Patient (BDT)	QALY Gained	ICER	EVPI
9 Month (DF)	942,315	6.00	-997,257 (Dominates)	13,719
20-24 Month (NTP)	1,434,254	5.51		

Cost-Effectiveness Acceptability Curve (CEAC)

CEAC has been shown in Figure 6.3. Since the 9-month regimen dominates over the 20-24-month regimen, the CEAC for the 9-month regimen is over 0.75 form the beginning. With increasing willingness-to-pay CEAC value gets bigger. On the other

hand, it decreases for the 20-24-month regimen for higher values (Figure 6.4).

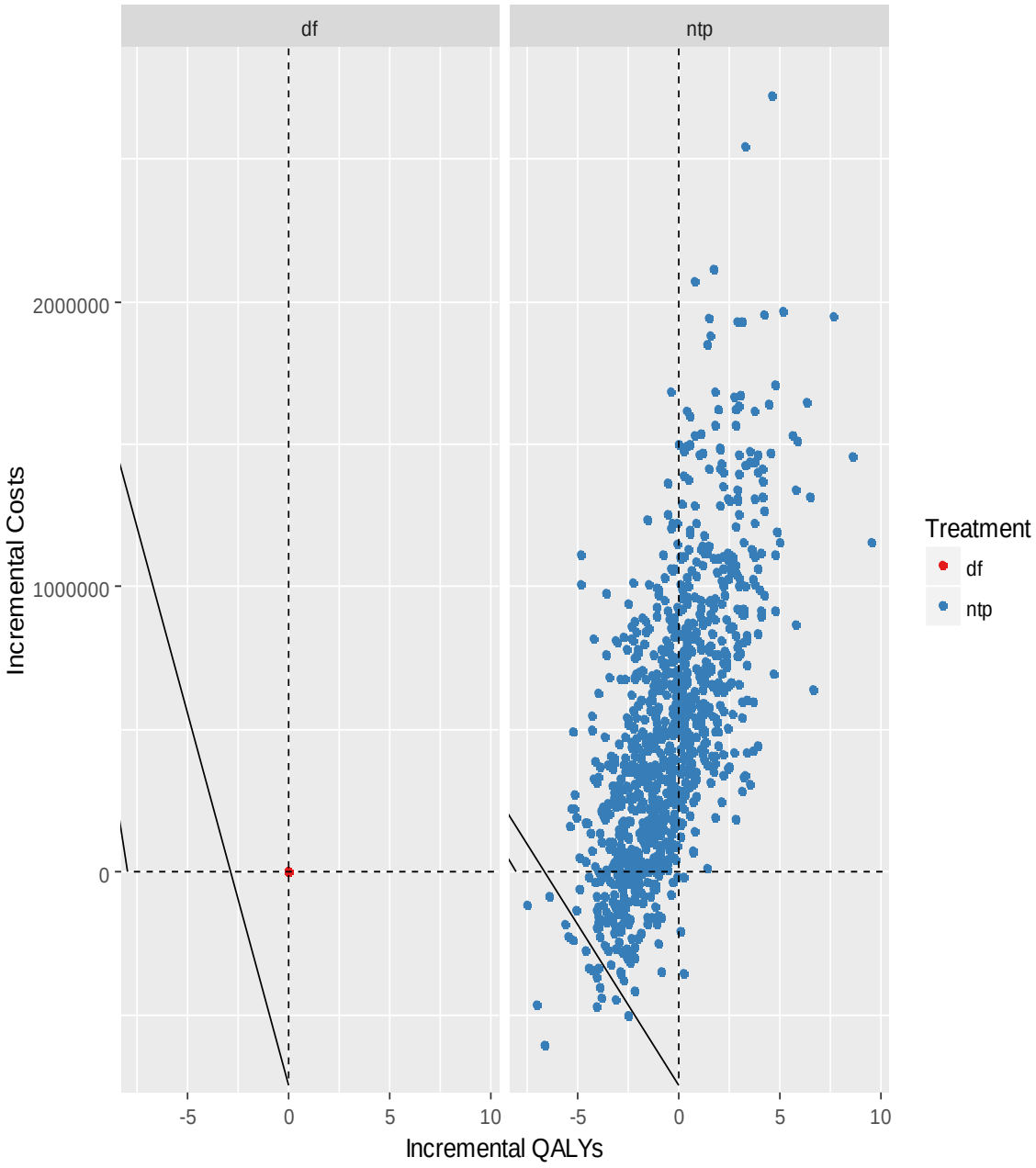

Figure 6.3 Cost-Effectiveness Plane

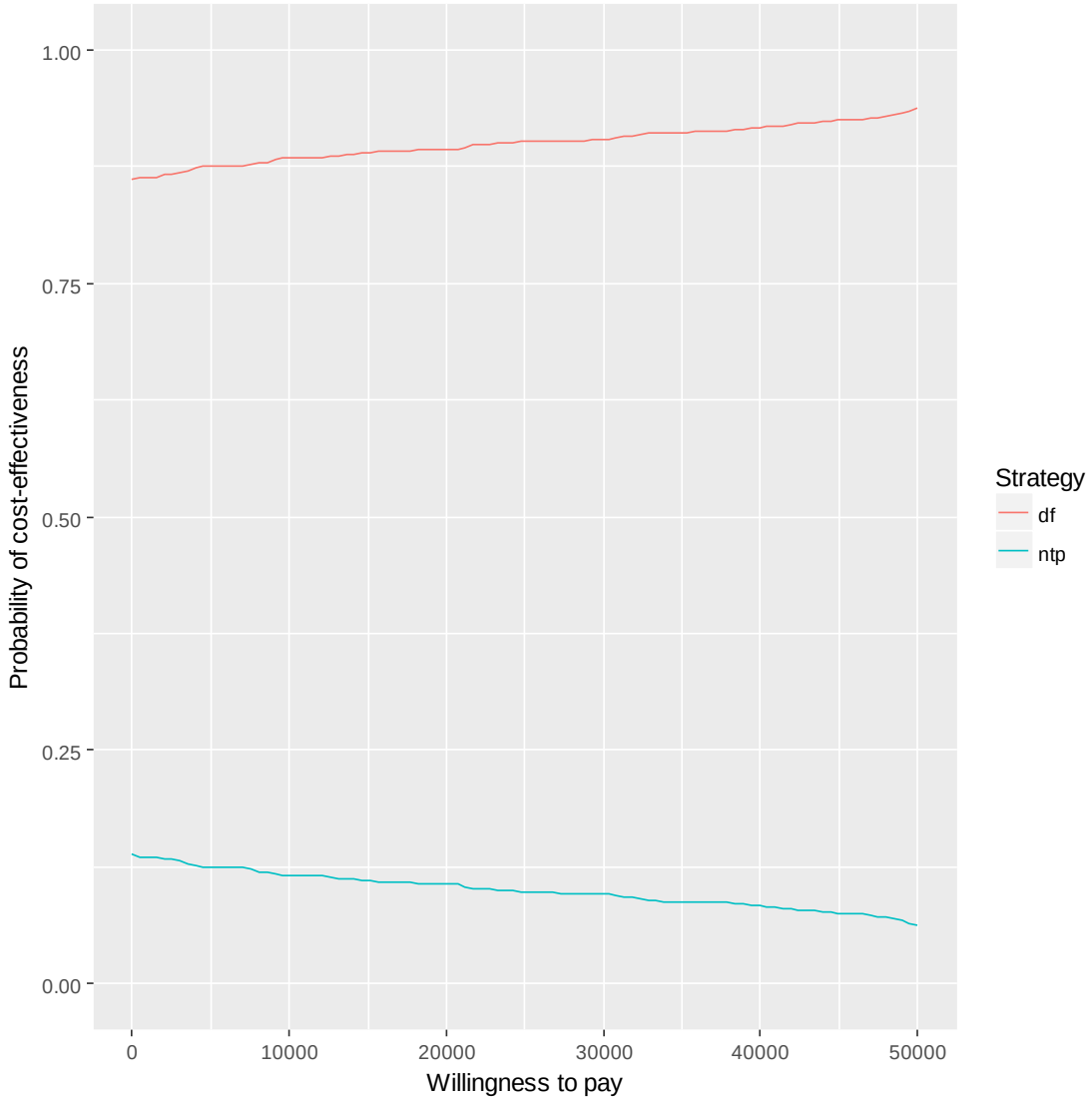

Figure 6.4 Cost-Effectiveness Acceptability Curve

Expected Value of Perfect Information (EVPI)

EVPI is the absolute limit of the value of further research that would completely eliminate the uncertainty around the parameters in the model. EVPI value of BDT 13, 719 shows that with reducing uncertainty around the parameters would require only BDT 13,719. It is also evident from the Figure 6 that with increasing willingness-to-pay the EVPI decreases and offsets the need of further research due to the small gains.

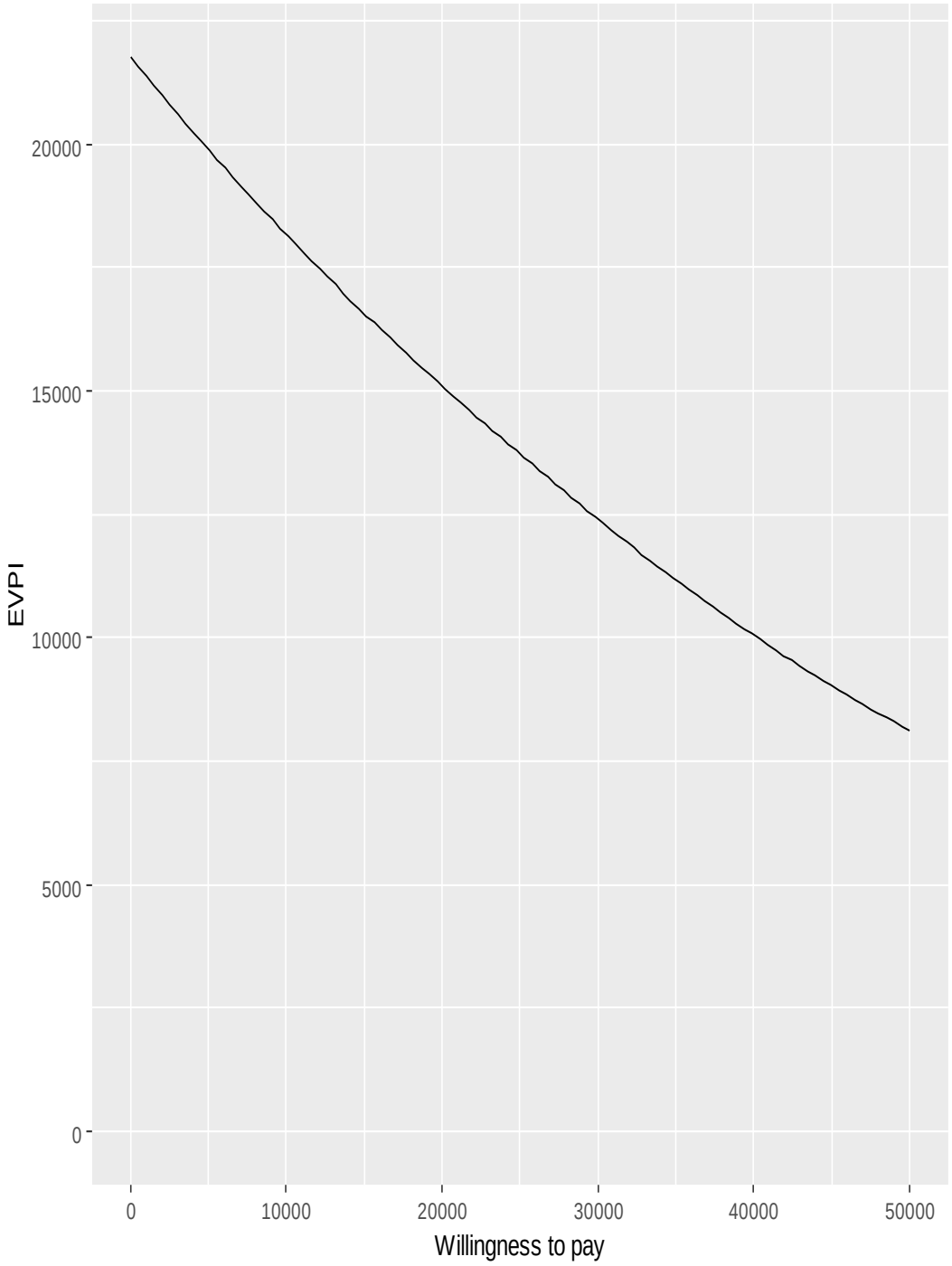

Figure 6.5 Expected Value of Perfect Information (EVPI) Curve

Discussions

The study results show that the 9-month "Bangladesh" regimen is cost-effective from a societal perspective. Bangladesh regimen has more cure rate and it provides more utility to the patient than those who undergone the 20-24-month regimen which WHO currently endorse. However, in 2012 a clinical trial named the STREAM (Standardized Treatment Regimen of Anti-Tuberculosis Drugs for Patients with MDR TB) in Ethiopia, Mongolia, South Africa, and Vietnam had been initiated (International Union Against Tuberculosis and Lung Disease (The Union), 2017). The primary objective of the first stage of the trial is to evaluate the effectiveness of the shorter "Bangladesh" regimen in other settings (Moodley & Godec, 2016). Damien Foundation initiated the Fluoroquinolone based shorter regimen and tested over 12-year period (Van Deun et al., 2010); but the study lacks in terms of it was only an observational study and more patients opted out from participation in the study; patients with HIV were not included; and cohorts were enrolled consecutively, i.e., various regimens were tested in various time periods, and cohort sizes were not predetermined (TBFACTS.ORG, 2017). Since in the published description of the trial does not mention any undertaking of cost-effectiveness analysis alongside the clinical trial this study provides an important evidence of cost-effectiveness for the shorter regimen.

Several studies have also been conducted to assess the cost-effectiveness of different MDR-TB treatment regimens. Fitzpatrick et al. (2012) conducted a systemic review of studies which used primary data and outcome which eventually includes only four studies conducted in Estonia, Peru, the Philippines, and Tomsk, Russia. Cost per DALY averted with second line drugs were $598, $163, $143, $745 respectively. The

cost per DALY averted was lower than GDP per capita in all 14 WHO sub-regions considered. In other studies, Diel and colleagues showed that the treatment of MDR-TB is cost-effective in Germany (Diel, Nienhaus, et al., 2014)and European Union (EU) countries combined (Diel, Vandeputte, et al., 2014).

Our study results suggest that shorter regimen is cost-effective in Bangladesh setting. Since Bangladesh is developing country, the findings can be emulated in other developing countries. There is already evidence that MDR-TB treatment is itself cost-effective in developed countries; with shorter regimen treatment adherence will increase in efficacy of the treatment. Although STREAM trial will evaluate the incidence of adverse drug reactions among the shorter and current regimens, in this study we found that the adverse drug events were less among the patients undergoing shorter regimen. Both shorter duration of treatment and lesser adverse drug reactions translated into more QALY for the shorter regimen and eventually made the shorter regimen cost-effective.

This study has several limitations. For transitional probabilities we used one study for each treatment regimens due to lack of published study. This made the results biased. Results from the STREAM study will help to fill this void and the clinical trial results can be used for future studies. Cost and effectiveness data from the patients may suffer from the recall bias, especially for the patients under the 20-24-month regimen. Health care facility level cost data were also collected from four facilities (two for each regimen) may suffer from biased estimates.

Despite these limitations, this study tried to collect the patient and provider level data comprehensively using pre-set questionnaires. To our best knowledge, it is also the

first study to conduct economic evaluation between shorter and current regimens of MDR-TB treatment.

Growing evidence of efficacy compels the policy makers to adopt the shorter regimen as the approved regimen in near future. Results of this study makes the case for shorter regimen stronger with the evidence of cost-effectiveness which is often considered as the pivotal consideration for allocating scarce resources.

We can conclude that the evidence of cost-effectiveness of shorter regimen of MDR-TB and the efficacy of the regimen from other studies reflect that it is high time to adopt the shorter regimen as the prescribed treatment for MDR-TB treatment. This will prevent the deadly disease to spread among the vulnerable population worldwide and help us to reach the End TB strategy goals.

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APPENDIX A- STUDY III SUPPLEMENTAL INFORMATION

Table A.1 MDR-TB Drug Costs

Drug	Short Form	Dose (mg)	Price	Daily Dose (mg)	Daily dose Price
Kanamycin	Km	1000	79.25	500	0.79
Moxifloxacin	Mfx	400 mg	39	400	0.39
Prothionamide	Pto	250	13.39	500	0.27
Levofloxacin	Lfx	750	10.00	750	0.10
Cycloserine	Cs	250	28.80	500	0.58
Ethionamdie	Eto	250	7.77	500	0.16
Clofazimine	Cfz	100	103.86	100	1.04
Pyrazinamide	Z	500	17.305	1000	0.05
High dose Isoniazid (H)	H	300	12.76	900	0.06
Ethambutol	Eto	400	20.29	400	0.03

Table A.2 Drug Costs for MDR-TB Treatment Regimes

Phase	20-24-month regimen	Duration (month)	Price (Each Day)	Price (Period)	BDT
Intensive	Z-KM-Eto-Cs-Ofx/Lvx	8	1.68	402.10	
Continuation	Z-Eto-Cs-Ofx/Lvx	14	0.89	370.82	
			Total	**772.916**	61833
Phase	**9-month regimen**	**Duration (month)**	**Price (Each Day)**	**Price (Period)**	**BDT**
Intensive	Km-Mfx-Pto-Cfz-Z-Hhigh-dose-E	4	2.60	311.69	
Continuation	Mfx-Cfz-Z-E	5	1.49	222.83	
			Total	**534.5187**	42762

Table A.3 Diagnostic Test Costs for 20-24-Month Regimen

SL	Laboratory Investigations	At base line or before starting the treatment	Rate (Tk)	During Intensive Phase (Injectable Period- usually 8 month*)	Total Amount in 8* Month (Investigation Rate X Frequency)	During Continuation Phase (Oral Medication only-Usually 12 month***)	Total Amount in 12* Month (Investigation Rate X Frequency)
1	Pure Tone Audiometry (PTA)	Must	750	Monthly	6000	No clear decision regarding this!	
2	S. Creatinine	Must	350	Monthly**	2800	Need based on symptoms / Clinical Decision**	1400
3	S. Electrolyte	Must	900	Monthly**	7200	Need based on symptoms / Clinical Decision**	3600
4	S. Bilirubin, SGPT, ALP	Must	950	Every 1-3 Monthly	2850	Need based on symptoms / Clinical Decision**	3800
5	Thyroid Function Test (TSH)	Must	900	Every 6 Monthly	900	Every 6 Monthly	1800
6	Complete Blood Count (CBC)	Must	450	Need based on symptoms / Clinical Decision**	900	Need based on symptoms / Clinical Decision**	1800
7	S. Uric Acid	Must	400	Need based on symptoms / Clinical Decision**	800	Need based on symptoms / Clinical Decision**	1600
8	Random Blood Sugar (RBS)	Must	250	Need based on symptoms / Clinical Decision*	500	Need based on symptoms / Clinical Decision**	1000
9	Chest X Ray	Must	450	Every 6 Monthly	450	Every 6 Monthly	900
10	Pregnancy Test (Female at Child Bearing Age)	Must	300	Need based on symptoms / Clinical Decision**		Need based on symptoms / Clinical Decision**	
	Expenditure at Baseline/Patient		5700	Expenditure at Intensive Phase/Patient	22400	Expenditure in Continuation Phase/Patient	15900

Table A.4 Diagnostic Test cost for 9-Month Regimen

	4 Month		5 Month	Total
Intensive Phase	(22400/8)*5	Continuation Phase	(15900/12)*5	17825

APPENDIX B- PATIENT QUESTIONNAIRE (DS-TB)

Face Sheet for DRUG SENSITIVE TB Patient Interview

IDENTIFICATION	
DIVISION:	
DISTRICT:	
UPAZILA:	
NAME AND TYPE OF THE FACILITY: (Union Health Center =01, Upazila Health Complex =02, District Hospital =03)	
HEALTH FACILITY CODE:	
TYPE OF THE PROVIDER: (BRAC =01, Damien Foundation =02, Other (Please specify)=03)	
RESPONDENT: (Patient=01, Friend/Guardian=02, Other (Please specify)=03)	
SEX OF THE RESPONDENT: (Male=01, Female= 02)	
SEX OF THE PATIENT: (Male=01, Female= 02)	
NAME OF THE DOT PROVIDER:	

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE				
INTERVIEWER'S NAME & CODE				RESULT CODE
RESULT CODE*				RESULT CODE

***RESULT CODES:**

01	COMPLETED	03	POSTPONED	05	PARTLY COMPLETED
02	NOT AVAILABLE	04	REFUSED	96	OTHER, *SPECIFY*_____

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY

Collect information from only those patients who have completed their treatment within last two months.

Section 1: Patient Information

(TO BE FILLED BY INTERVIEWER TRANSFERING INFORMATION FROM THE TB CARD)

		Options		
Consent obtained from patient or caregiver?		Yes……1 No……2	☐	
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
101	Patient age		Years ☐☐ Months ☐☐	
102	Patient Sex	Male……1 Female..……2	☐	
103	BCG Vaccine	No Scar……1 Scar Seen……2	☐	
104	Type of TB	Pulmonary smear positive..……1 Pulmonary smear negative…….2 Xpert MTB/RIF Positive……...3 Extra-Pulmonary ……...4 Please Specify_____	☐	

105	Type of Patient	New…….……1 Failure……...……..2 Transfer in..……3 Relapse……..4 Treatment after loss to follow up/default…….….5 Other ……...……6 Specify_____	☐	
106	Referred by which type of provider?	Private Practitioner (Graduate)…1 Private Practitioner (Non-Graduate)……..2 Govt. field staff……..3 Shasthya Sebika (SS)/Non-govt. field staff (NGFS)…….4 Village Doctor (VD)……..5 Community Volunteer…….6 Govt. Hospital……..7 Private Hospital……...8 Community Health Care Provider (CHCP)…….9 TB Patient…… Other_____10 Please specify	☐	
107	Results of sputum Examination			
108	Treatment Regimen	Cat I……1 Cat II……..2	☐	

Month	Smear 1	Smear 2	Xpert Result	Weight (kg)
0				
2/3				
3/4				
5				
6/8				

109	Treatment outcome	Cured……..…….1 Treatment completed....……..2 Died……...……3 Treatment failure……..4 Lost to follow up/Default.…….5 Transfer Out……..……6 Not Evaluated……7		
110	HIV Status	Positive…….……1 Negative……..…….2 Not Tested…...……3 Unknown……..……..4 Declined.…….….5		
111	Type of Drug Reaction			
112	Date of starting treatment		Day Month Year	
113	Date of treatment completion		Day Month Year	

Section 2.0: Previous treatment

PATIENT INTERVIEW SECTION Start time: Hours |__|__| Minutes |__|__|

No.	Questions and filters	Coding categories	Response	Skip
201	Have you ever had TB treatment before? CROSS-CHECK WITH INFORMATION FROM PATIENT CARD	Yes……1 No…….2	☐	If 2 ► 301
202	Have you completed your previous TB treatment? CROSS-CHECK WITH INFORMATION FROM PATENT CARD	Yes……1 No…….2	☐	If 1 ► 301
203	Why did not you complete your previous treatment? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Distance to the facility		
		B. Lack of money for treatment costs		
		C. Drug Side Effects		
		D. Moved/Migrated		
		E. Thought that no more treatment was necessary		
		E. Other Please Specify_____		

Section 3: Delay, Prediagnostic & Diagnostic Costs

No.	Questions and filters	Coding categories	Response	Skip
301	What symptoms did you experience that led you to seek treatment for your most recent illness with TB? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	a. Cough		
		b. Evening rise of temperature/low grade fever		
		c. Night sweats		
		d. Coughing up blood		
		e. Weight loss		
		f. Other Specify_____		
302	How long did you experience these symptoms before you went to seek treatment? [*For each option, record number of weeks if mentioned yes in the previous question.]*	a. Cough	Weeks ☐☐	
		b. Evening rise of temperature/low grade fever	Weeks ☐☐	
		c. Night sweats	Weeks ☐☐	
		d. Coughing up blood	Weeks ☐☐	
		e. Weight loss	Weeks ☐☐	
		f. Other Specify_____	Weeks ☐☐	

Section 3.1 First Visit				
303	After you experienced the symptoms, which provider did you go to first?	Community Clinic……..…….1 Union Subcenter……...……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
304	What was the distance to the provider from your home?		Kilometer ☐☐	
305	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
306	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
307	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
308	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
309	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

310	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
311	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
312	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
313	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
314	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.2 Second Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
315	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE FIRST VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
316	What was the distance to the provider from your home?		Kilometer ☐☐	
317	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
318	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
319	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
320	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
321	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

322	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
323	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
324	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
325	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
326	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.3 Third Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
327	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the second visit's provider type)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……...……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
328	What was the distance to the provider from your home?		Kilometer ☐☐	
329	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
330	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
331	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
332	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
333	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

334	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
335	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
336	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
337	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
338	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.4 Fourth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
339	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the third visit's provider type)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
340	What was the distance to the provider from your home?		Kilometer ☐☐	
341	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
342	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
343	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
344	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
345	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

346	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
347	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
348	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
349	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
350	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.5 Fifth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
351	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the fourth visit's provider type)	Community Clinic……..……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
352	What was the distance to the provider from your home?		Kilometer ☐☐	
353	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
354	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
355	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
356	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
357	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

358	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
359	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
360	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
361	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
362	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.6 Sixth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
363	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the fifth visit's provider type)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
364	What was the distance to the provider from your home?		Kilometer ☐☐	
365	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
366	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
367	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
368	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
369	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

370	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
371	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
372	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
373	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
374	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.7 Seventh Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
375	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the sixth visit's provider type)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
376	What was the distance to the provider from your home?		Kilometer ☐☐	
377	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
378	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
379	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
380	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
381	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

382	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
383	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
384	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
385	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
386	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.8 Eighth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
387	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (Mention the seventh visit's provider type)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Village Doctor……8 Traditional Healer…….9 Other……..……10 Specify_____	☐☐	
388	What was the distance to the provider from your home?		Kilometer ☐☐	
389	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
390	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
391	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
392	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
393	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

394	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
395	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
396	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
397	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
398	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 4.0: Treatment Costs

Section 4.1 Cost Related to DOT				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
401	From where did you get your TB drugs?	Health facility…….……1 Home…….....……..2 Community……..……3 Pharmacy……..……..4 Workplace…….…….….5 Other……..……9 Specify_____	☐	
402	How often do you travel to the health facility / hospital for picking up your TB drugs?		Times/month ☐☐	
403	How long does it take to go to the place for picking up the drugs (ONE WAY)?	A. On Foot	Hour ☐☐ Minute ☐☐	
		B. By Transport	Hour ☐☐ Minute ☐☐	
404	How long does one of these visits take on average, including time on the road and waiting time (total turnaround time)?		Hour ☐☐ Minute ☐☐	
405	From your home to the facility, how much does it cost if you take transport? (both ways)	IF not known put 99999	☐☐☐☐☐	

406	If you go to a facility to pick up your drugs, how much do you spend on food on that day? (on the road, while waiting, lunch etc.)	IF not known put 99999	☐☐☐☐☐	
407	Do you have to pay administration fees when picking up your TB drugs?	Yes……1 No……2	☐	If 2 ► 409
408	What was the administration cost?	IF not known put 99999 IF no administration cost 000	☐☐☐☐☐	
409	Do you have to pay for accommodation when picking up your TB drugs?	Yes……1 No……2	☐	If 2 ► 411
410	What was the accommodation cost?	IF not known put 99999 IF no accommodation cost 000	☐☐☐☐☐	
Section 4.2 Cost related to Follow Up Tests				
411	Did you ever have to go to the health facility in addition to your regular visits for follow up tests since the beginning of treatment?	Yes……1 No……2	☐	If 2 ► 414
412	If yes, how many times?		Times ☐☐	
413	If yes, did you have to pay any additional costs any time during the entire period?	Yes……1 No……2	☐	If 2 ► 421
414	If so, what kind of costs and how much did you	A. Fees	☐☐☐☐☐	

	pay last time (In TAKA)? IF not known put 99999 IF no cost put 000	B. Sputum Test		
		C. X -ray		
		D. TB Drugs		
		E. Other Drugs		
		F. Others		
415	How long does one of these follow-up visits take on average, including time on the road, waiting time and tests (total turnaround time)?		Hour Minute	

Section 5.0: Cost related to accompanied persons (Friends/Guardian)

No.	Questions and filters	Coding categories	Response	Skip
501	Does any family/friend/DOT supporter accompany you on any visits before diagnosis and/or during diagnosis?	Yes……1 No…….2		If 2 ► 507
502	If YES, on how many visits has your family/friend/DOT supporter accompanied you or gone with you before diagnosis and/or during diagnosis?		Times	
503	What was the cost for pre-diagnosis/diagnosis visits of	A. Transport Cost		

	your accompanying person in Taka)? IF not known put 99999 IF no cost put 000	B. Food Cost		
		C. Accommodation Cost		
504	Does your accompanying person earn?	Yes……1 No…….2		If 2 ► 506
505	If earn, how much the person earn per day (in TAKA)? IF not known put 99999			
506	Why did someone accompany you? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Distance		
		B. Security		
		C. Administrative barrier		
		D. Too ill to travel alone		
		E. Was required for treatment		
		F. Other Please Specify_____		
507	Does any family/friend/DOT supporter accompany you on any visits during treatment (taking drugs)?	Yes……1 No…….2		If 2 ► 601
508	If YES, on how many visits has your family/friend/DOT supporter accompanied you or gone with you during treatment?		Times	
509	What was the cost for visits of your accompanying	A. Transport Cost		

	person during your treatment in TAKA)? IF not known put 99999 IF no cost put 000	B. Food Cost		
		C. Accommodation Cost		
510	Does your accompanying person earn?	Yes……1 No…….2		If 2 ► 512
511	If earn, how much the person earn per day (In TAKA)?			
512	Why did someone accompany you? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]* IF not known put 99999	A. Distance		
		B. Security concern		
		C. Administrative barrier		
		D. Too ill to travel alone		
		E. Was required for treatment		
		F. Other Please Specify_____		

Section 6.0: Hospitalization Costs

No.	Questions and filters	Coding categories	Response	Skip
601	Have you been hospitalized before (but due to TB) or during your TB treatment?	Yes……1 No…….2		If 2 ► 701
602	If YES, how many times were you hospitalized for this illness?		Times	
603		A. Hospital Administration Fees		

	How much did you pay during your last stay at the hospital (In TAKA)? IF not known put 99999 IF no cost put 000	B. Hospital stay charges		
		C. Food (Not provided by the hospital)		
		D. Transport (Both Ways)		
		E. Drugs		
		F. Diagnostic Tests		
		G. Others		
604	Did any attendant/caregiver stay with you at the hospital?	Yes……1 No…….2		If 2 ► 701
605	If YES, how many days he/she stay with you (sleep there)?		Days	
606	Were there any extra costs for your relative/friend for staying at the hospital?	Yes……1 No…….2		If 2 ► 506
607	What was the cost for the accompanying person during your hospitalization (stayed at night)? In TAKA IF not known put 99999	A. Transport Cost		
		B. Food Cost		
		C. Accommodation Cost		
		D. Other Cost		
608	Does your accompanying person earn?	Yes……1 No…….2 Don't Know…….3		If 2 /3 ► 610

609	If earn, how much the accompanying person earn per day?			
610	Did any other family/friend visit you while in hospital?	Yes……1 No…….2		If 2 ► 701
611	If YES, How many people visited you?		Days	
612	On an average, how many times did each of these person visit you?		Times	
613	What was the cost for EACH VISIT of them (IN TAKA)? IF not known put 99999	A. Transport Cost		
		B. Food Cost		
		C. Accommodation Cost		
		D. Other Cost		
614	How long were the visits including traveling time?		Hour Minute	

Section 7.0: Other Costs, Other Illnesses and Coping Costs

Section 7.1 Other Costs				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
701	Did you buy any supplements for your diet because of the TB illness, for example vitamins, meat, energy drinks, soft drinks, fruits or medicines?	Yes……1 No…….2		If 2 ► 703
702	If YES, how much did you spend approximately on	A. Meat		

	each of these items each month (in TAKA)? IF not known put 99999	B. Fish		
		C. Fruits		
		D. Drinks		
		E. Vegetables		
		F. Vitamins/Herbs		
		G. Others		
Section 7.2 Other illnesses				
703	Do you have any chronic illness for which you are receiving treatment?	Yes……1 No……2	☐	If 2 ► 707
704	If YES, which disease do you have? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Diabetes		
		B. Heart Disease		
		C. High Blood Pressure		
		D. Cancer		
		E. Arthritis		
		F. Other Specify		
		G. Other Specify		
705	Are there any additional costs for you because of this other illness besides the costs that you have already mentioned?	Yes……1 No……2	☐	If 2 ► 707
706	If YES, how much are these additional costs on average per month? In TAKA	A. Drugs		
		B. Diagnostic tests		

	IF not known put 99999	C. Transport		
		D. Fees		
		E. Others		
707	How much did you spend on healthcare on average per month BEFORE the TB illness? In TAKA	IF not known put 99999		
708	How much did you spend on healthcare on average per month AFTER the TB illness? In TAKA	IF not known put 99999		
Section 7.3 Coping Costs				
709	Has your illness with TB resulted in a financial burden?	Yes……1 No……2		
710	Did you borrow any money to cover costs due to the TB illness?	Yes……1 No……2		If 2 ► 715
711	If YES, how much did you borrow? In TAKA	IF not known put 99999		
712	From whom did you borrow? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Family		
		B. Neighbor		
		C. Friend		
		D. Bank		
		E. Cooperative		
		F. NGO		
		G. Money lender		
		H. Others Specify_____		

713	Have you already paid back the borrowed money?	Yes……1 No……2	☐	If 2 ► 716
714	How are you planning to pay back the money?	In Full……1 In Installment……2	☐	If 2 ► 716
715	If you are paying in installment, what is the monthly installment? In TAKA	IF not known put 99999	☐☐☐☐☐	
716	Have you sold any of your property to finance the cost of the TB illness?	Yes……1 No……2	☐	If 2 ► 718
717	How much money did you get from the sale of each of these properties? IF not known put 99999	A. Land	☐☐☐☐☐	
		B. Livestock	☐☐☐☐☐	
		C. Transport/Vehicle	☐☐☐☐☐	
		D. Household item	☐☐☐☐☐	
		E. Farm produce	☐☐☐☐☐	
		F. Jewelry	☐☐☐☐☐	
		G. Savings (FDR)	☐☐☐☐☐	
		H. Other Specify	☐☐☐☐☐	
718	Have you employed any household help for your illness?	Yes……1 No……2	☐	If 2 ► 801

719	How much do you pay monthly to the household help? In TAKA	IF not known put 99999		

Section 8.0 Patient Income and Patient's Household Income

Section 8.1 Personal Income				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
801	Who is the primary income earner of the household?	Patient…….……1 Patient's Wife.……...……..2 Patient's Husband..……3 Patient's Mother……...4 Patient's Father……..…….5 Patient's Son….……..6 Patient's Daughter..……..……7 Other ……...…….8 Specify_____		
802	What is the highest level of Education (In years) of these individuals? [*For each option, record the number of years spent studying. if the person is illiterate/did not go to school record "0"*]	A. Patient		
		B. Primary Income Earner (If Other than patient)		
		C. Household Head (If Other than patient)		
		B. Spouse of Household Head (If Other than patient)		
803	Are you involved in income earning activities?	Yes, formal work……1 Yes, agricultural and other household work…….2 Yes, informal work……3 No……4		If 4 ► 809

804	If No, why are you not involved in any income earning activities?	Cannot work due to illness …….1 Stopped working after contracting TB ……..……...……...……..2 Retired…….…….3 Student……...……...……..4 Other……...……5 Specify----------	☐	
805	Have you left your job due to your TB illness?	Yes…….……1 No……...……...……..2	☐	If 2 ► 809
806	If YES, how many months ago did you leave your job?		Months ☐☐	
807	What was your monthly income when you were working? In TAKA	IF not known put 99999	☐☐☐☐☐	
808	How regularly did you work before you became ill with TB?	Throughout the year…….…….1 Seasonal/part of the year……..2 Day Labor……...……3 Other……...……4 Specify----------	☐	

809	What was your main occupation before your illness with TB?	Service……..……1 Agriculture…..……...……..2 Household work…...……3 Construction…….……4 Garments worker……...……..5 Transport…...……..……6 Student…….……7 Retired…...……...…….8 Other…….…...……9 Specify----------	☐	
810	Did you have to change jobs when you became ill with TB?	Yes…….……1 No……...……...……..2	☐	
811	What is your main occupation after your illness with TB?	Service……..……1 Agriculture…..……...……..2 Household work…...……3 Construction…….……4 Garments worker……...……..5 Transport…...……..……6 Student…….……7 Retired…...……...…….8 Other…….…...……9 Specify----------	☐	
812	How many hours did you work on average per day BEFORE you became ill with TB?		Hours ☐☐	
813	How many hours do you work on average NOW per day?		Hours ☐☐	

814	If answer to 812 differs from answer to 813:Is the change related to the TB illness?	Yes…….……1 No……..……..……..2	☐	If 2 ► 818
815	What was your estimated personal income per month BEFORE the TB illness? In TAKA	IF not known put 99999	☐☐☐☐☐	
816	What is your estimated personal income per month NOW? In TAKA	IF not known put 99999	☐☐☐☐☐	
817	Is someone doing the work you used to do after your illness?	Spouse…….……1 Son……..……..……..2 Daughter……..…...……3 Friend…….…….…….4 Nobody……...……..5 Other…….…...……9 Specify----------	☐	
818	Do you have children of or below school age?	Yes…….……1 No……..……..……..2	☐	If 2 ► 822
819	Are all of your children attending school regularly?	Yes…….……1 No……..……..……..2	☐	If 1 ► 822
820	Did your children go to school regularly before your recent illness with TB?	Yes…….……1 No……..……..……..2	☐	
821	If your children do not go to school, indicate the reasons for not attending school regularly?	A. Needs to help around the house		
		B. No money for school fess		
		C. Also sick		
		D. Has to work to earn		

	[*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	E. Take care of patient		
		F. Other Specify_____		
822	Has the TB illness affected your social or private life in any way?	Yes…….……1 No……...……...……..2	☐	If 2 ► 823
823	If YES, how was your social life affected? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Divorce		
		B. Loss of job		
		C. Dropped out of school		
		D. Separated from spouse		
		E. Disruption of sexual life		
		F. Sick child		
		G. Other Specify_____		
8824	What is your religion?	Islam…….……1 Hindu……...……...……..2 Christian……..…...……3 Buddhism.……..……4 Other…….…...……5 Specify----------	☐	
Section 8.2 Household Income				
825	How much do you estimate was the average income of your household per month BEFORE the TB illness? (for all persons in the house, including patient; includes welfare payments, government assistance or	A. Patient's income	☐☐☐☐☐	
		B. Income of rest of the household	☐☐☐☐☐	
		C. Govt. assistance	☐☐☐☐☐	

	other social support)? In TAKA IF not known put 99999	D. Other		
826	How much do you estimate was the average income of your household per month NOW? (for all persons in the house, including patient; includes welfare payments, government assistance or other social support)? In TAKA IF not known put 99999	A. Patient's income		
		B. Income of rest of the household		
		D. Govt. assistance		
		E. Other		
827	How many people regularly sleep in your house? (including patient)			
828	How many members of the household are employed for wage/salary? (including patient)			
829	Besides yourself, does anyone else of your household receive treatment for TB?	Yes……..……1 No……...……...……..2		If 2 ► 823
830	If YES, how many household members are suffering from TB?			

Section 9.0 Socioeconomic Indicators

Section 9.0 Questions about the household			RESPONSES	Skip
901	What is the **main** source of lighting for the household?	Electrical mains ..... 01 Solar electricity ..... 02 Generator..... 03 Gas……..….04 Kerosine/Oil lamp ..... 05 Candles / Torch ..... 06 Coleman (Kerosene/Pressure lanterns)…….07 Improvised lamp..... 08 Others ..... 96 *Specify* _____ No source of lighting..... 98	☐☐	
902	What is the **main** source of water for drinking and food preparation for the household?	Piped into household .....01 Piped to yard/plot .....02 Piped into neighborhood.....03 Protected well .....04 Unprotected well .....05 Protected Spring .....06 Unprotected Spring .....07 River/stream .....08 Pond/lake/dam.....10 Communal tank .....11 Rainwater.....12 Tank truck / Water cart.....13 Bottled water .....14 Other_____ .....96 (Specify) Not reported.....99	☐☐	
903	What type of fuel is **mainly** used in your household for cooking?	Gas..... 01 Stove with kerosene..... 02 Firewood..... 03 Charcoal ..... 04 Dung..... 05	☐☐	

		Electricity ..... 06 Biogas..... 07 Straw/shrubs/grass..... 08 Saw dust ..... 09 Others ..... 96 *Specify* _____		
904	What kind of toilet facility do people in your house **mainly** use?	Own flush toilet.....01 Shared flush toilet.....02 Ventilated improved pit latrine.....03 Pit latrine with slab.....04 Pit latrine without slab / open pit.....05 Bowl/Bucket system.....06 Closet oversea/river.....07 No facility/bush/seashore .....08 Other_____ ..... 96 (Specify) Not reported..... …. 99	☐☐	
905	Main material of the floor for the principal residence structure	**Natural Floor:** Earth .....11 Sand.....12 **Rudimentary:** Wood planks.....21 Palm/bamboo.....22 **Finished:** Polished wood .....31 Vinyl/asphalt strips.....32 Marble/Ceramic tiles .....33 Floor tile .....34 Cement / Concrete/ .....35 Brick.....36 Carpet .....37 Unpolished.....38 Other_____ ..... 96 (Specify) Not reported..... …. 99	☐☐	
906	Main material of the roof of the principal residence	**Natural roofing** No roof .....11 Thatch/palm leaf.....12 **Rudimentary roofing** Bamboo .....21 Wood planks.....22 Cardboard .....23 **Finished roofing** Tin / Metal .....31 Wood .....32 Ceramic Tiles 33	☐☐	

		Cement / Concrete .....34 Other_____ .....96 (Specify)		
907	Main material of the exterior walls of principal residence	**Natural Walls** No walls.....11 Cane/Palm/Trunks .....12 Dirt .....13 **Rudimentary walls** Bamboo with mud / matting .....21 Stone with mud.....22 Mud .....23 Fibro .....24 Plywood.....25 Cardboard .....26 **Finished walls** Tin / Metal sheets .....31 Cement / Concrete .....32 Brick.....31 Stone with lime/cement .....33 Bricks .....34 Wood planks/shingles.....35 Other_____ .....96 (Specify)	☐☐	
908	What type of fuel does your household mainly use for cooking?	ELECTRICITY . . . . . 01 LPG . . . . . 02 NATURAL GAS . . . . . 03 BIOGAS . . . . . 04 KEROSENE . . . . . 05 COAL, LIGNITE . . . . . 06 CHARCOAL . . . . . 07 WOOD . . . . . 08 STRAW/SHRUBS/GRASS . . . . . 09 AGRICULTURAL CROP . . . . . 10 ANIMAL DUNG . . . . . 11 NO FOOD COOKED IN HOUSEHOLD . . . . . 95 OTHER 96 (SPECIFY)	☐☐	If 95 ► 911

909	Is the cooking usually done in the house, in a separate building, or outdoors?	IN THE HOUSE . . . . . 1 IN A SEPARATE BUILDING . . . . . 2 OUTDOORS . . . . . 3 OTHER 6 (SPECIFY)	☐	
910	Do you have a separate room which is used as a kitchen?	Yes……1 No……..……..……..2	☐	
911	Does your household own any homestead?	Yes……1 No……..……..……..2	☐	

912	*Does your household or any member of the household own the items?*		Yes	No	Responses
	Electricity connection?	A. Electricity	1	2	
	Solar Electricity?	B. Solar electricity…….	1	2	
	A radio?	C. Radio.....	1	2	
	A television?	D. Television	1	2	
	A mobile phone?	E. Mobile phone	1	2	
	A non-mobile phone?	F. Non-mobile phone.....	1	2	
	A refrigerator?	G. Refrigerator	1	2	
	A DVD/VCD player?	H. DVD/VCD player.....	1	2	
	An electric fan?	I. Fan	1	2	
	An Almirah/wardrobe?	J. Almirah.....	1	2	
	A water pump	K. Water Pump.....	1	2	
	An IPS?Generator	L. Generator/IPS.....	1	2	
	An air conditioner	M. AC.....	1	2	
	A computer/laptop?	N. Computer/Laptop.....	1	2	
913	In your opinion, is your household a high income household, a middle income household or a poor household?	High income……1 Middle income……2 Low income……..3			☐
914	How many people live in your household?	Total household size			☐☐
915	How many adult members (15 years or older)	Number of adults in the household			☐☐
916	How many children (less than 15 years)	Number of children in the household			☐☐

917	How many separate sleeping rooms are there for the use of your household members in your residence?	Number of rooms	☐☐
918	What is your current place of residence?	Urban……1 Urban slum…….……2 Rural……..3 Other……..4 Specify_____	☐
919	If the government could provide you with some service to ease the burden of TB on you and your household, what would you prefer to have? DO NOT READ. INDICATE THE ITEMS MENTIONED. IF NOT IN THE LIST, ADD ANY NEW GOVT. SERVICE MENTIONED.	Transport vouchers..……1 Food vouchers…….……2 More efficient service……..3 Other……..4 Specify_____	☐
920	How much would you be willing to pay for not becoming ill with TB in the first place? In TAKA	☐☐☐☐☐☐☐	

Section 10.0 Performance of the Facility

The next part of the survey is about the quality of TB care that you received during your visits to this facility. Please answer the questions in this part of the survey about this facility only. Do not include any other facilities in your answer.

No.	Questions and filters	Coding categories	Response	Skip
Section 10.1 Availability of TB Services				
1001	Are the waiting time(s) before being served by health providers of this facility acceptable to you?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1002	How often are you attended to by the same health providers in this facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1003	How often are the service hours of this facility inconvenient for you to get your TB treatment?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1004	How often are drugs not available when you require them?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1005	How often do you experience difficulties in obtaining TB services in this facility because of language barriers?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	

1006	How often do you have to go to another health unit for TB services or treatment?	Never…….…….1 Sometimes……..……..2 Usually……...……3 Always…..……..4	☐	
1007	Is this health facility easy to reach (distance)?	Never…….…….1 Sometimes……..……..2 Usually……...……3 Always…..……..4	☐	
1008	How often are TB services available during the working hours of this facility?	Never…….…….1 Sometimes……..……..2 Usually……...……3 Always…..……..4	☐	
1009	How often are the relevant health providers you come to see in this facility available?	Never…….…….1 Sometimes……..……..2 Usually……...……3 Always…..……..4	☐	
Section 10.2 Communication and Information				
1010	Do the health providers in this facility tell you when you stop spreading TB to others?	Yes…….…….1 No……...……...……..2	☐	
1011	Do the health providers in this facility tell you that TB can be cured?	Yes…….…….1 No……...……...……..2	☐	
1012	Do the health providers in this facility tell you about the importance of observed treatment?	Yes…….…….1 No……...……...……..2	☐	

1013	Do the health providers in this facility tell you about the side effects of TB drugs?	Yes……1 No……..……..……..2	☐	
1014	Do the health providers in this facility tell you about the need for sputum tests at given points during your treatment schedule?	Yes……1 No……..……..……..2	☐	
1015	Do the health providers in this facility tell you about the duration of the TB treatment?	Yes……1 No……..……..……..2	☐	
1016	During your visits to this facility, do health providers tell you about how to store your drugs obtained for your treatment?	Yes……1 No……..……..……..2	☐	
1017	Does the health provider in this facility tell you when next to come back for TB services?	Yes……1 No……..……..……..2	☐	
Section 10.3 Patient – Provider interaction and counselling				
1018	During your visits to this facility, how often does the health provider treat you with respect?	Never……1 Sometimes……..……..2 Usually……..……3 Always…..……..4	☐	

1019	During your visits to this facility, how often does the health provider listen carefully to you?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1020	During your visits to this facility, how often do health providers explain things in a way you can understand?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1021	During your visits to this facility, how often do you have sufficient time to discuss your problems?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1022	During your visits to this facility, how often do health providers discuss with you how to deal with your problems?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1023	During your visits to this facility, how often do you experience discrimination because you have TB?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1024	During your visits to this facility, how often is your privacy respected during examination?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		

1025	Do health providers at this facility tell you how TB can affect your every day life?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
Section 10.4 Infrastructure				
1026	How often is this facility clean?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1027	How often is there safe drinking water in this facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1028	How often are the toilets in this facility usable?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1029	How often do you find enough comfortable places to sit on in this facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
Section 10.5 Professional Competence				
1030	Does this facility offer services to examine your sputum?	Yes……..…….1 No……...……...……..2	☐	

1031	Does this facility offer home based TB treatment?	Yes……1 No……..……..……..2	☐	
1032	Were you physically examined during your first visit to this health facility?	Yes……1 No……..……..……..2	☐	
1033	Was your sputum examined when you were diagnosed with TB?	Yes……1 No……..……..……..2	☐	
1034	How many working days were there between your first sputum submission and the time you got your results?	0-2 Working days……1 3-4 Working days ……..……..2 More than 5 Working days..…3	☐	
1035	In case of germs in your sputum that cause TB, were your close contacts examined by the TB facility?	Yes……1 No……..……..……..2	☐	
1036	How often is there a treatment observer checking on your daily intake of TB drugs?	Never……1 Sometimes……..……..2 Usually……..……3 Always…..……..4	☐	
Section 10.6 Affordability				

1037	How often do you have to pay for your regular TB services (e.g. sputum tests, TB-drugs, X-rays, etc.)?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1038	How often do you have to pay a tip in order to receive TB services?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1039	How often do costs (e.g. transport) prevent you from getting to the health facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
Section 10.7 Support				
1040	How often do you receive transport support from the health facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1041	How often do you receive food support from the health facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1042	How often do you receive financial assistance from the health facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
Section 10.8 Stigma				

1043	Does the health provider talk to you the same way you are spoken to when you receive services other than TB?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1044	Does the health provider welcome you into the health facility when you visit for TB services?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1045	Does the health provider turn his/her face away when speaking with you?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		
1046	Do you feel that you are treated with dignity when you visit the health facility?	Never……..…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4		

Section 11.0 Quality of Life

Section 11.1 Health Related Quality of Life (FACIT-TB Questionnaire)

How would you describe your level of feeling for the following statements: (record the number in the right column)		**Not At All**	**Slightly**	**Moderately**	**Quite A Bit**	**Extremely**	**Response**
A. Physical well-being							
1101	I feel ill	1	2	3	4	5	
1102	I get tired easily	1	2	3	4	5	

1103	I have a lack of energy	1	2	3	4	5	
1104	I have pain	1	2	3	4	5	
1105	I feel weak all over	1	2	3	4	5	
1106	I feel fatigued	1	2	3	4	5	
1107	I have been short of breath	1	2	3	4	5	
1108	I have nausea-"a sense of vomiting outbreak"	1	2	3	4	5	
1109	Because of my physical condition, I have trouble meeting the needs of my family	1	2	3	4	5	
1110	I am bothered by fever (episode of high body temperature)	1	2	3	4	5	
1111	I am forced to spend time in bed	1	2	3	4	5	
1112	I have discomfort or pain in my stomach area	1	2	3	4	5	
1113	I have had itching	1	2	3	4	5	
1114	I have a loss of appetite	1	2	3	4	5	
1115	I have been coughing	1	2	3	4	5	
1116	I am bothered by side effects of treatment	1	2	3	4	5	
1117	Dusts Worsen my symptoms	1	2	3	4	5	
B. Social and economic well-being							
1118	I feel close to my friends	1	2	3	4	5	
1119	I get emotional support from my family	1	2	3	4	5	
1120	I am satisfied with my family communication about my illness	1	2	3	4	5	
1121	My family has accepted my illness	1	2	3	4	5	
1122	I feel close to my partner (or the person	1	2	3	4	5	

	who is my main support)						
1123	I get support from my friends	1	2	3	4	5	
1124	My physical condition and/or medical treatment cause me financial difficulties	1	2	3	4	5	
C. Emotional well-being/Stigma of having TB							
1125	I worry that my condition will get worse	1	2	3	4	5	
1126	I worry about dying	1	2	3	4	5	
1127	I am concerned about what the future holds for me	1	2	3	4	5	
1128	I am embarrassed by my illness	1	2	3	4	5	
1129	It is hard to tell other people about my infection	1	2	3	4	5	
1130	I am losing hope in the fight against my illness	1	2	3	4	5	
1131	I am bothered by the change in weight	1	2	3	4	5	
1132	I worry about spreading my infection	1	2	3	4	5	
1133	I feel nervous	1	2	3	4	5	
1134	I feel sad	1	2	3	4	5	
1135	I am satisfied with how I am coping with my illness	1	2	3	4	5	
D. Functional well-being							
1136	I am content with the quality of my life right now	1	2	3	4	5	
1137	My work (include work at home) is fulfilling	1	2	3	4	5	
1138	I am able to work (include work at home)	1	2	3	4	5	
1139	I am able to enjoy life	1	2	3	4	5	
1140	I am enjoying the things I usually do for fun	1	2	3	4	5	

1141	I have accepted my illness	1	2	3	4	5	
1142	I am sleeping well	1	2	3	4	5	
E. Spiritual well-being							
1143	I find strength in my faith or spiritual belief	1	2	3	4	5	
1144	My illness has strengthened my faith or spiritual belief	1	2	3	4	5	
1145	My life is still productive	1	2	3	4	5	

Section 11.2 EQ-5D-5L Questionnaire

Under each heading, please tick the ONE box that best describes your health TODAY.

Sl	Category	Options	Response
1146	Mobility	I have no problems in walking about.....1 I have slight problems in walking about.....2 I have moderate problems in walking about.....3 I have severe problems in walking about.....4 I am unable to walk about.....5	☐
1147	Self-Care	I have no problems washing or dressing myself.....1 I have slight problems washing or dressing myself.....2 I have moderate problems washing or dressing myself....3 I have severe problems washing or dressing myself.....4 I am unable to wash or dress myself.....5	☐

1148	Usual Activities (e.g., work, study, housework, family or leisure activities)	I have no problems doing my usual activities.....1 I have slight problems doing my usual activities.....2 I have moderate problems doing my usual activities.....3 I have severe problems doing my usual activities.....4 I am unable to do my usual activities.....5	☐
1149	Pain/Discomfort	I have no pain or discomfort.....1 I have slight pain or discomfort.....2 I have moderate pain or discomfort.....3 I have severe pain or discomfort.....4 I have extreme pain or discomfort.....5	☐
1150	Anxiety/Depression	I am not anxious/depressed.....1 I am slightly anxious/depressed.....2 I am moderately anxious/depressed.....3 I am severely anxious/depressed.....4 I am extremely anxious/depressed.....5	☐

Section 11.3 SF-6D Questionnaire			
Under each heading, please tick the ONE box that best describes your health TODAY.			
Sl	**Category**	**Options**	**Response**
1151	Physical Functioning	My health does not limit me in vigorous activities.....1 My health limits me a little in vigorous activities.....2 My health limits me a little in moderate activities.....3 My health limits me a lot in moderate activities.....4 My health limits me a little in bathing and dressing.....5 My health limits me a lot in bathing and dressing.....6	☐
1152	Role Limitation	I have no problems with your work or other regular daily activities as a result of your physical health or any emotional problems.....1 I am limited in the kind of work or other activities as a result of your physical health.....2 I accomplish less than you would like as a result of emotional problems.....3 You are limited in the kind of work or other activities as a result of your physical health and accomplish less than you would like as a result of emotional problems.....4	☐
1153	Social Functioning	My health limits my social activities none of the time.....1 My health limits my social activities a little of the time.....2	☐

		My health limits my social activities some of the time.....3 My health limits my social activities most of the time.....4 My health limits my social activities all of the time.....5	
1154	Pain	I have no pain.....1 I have pain, but it does not interfere with my normal work (both outside the home and housework).....2 I have pain that interferes with your normal work (both outside the home and housework) a little bit.....3 I have pain that interferes with your normal work (both outside the home and housework) moderately.....4 I have pain that interferes with your normal work (both outside the home and housework) quite a bit.....5 I have pain that interferes with your normal work (both outside the home and housework) extremely.....6	☐
1155	Mental Health	I feel tense or downhearted and low none of the time.....1 I feel tense or downhearted and low a little of the time.....2 I feel tense or downhearted and low some of the time.....3 I feel tense or downhearted and low most of the time.....4 I feel tense or downhearted and all of the time.....5	☐
1156	Vitality	I have a lot of energy all of the time.....1 I have a lot of energy most of the	☐

		time.....2 I have a lot of energy some of the time.....3 I have a lot of energy a little of the time.....4 I have a lot of energy none of the time.....5	

Section 11.4 Visual Analog Scale

1157 Visual Analog Scale Score

1158	*Comments by interviewer on the interview*

1159	**INTERVIEWERS: CHECK YOUR FILLED IN QUESTIONNAIRE CAREFULLY BEFORE LEAVING THE RESPONDENTS AND END YOUR INTERVIEW BY GIVING THANKS TO THE RESPONDENT.**

RECORD THE END TIME OF THE INTERVIEW: Hour ☐☐ ☐☐ Minutes

APPENDIX C – PATIENT QUESTIONNAIRE (MDR-TB)

Face Sheet for MULTI-DRUG RESISTANT TB(MDR-TB) Patient Interview

IDENTIFICATION	
DIVISION:	☐☐
DISTRICT:	☐☐
UPAZILA:	☐☐
NAME AND TYPE OF THE FACILITY: (NIDCH =01, District Chest Hospital =02, Damien Foundation Hospital =03, Other=04, Please Specify)	☐☐
HEALTH FACILITY CODE:	☐☐☐☐☐☐
DRUG REGIMEN FOLLOWED: (21 MONTH REGIMEN =01, 9 MONTH REGIMEN =02)	☐☐
RESPONDENT: (Patient=01, Friend/Guardian=02, Other (Please specify)=03)	☐☐
SEX OF THE RESPONDENT: (Male=01, Female= 02)	☐☐
SEX OF THE PATIENT: (Male=01, Female= 02)	☐☐
NAME OF THE DOT PROVIDER:	

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE				
INTERVIEWER'S NAME & CODE				RESULT CODE
RESULT CODE*				RESULT CODE

***RESULT CODES:**

01	COMPLETED	03	POSTPONED	05	PARTLY COMPLETED
02	NOT AVAILABLE	04	REFUSED	96	OTHER, *SPECIFY*_____

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY

Take information for only those patients (>18 years of age) who are undergoing the treatment or have completed their treatment within last two months.

Section 1: Patient Information

(TO BE FILLED IN BY THE INTERVIEWER WITH HELP OF PATIENT TB CARD; FILL IN ALSO IF INTERVIEW IS REFUSED FRO NON-RESPONSE ANALYSIS)

		Options	
Consent obtained from patient or caregiver?		Yes……1 No……2	☐
No.	**Questions and filters**	**Coding categories**	**Response**
101	Patient age		Years ☐☐
102	Patient Sex	Male ……...……1 Female….. …….2	☐
103	Site	Pulmonary ……...……1 Extra-Pulmonary …….2 Please Specify_____	☐
104	History of contact with TB/ DR TB Patient	Yes……1 No……..2	☐
105	IF YES, Relation and duration	WRITE DOWN FROM PATIENT CARD	
106	Medical Diagnosis other than TB	WRITE DOWN FROM PATIENT CARD	

<table>
<tr><td>10
7</td><td>Registration Status</td><td>CAT I Non converter…….……1
CAT I Failure……..…..2
Treatment After loss to follow-up- CAT I……...…3
CAT I Relapse……..4
CAT I Non converter…….…….5
CAT II Failure……6
Treatment After loss to follow-up- CAT Ii……...…7
CAT I Relapse……..8
Close contact of DR TB with S/S……..9
Transfer In……10
HIV Infected Patient…….11
Pulmonary-clinically diagnosed, new/previously treated…….12
Extra pulmonary, new/previously treated…….13
Unknown TB treatment history..14
New (Pulmonary), bacteriologically confirmed…..15</td><td></td></tr>
<tr><td>10
8</td><td>Type of Resistance</td><td>MDR TB/XDR TB/Polyresistance……1

Monoresistance……2</td><td></td></tr>
<tr><td>10
9</td><td>Previous TB Treatment Episode including DR TB</td><td>
<table>
<tr><td>No.</td><td>Start Date</td><td>Regimen</td><td>Outcome</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
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<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
Drugs:
<table>
<tr><td>First Line Drugs:
H=Isoniazid
R=Rifampicin
E=Ethambutol
Z=Pyrizinamide
S=Streptomycin</td><td>Second Line Drugs:
Km=Kanamycin
Ofx=Ofloxacin
Lfx=Levofloxacin
Eto=Ethionamide
Cs=Cycloserine
PAS=Para-aminosalicyclic Acid
Cm=Capreomycin
Clf=Clofazimine
Lzd=Linezoli
Trd=Terizidone
Amx/Clv=Amxicillin+Clavulanate Acid
Mfx=Moxifloxacin
Other……</td></tr>
</table>
</td></tr>
</table>

110 Regimen and Drug Doses

*Date: Date treatment started and doses, Change of doses (if any)

Date *	Z (mg)	Km (gm)	Ofx/Lfx (mg)	Eto (mg)	Cs (mg)	Cm (gm)	PAS (gm)
Date *	Clf (mg)	Amx/Clv (gm)	Trd (mg)	Lzd (mg)	Mfx (mg)	Other	Comments

111 Results of sputum Examination

[Notation method:

No AFB =0

1-9 AFB per 100 HPF= Scanty (report number of AFB)

10-99 AFB per 100 HPF= +

1-10 AFB per HPF= ++

>10 AFB=+++]

Month	Week	Date of sample collection	Result
0			
1	1		
	2		
	3		
	4		
2	1		
	2		
	3		
	4		
3	1		
	2		
	3		
	4		
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

112	Adverse Drug Reaction	Date	Adverse Drug Reaction	Suspected Drug	Measure Taken
113	Results of Culture [Notation Method: No growth reported=0 Fewer than 10 colonies=report number of colonies (1-9) 10-100 Colonies=+ More than 100 colonies=++ Innumerable or confluent growth=+++ Non-tuberculous mycobacteria= NTM Contaminated=contaminated]	Month	Date of sample collection	Result	
		0			
		1			
		2			
		3			
		4			
		5			
		6			
		7			
		8			
		9			
		10			
		11			
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		20			
		21			
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		23			
		24			

<table>
<tr>
<td>114</td>
<td>Drug Susceptibility Testing (DST) Results

[Notation:
R=Resistant
S=Susceptible
C=Contaminated
Unk=Unknown]

Method:
Xpert MTB/RIF……..1
Line Probe Assay (LPA2
Liquid Culture……...3
Solid Culture (L-J)……4</td>
<td colspan="2">
<table>
<tr><td>Method</td><td>Date</td><td>S</td><td>H</td><td>R</td><td>E</td><td>Km</td></tr>
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<tr><td>Method</td><td>Date</td><td>Ofx/Lfx</td><td>Eto</td><td>Other</td><td>Other</td><td>Other</td></tr>
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<tr>
<td>115</td>
<td>In which phase of the treatment are you currently on?</td>
<td>Injectable phase of 21 months regimen…1
Continuation phase of 21 months regimen…2
Injectable phase of 9 months regimen…3
Continuation phase of 9 months regimen…4</td>
<td>☐</td>
</tr>
<tr>
<td>116</td>
<td>How long are you on this phase of treatments?</td>
<td></td>
<td>Months ☐☐</td>
</tr>
<tr>
<td>117</td>
<td>HIV Status</td>
<td>Positive…….……1
Negative…….....……..2
Not Tested…...……3
Unknown……..4
Declined.…….5</td>
<td>☐</td>
</tr>
</table>

118	Final outcome (If treatment is completed)	Cured…….……1 Treatment completed....……..2 Died……...……3 Treatment failure……..4 Default.…….….5 Transfer Out……..……6	☐
119	Date of starting treatment		Day ☐☐ Month ☐☐ Year ☐☐
120	Date of completion of treatment		Day ☐☐ Month ☐☐ Year ☐☐

Section 2.0: Previous treatment

PATIENT INTERVIEW SECTION Start time: Hours |__|__|
Minutes |__|__|

No.	Questions and filters	Coding categories	Response	Skip
201	Have you ever had TB treatment before? CROSS-CHECK WITH INFORMATION FROM PATENT CARD	Yes……1 No…….2	☐	If 2 ► 301
202	What is your TB treatment history CROSS-CHECK WITH INFORMATION FROM PATENT CARD	Cat I Treatment failure……1 Cat II Treatment failure..…….2 Transfer to Cat-IV during non-MDR treatment……3 Treatment after default..……4 TB relapse…….5 Other……...6 Specify _____	☐	If 1,2,5 ► 301 If 3 ► 204
203	Your treatment card indicated that you had default treatment. Why was previous treatment not completed? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Distance to the facility		
		B. Lack of money for treatment costs		
		C. Drug Side Effects		
		D. Moved/Migrated		
		E. Other Please Specify_____		
204	If on Cat IV treatment, how long have you been on TB treatment before you were diagnosed with MDR-TB?		Months ☐☐	

Section 3: Delay, Prediagnostic & Diagnostic Costs

No.	Questions and filters	Coding categories	Response	Skip
301	What symptoms did you experience that led you to seek treatment for your most recent illness with TB? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	a. Cough		
		b. Evening rise of temperature/low grade fever		
		c. Coughing up blood		
		d. Weight loss		
		e. Other Specify_____		
302	How long did you experience these symptoms before you went to seek treatment? [*For each option, record number of weeks if mentioned yes in the previous question.]*	a. Cough	Weeks ☐☐	
		b. Evening rise of temperature/low grade fever	Weeks ☐☐	
		c. Coughing up blood	Weeks ☐☐	
		d. Weight loss	Weeks ☐☐	
		e. Other Specify_____	Weeks ☐☐	

Section 3.1 First Visit				
303	After you experienced the symptoms, which provider did you go to first?	Community Clinic…….……1 Union Subcenter……...……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….…5 Homoeopath……..……6 Private Hospital……..……..7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
304	What was the distance to the provider from your home?		Kilometer ☐☐	
305	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
306	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
307	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
308	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
309	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

310	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
311	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
312	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
313	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
314	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.2 Second Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
315	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE FIRST VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter……...……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
316	What was the distance to the provider from your home?		Kilometer ☐☐	
317	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
318	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
319	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
320	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
321	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

3322	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
323	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
324	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
325	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
326	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.4 Fourth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
339	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE THIRD VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter…….....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……...7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
340	What was the distance to the provider from your home?		Kilometer ☐☐	
341	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
342	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
343	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
344	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
345	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

346	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
347	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
348	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
349	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
350	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.5 Fifth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
351	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE FOURTH VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter…….....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……...7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
352	What was the distance to the provider from your home?		Kilometer ☐☐	
353	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
354	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
355	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
356	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
357	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

358	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
359	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
360	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
361	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
362	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.6 Sixth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
363	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE FIFTH VISIT'S PROVIDER TYPE*)	Community Clinic……..……1 Union Subcenter……...……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……..7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
364	What was the distance to the provider from your home?		Kilometer ☐☐	
365	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
366	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
367	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
3368	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
369	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

370	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
371	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
372	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
373	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
374	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.7 Seventh Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
375	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE SIXTH VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter……....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……...7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
376	What was the distance to the provider from your home?		Kilometer ☐☐	
377	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
378	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
379	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
380	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
381	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

382	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
383	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
384	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
385	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
386	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 3.8 Eighth Visit				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
387	Once you experience the symptoms to which provider did you go after you have seen the provider type _____? (*MENTION THE SEVENH VISIT'S PROVIDER TYPE*)	Community Clinic…….……1 Union Subcenter…….....……..2 Upazila Health Complex…..……3 District Hospital……..……..4 Pharmacy & Drug Store…….….5 Homoeopath……..……6 Private Hospital……..……...7 Traditional Healer…….8 Other……..……9 Specify_____	☐	
388	What was the distance to the provider from your home?		Kilometer ☐☐	
389	What was the travel time to reach this provider?		Hour ☐☐ Minute ☐☐	
390	What was the waiting and consultation time with the provider?		Hour ☐☐ Minute ☐☐	
391	What was the registration (ticket) cost paid by you? In TAKA	IF not known put 99999 IF no registration cost 000	☐☐☐☐☐	
392	What was the consultation fee you have paid? In TAKA	IF not known put 99999 IF no consultation fee 000	☐☐☐☐☐	
393	What was the cost you paid for diagnostic tests? In TAKA	IF not known put 99999 IF no cost for tests 000	☐☐☐☐☐	

394	What was the cost for x-ray? In TAKA	IF not known put 99999 IF no cost for x-ray 000		
395	What was the costs of drugs? In TAKA	IF not known put 99999 IF no cost for drugs 000		
396	What was travel costs? (INCLUDE ALL TRAVEL RELATED COSTS: RETURN TRAVEL, TRAVEL FOR LABORATIRY TESTS, DTUGS, COST FOR ACCOMPANYING PERSONS) In TAKA	IF not known put 99999 IF no travel cost 000		
397	What was the food costs? In TAKA	IF not known put 99999 IF no food cost 000		
398	What was cost for accommodation?	IF not known put 99999 IF no accommodation cost 000		

Section 4.0: Treatment Costs

Section 4.1 Cost Related to DOT				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
401	From where did you get your TB drugs?	Health facility…….……1 Home…….....……..2 Community……..……3 Pharmacy……..……..4 Workplace…….…….….5 Other……..……9 Specify_____	☐	
402	How often do you travel to the health facility / hospital for picking up your TB drugs?		Times/ month ☐☐	
403	How long does it take to go to the place for picking up the drugs (ONE WAY)?	A. On Foot	Hour ☐☐ Minute ☐☐	
		B. By Transport	Hour ☐☐ Minute ☐☐	
404	How long does one of these visits take on average, including time on the road and waiting time (total turnaround time)?		Hour ☐☐ Minute ☐☐	
405	From your home to the facility, how much does it cost if you take transport? (BOTH WAYS)	IF not known put 99999	☐☐☐☐☐	

406	If you go to a facility to pick up your drugs, how much do you spend on food on that day? (on the road, while waiting, lunch etc.)	IF not known put 99999	☐☐☐☐☐	
407	Do you have to pay administration fees when picking up your TB drugs?	Yes……1 No……2	☐	If 2 ► 409
408	What was the administration cost?	IF not known put 99999 IF no administration cost 000	☐☐☐☐☐	
409	Do you have to pay for accommodation when picking up your TB drugs?	Yes……1 No……2	☐	If 2 ► 411
410	What was the accommodation cost?	IF not known put 99999 IF no accommodation cost 000	☐☐☐☐☐	
Section 4.2 Cost related to Follow Up Tests				
411	Did you ever have to go to the health facility in addition to your regular visits for follow up tests since the beginning of treatment?	Yes……1 No……2	☐	If 2 ► 414
412	If yes, how many times?		Times ☐☐	
413	If yes, did you have to pay any additional costs any time during the entire period?	Yes……1 No……2	☐	If 2 ► 421
414	If so, what kind of costs and how much did you	A. Fees	☐☐☐☐☐	

	pay last time (In TAKA)? IF not known put 99999 IF no cost put 000	B. Sputum Test		
		C. X -ray		
		D. TB Drugs		
		E. Other Drugs		
		F. Others		
415	How long does one of these follow-up visits take on average, including time on the road, waiting time and tests (total turnaround time)?		Hour Minute	

Section 5.0: Cost related to accompanied persons (Friends/Guardian)

No.	Questions and filters	Coding categories	Response	Skip
501	Does any family/friend/DOT supporter accompany you on any visits before diagnosis and/or during diagnosis?	Yes……1 No…….2		If 2 ► 507
502	If YES, on how many visits has your family/friend/DOT supporter accompanied you or gone with you before diagnosis and/or during diagnosis?		Times	
503	What was the cost for pre-diagnosis/diagnosis visits of	A. Transport Cost		

	your accompanying person in Taka)? IF not known put 99999 IF no cost put 000	B. Food Cost		
		C. Accommodation Cost		
504	Does your accompanying person earn?	Yes……1 No…….2		If 2 ► 506
505	If earn, how much the person earn per day (in TAKA)?	IF not known put 99999		
506	Why did someone accompany you? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Distance		
		B. Security		
		C. Administrative barrier		
		D. Too ill to travel alone		
		E. Was required for treatment		
		F. Other Please Specify_____		
507	Does any family/friend/DOT supporter accompany you on any visits during treatment (taking drugs)?	Yes……1 No…….2		If 2 ► 601
508	If YES, on how many visits has your family/friend/DOT supporter accompanied you or gone with you during treatment?		Times	
509	What was the cost for visits of your accompanying person during your treatment in TAKA)?	A. Transport Cost		
		B. Food Cost		

	IF not known put 99999 IF no cost put 000	C. Accommodation Cost		
510	Does your accompanying person earn?	Yes……1 No…….2		If 2 ► 512
511	If earn, how much the person earn per day (In TAKA)?			
512	Why did someone accompany you? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Distance		
		B. Security		
		C. Administrative barrier		
		D. Too ill to travel alone		
		E. Was required for treatment		
		F. Other Please Specify_____		

Section 6.0: Hospitalization Costs

No.	Questions and filters	Coding categories	Response	Skip
601	Have you been hospitalized before (but due to TB) or during your TB treatment?	Yes……1 No…….2		If 2 ► 701
602	If YES, how many times were you hospitalized for this illness?		Times	
603	How much did you pay during your last stay at the hospital (In TAKA)?	A. Hospital Administration Fees		
		B. Hospital stay charges		

	IF not known put 99999 IF no cost put 000	C. Food (Not provided by the hospital)		
		D. Transport (Both Ways)		
		E. Drugs		
		F. Diagnostic Tests		
		G. Others		
604	Did any attendant/caregiver stay with you at the hospital?	Yes……1 No…….2		If 2 ► 701
605	If YES, how many days he/she stay with you (sleep there)?		Days	
606	Were there any extra costs for your relative/friend for staying at the hospital?	Yes……1 No…….2		If 2 ► 506
607	What was the cost for the accompanying person during your hospitalization (stayed at night)? In TAKA IF not known put 99999 IF no cost put 000	A. Transport Cost		
		B. Food Cost		
		C. Accommodation Cost		
		D. Other Cost		
608	Does your accompanying person earn?	Yes……1 No…….2 Don't Know…….3		If 2 /3 ► 610

609	If earn, how much the accompanying person earn per day? IF not known put 99999			
610	Did any other family/friend visit you while in hospital?	Yes……1 No…….2		If 2 ► 701
611	If YES, How many people visited you?		Days	
612	On an average, how many times did each of these person visit you?		Times	
613	What was the cost for EACH VISIT of them (IN TAKA)? IF not known put 99999 IF no cost put 000	A. Transport Cost		
		B. Food Cost		
		C. Accommodation Cost		
		D. Other Cost		
614	How long were the visits including traveling time?		Hour Minute	

Section 7.0: Other Costs, Other Illnesses and Coping Costs

Section 7.1 Other Costs				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
701	Did you buy any supplements for your diet because of the TB illness, for example vitamins, meat, energy drinks, soft drinks, fruits or medicines?	Yes……1 No……2	☐	If 2 ► 703
702	If YES, how much did you spend approximately on each of these items each month (in TAKA)? IF not known put 99999	A. Meat	☐☐☐☐☐	
		B. Fish	☐☐☐☐☐	
		C. Fruits	☐☐☐☐☐☐	
		D. Drinks	☐☐☐☐☐	
		E. Vegetables	☐☐☐☐☐	
		F. Vitamins/Herbs	☐☐☐☐☐	
		G. Others	☐☐☐☐☐	
703	Did you have to move to be able to receive (MDR) TB treatment?	Yes……1 No……2	☐	If 2 ► 705
704	If YES: how much did you pay for relocation? (In TAKA) IF not known put 99999		☐☐☐☐☐	

705	Did you experience any adverse events during the treatment of (MDR-) TB? (Adverse events are any additional health problems that occur during(MDR-) TB treatment and that may be related to the treatment)	Yes……1 No……2	☐	If 2 ► 708
706	If YES: Was treatment required of these events? This includes changes in TB drug regimen!	Yes……1 No……2	☐	
707	IF YES, How much did you spend on treatment of adverse events and/or changes in the TB drug regimen approximately?	A. Drugs	☐☐☐☐☐	
		B. Fees	☐☐☐☐☐	
		C. Transport	☐☐☐☐☐☐	
		D. Accommodation	☐☐☐☐☐	
		E. Costs borne by guardian/friends	☐☐☐☐☐	
		F. Others	☐☐☐☐☐	
Section 7.2 Other illnesses				
708	Do you have any chronic illness for which you are receiving treatment?	Yes……1 No……2	☐	If 2 ► 712
709	If YES, which disease do you have? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Diabetes		
		B. Heart Disease		
		C. High Blood Pressure		
		D. Cancer		
		E. Arthritis		
		F. Other Specify		

		G. Other Specify		
710	Are there any additional costs for you because of this other illness besides the costs that you have already mentioned?	Yes……1 No……2	☐	If 2 ► 712
711	If YES, how much are these additional costs on average per month? In TAKA IF not known put 99999	A. Drugs	☐☐☐☐☐☐	
		B. Diagnostic tests	☐☐☐☐☐	
		C. Transport	☐☐☐☐☐	
		D. Fees	☐☐☐☐☐	
		E. Others	☐☐☐☐☐	
712	How much did you spend on healthcare on average per month BEFORE the TB illness? In TAKA		☐☐☐☐☐	
713	How much did you spend on healthcare on average per month AFTER the TB illness? In TAKA		☐☐☐☐☐	
Section 7.3 Coping Costs				
714	Has your illness with TB resulted in a financial burden?	Yes……1 No……2	☐	
715	Did you borrow any money to cover costs due to the TB illness?	Yes……1 No……2	☐	If 2 ► 720
716	If YES, how much did you borrow? In TAKA	IF not known put 99999	☐☐☐☐☐	
		A. Family		

717	From whom did you borrow? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	B. Neighbor		
		C. Friend		
		D. Bank		
		E. Cooperative		
		F. NGO		
		G. Money lender		
		H. Others Specify_____		
718	Have you already paid back the borrowed money?	Yes……1 No……2	☐	If 2 ► 721
719	How are you planning to pay back the money?	In Full……1 In Installment..……..2	☐	If 2 ► 721
720	If you are paying in installment, what is the monthly installment? In TAKA	IF not known put 99999	☐☐☐☐☐	
721	Have you sold any of your property to finance the cost of the TB illness?	Yes……1 No……2	☐	If 2 ► 723
722	How much money did you get from the sale of each of these properties? IF not known put 99999	A. Land	☐☐☐☐☐	
		B. Livestock	☐☐☐☐☐	
		C. Transport/Vehicle	☐☐☐☐☐	
		D. Household item	☐☐☐☐☐	
		E. Farm produce	☐☐☐☐☐	

		F. Jewelry		
		G. Savings (FDR)		
		H. Other Specify		
723	Have you employed any household help for your illness?	Yes……1 No……2		If 2 ► 801
724	How much do you pay monthly to the household help? In TAKA	IF not known put 99999		

Section 8.0 Patient Income and Patient's Household Income

Section 8.1 Personal Income				
No.	**Questions and filters**	**Coding categories**	**Response**	**Skip**
801	Who is the primary income earner of the household?	Patient……..……1 Patient's Wife.……...……..2 Patient's Husband..……3 Patient's Mother……..4 Patient's Father……..…….5 Patient's Son….……..6 Patient's Daughter..……..…….7 Other ……...…….8 Specify_____	☐	
802	What is the highest level of Education (In years) of these individuals? [*For each option, record the number of years spent studying. if the person is illiterate/did not go to school record "0"*]	A. Patient		
		B. Primary Income Earner (If Other than patient)		
		C. Household Head (If Other than patient)		
		B. Spouse of Household Head (If Other than patient)		
803	Are you involved in income earning activities?	Yes, formal work……1 Yes, agricultural and other household work…….2 Yes, informal work……3 No……4	☐	If 4 ► 809

804	If No, why are you not involved in any income earning activities?	Cannot work due to illness …….1 Stopped working after contracting TB ……..……...……...……..2 Retired…….…….3 Student……...……...……..4 Other……...……5 Specify----------	☐	
805	Have you left your job due to your TB illness?	Yes…….……1 No……...……...……..2	☐	If 2 ► 809
806	If YES, how many months ago did you leave your job?		Months ☐☐	
807	What was your monthly income when you were working? In TAKA	IF not known put 99999	☐☐☐☐☐	
808	How regularly did you work before you became ill with TB?	Throughout the year…….…….1 Seasonal/part of the year……..2 Day Labor……...……3 Other……...……4 Specify----------	☐	

809	What was your main occupation before your illness with TB?	Service……..…….1 Agriculture…..……...……..2 Household work…...……3 Construction…….…….4 Garments worker……...……..5 Transport…...……..……6 Student…….…….7 Retired…...……...…….8 Other…….…...……9 Specify----------	☐	
810	Did you have to change jobs when you became ill with TB?	Yes…….……1 No……...……...……..2	☐	
811	What is your main occupation after your illness with TB?	Service…….…….1 Agriculture…..……...……..2 Household work…...……3 Construction…….…….4 Garments worker……...……..5 Transport…...……..……6 Student…….…….7 Retired…...……...…….8 Other…….…...……9 Specify----------	☐	
812	How many hours did you work on average per day BEFORE you became ill with TB?		Hours ☐☐	
813	How many hours do you work on average NOW per day?		Hours ☐☐	

814	If answer to 812 differs from answer to 813:Is the change related to the TB illness?	Yes……..……1 No……...……...……..2	☐	If 2 ► 818
815	What was your estimated personal income per month BEFORE the TB illness? In TAKA	IF not known put 99999	☐☐☐☐☐	
816	What is your estimated personal income per month NOW? In TAKA	IF not known put 99999	☐☐☐☐☐	
817	Is someone doing the work you used to do after your ilnness?	Spouse……..……1 Son……...……...……..2 Daughter……..…...……3 Friend…….……..……4 Nobody……...……...5 Other…….…...……9 Specify----------	☐	
818	Do you have children of or below school age?	Yes……..……1 No……...……...……..2	☐	If 2 ► 822
819	Are all of your children attending school regularly?	Yes……..……1 No……...……...……..2	☐	If 1 ► 822
820	Did your children go to school regularly before your recent illness with TB?	Yes……..……1 No……...……...……..2	☐	
821	If your children do not go to schoo1, indicate the reasons for not attending school regularly?	A. Needs to help around the house		
		B. No money for school fess		
		C. Also sick		
		D. Has to work to earn		

	[*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	E. Take care of patient		
		E. Other Specify_____		
822	Has the TB illness affected your social or private life in any way?	Yes…….……1 No……...……...……..2	☐	If 2 ► 823
823	If YES, how was your social life affected? [*For each option, record 1 if the option is mentioned and record 2 if the option has not been mentioned.]*	A. Divorce		
		B. Loss of job		
		C. Dropped out of school		
		D. Separated from spouse		
		E. Disruption of sexual life		
		F. Sick child		
		G. Other Specify_____		
824	What is your religion?	Islam…….…….1 Hindu……...……...……..2 Christian……..…...……3 Buddhism.…….…….4 Other…….…...……5 Specify----------	☐	
Section 8.2 Household Income				
825	How much do you estimate was the average income of your household per month BEFORE the TB illness? (for all persons in the house, including patient; includes	A. Patient's income	☐☐☐☐☐	
		B. Income of rest of the household	☐☐☐☐☐	
		C. Govt. assistance	☐☐☐☐☐	

	welfare payments, government assistance or other social support)? In TAKA IF not known put 99999	D. Other		
826	How much do you estimate was the average income of your household per month NOW? (for all persons in the house, including patient; includes welfare payments, government assistance or other social support)? In TAKA IF not known put 99999	A. Patient's income		
		B. Income of rest of the household		
		c. Govt. assistance		
		D. Other		
827	How many people regularly sleep in your house? (including patient)			
828	How many members of the household are employed for wage/salary? (including patient)			
829	Besides yourself, does anyone else of your household receive treatment for TB?	Yes……..……1 No……...……...……..2		If 2 ► 823
830	If YES, how many household members are suffering from TB?			

Section 9.0 Socioeconomic Indicators

Section 9.0 Questions about the household			RESPONSES	Skip
901	What is the **main** source of lighting for the household?	Electrical mains ..... 01 Solar electricity ..... 02 Generator ..... 03 Gas……..….04 Kerosine/Oil lamp ..... 05 Candles / Torch ..... 06 Coleman (Kerosene/Pressure lanterns)…….07 Improvised lamp ..... 08 Others ..... 96 *Specify* _____ No source of lighting 98	☐☐	
902	What is the **main** source of water for drinking and food preparation for the household?	Piped into household .....01 Piped to yard/plot .....02 Piped into neighborhood.....03 Protected well .....04 Unprotected well .....05 Protected Spring .....06 Unprotected Spring .....07 River/stream .....08 Pond/lake/dam .....10 Communal tank .....11 Rainwater.....12 Tank truck / Water cart.....13 Bottled water .....14 Other_____ .....96 (Specify) Not reported.....99	☐☐	
903	What type of fuel is **mainly** used in your household for cooking?	Gas..... 01 Stove with kerosene..... 02 Firewood..... 03 Charcoal ..... 04 Dung 05	☐☐	

		Electricity ..... 06 Biogas..... 07 Straw/shrubs/grass..... 08 Saw dust ..... 09 Others ..... 96 *Specify* _____		
904	What kind of toilet facility do people in your house **mainly** use?	Own flush toilet.....01 Shared flush toilet.....02 Ventilated improved pit latrine.....03 Pit latrine with slab.....04 Pit latrine without slab / open pit.....05 Bowl/Bucket system.....06 Closet oversea/river.....07 No facility/bush/seashore .....08 Other_____ ..... 96 (Specify) Not reported..... …. 99	☐☐	
905	Main material of the floor for the principal residence structure	**Natural Floor:** Earth .....11 Sand.....12 **Rudimentary:** Wood planks.....21 Palm/bamboo.....22 **Finished:** Polished wood .....31 Vinyl/asphalt strips.....32 Marble/Ceramic tiles .....33 Floor tile .....34 Cement / Concrete/ .....35 Brick.....36 Carpet .....37 Unpolished.....38 Other_____ ..... 96 (Specify) Not reported..... …. 99	☐☐	
906	Main material of the roof of the principal residence	**Natural roofing** No roof .....11 Thatch/palm leaf.....12 **Rudimentary roofing** Bamboo .....21 Wood planks.....22 Cardboard .....23 **Finished roofing** Tin / Metal .....31 Wood .....32 Ceramic Tiles 33	☐☐	

		Cement / Concrete .....34 Other_____ .....96 (Specify)		
907	Main material of the exterior walls of principal residence	**Natural Walls** No walls.....11 Cane/Palm/Trunks .....12 Dirt .....13 **Rudimentary walls** Bamboo with mud / matting .....21 Stone with mud.....22 Mud .....23 Fibro .....24 Plywood.....25 Cardboard .....26 **Finished walls** Tin / Metal sheets .....31 Cement / Concrete .....32 Brick.....31 Stone with lime/cement .....33 Bricks .....34 Wood planks/shingles.....35 Other_____ .....96 (Specify)	☐☐	
908	What type of fuel does your household mainly use for cooking?	ELECTRICITY . . . . . 01 LPG . . . . . 02 NATURAL GAS . . . . . 03 BIOGAS . . . . . 04 KEROSENE . . . . . 05 COAL, LIGNITE . . . . . 06 CHARCOAL . . . . . 07 WOOD . . . . . 08 STRAW/SHRUBS/GRASS . . . . . 09 AGRICULTURAL CROP . . . . . 10 ANIMAL DUNG . . . . . 11 NO FOOD COOKED IN HOUSEHOLD . . . . . 95 OTHER 96 (SPECIFY)	☐☐	If 95 ► 911

909	Is the cooking usually done in the house, in a separate building, or outdoors?	IN THE HOUSE . . . . . 1 IN A SEPARATE BUILDING . . . . . 2 OUTDOORS . . . . . 3 OTHER 6 (SPECIFY)	☐	
910	Do you have a separate room which is used as a kitchen?	Yes……1 No……..……..……..2	☐	
911	Does your household own any homestead?	Yes……1 No……..……..……..2	☐	

912	*Does your household or any member of the household own the items?*		Yes	No	Respon ses
	Electricity connection?	A. Electricity	1	2	
	Solar Electricity?	B. Solar electricity…….	1	2	
	A radio?	C. Radio.....	1	2	
	A television?	D. Television	1	2	
	A mobile phone?	E. Mobile phone	1	2	
	A non-mobile phone?	F. Non-mobile phone.....	1	2	
	A refrigerator?	G. Refrigerator	1	2	
	A DVD/VCD player?	H. DVD/VCD player.....	1	2	
	An electric fan?	I. Fan	1	2	
	An Almirah/wardrobe?	J. Almirah	1	2	
	A water pump	K. Water Pump	1	2	
	An IPS?Generator	L. Generator/IPS.....	1	2	
	An air conditioner	M. AC.....	1	2	
	A computer/laptop?	N. Computer/Laptop.....	1	2	
913	In your opinion, is your household a high income household, a middle income household or a poor household?	High income……1 Middle income…….2 Low income……..3			☐
914	How many people live in your household?	Total household size			☐☐
915	How many adult members (15 years or older)	Number of adults in the household			☐☐
916	How many children (less than 15 years)	Number of children in the household			☐☐

917	How many separate sleeping rooms are there for the use of your household members in your residence?	Number of rooms	☐☐
918	What is your current place of residence?	Urban……1 Urban slum…….…….2 Rural……..3 Other……..4 Specify_____	☐
919	If the government could provide you with some service to ease the burden of TB on you and your household, what would you prefer to have? DO NOT READ. INDICATE THE ITEMS MENTIONED. IF NOT IN THE LIST, ADD ANY NEW GOVT. SERVICE MENTIONED.	Transport vouchers..……1 Food vouchers……..…….2 More efficient service……..3 Other……..4 Specify_____	☐
920	How much would you be willing to pay for not becoming ill with TB in the first place? In TAKA	☐☐☐☐☐☐☐	

Section 10.0 Performance of the Facility

The next part of the survey is about the quality of TB care that you received during your visits to this facility. Please answer the questions in this part of the survey about this facility only. Do not include any other facilities in your answer.

No.	Questions and filters	Coding categories	Response	Skip
Section 10.1 Availability of TB Services				
1001	Are the waiting time(s) before being served by health providers of this facility acceptable to you?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1002	How often are you attended to by the same health providers in this facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1003	How often are the service hours of this facility inconvenient for you to get your TB treatment?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1004	How often are drugs not available when you require them?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1005	How often do you experience difficulties in obtaining TB services in this facility because of language barriers?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	

1006	How often do you have to go to another health unit for TB services or treatment?	Never…….…….1 Sometimes……...……..2 Usually……...……3 Always…..……..4	☐	
1007	Is this health facility easy to reach (distance)?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1008	How often are TB services available during the working hours of this facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1009	How often are the relevant health providers you come to see in this facility available?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
Section 10.2 Communication and Information				
1010	Do the health providers in this facility tell you when you stop spreading TB to others?	Yes…….1 No……...……...2	☐	
1011	Do the health providers in this facility tell you that TB can be cured?	Yes…….1 No……...……...2	☐	
1012	Do the health providers in this facility tell you about the importance of observed treatment?	Yes…….1 No……...……...2	☐	
1013	Do the health providers in this facility tell you about the side effects of TB drugs?	Yes…….1 No……...……...2	☐	

1014	Do the health providers in this facility tell you about the need for sputum tests at given points during your treatment schedule?	Yes…….1 No……..……...2	☐	
1015	Do the health providers in this facility tell you about the duration of the TB treatment?	Yes…….1 No……..……...2	☐	
1016	During your visits to this facility, do health providers tell you about how to store your drugs obtained for your treatment?	Yes…….1 No……..……...2	☐	
1017	Does the health provider in this facility tell you when next to come back for TB services?	Yes…….1 No……..……...2	☐	
Section 10.3 Patient – Provider interaction and counselling				
1018	During your visits to this facility, how often does the health provider treat you with respect?	Never……1 Sometimes……...2 Usually……..…….3 Always…..…….4	☐	
1019	During your visits to this facility, how often does the health provider listen carefully to you?	Never……1 Sometimes……...2 Usually……..…….3 Always…..…….4	☐	
1020	During your visits to this facility, how often do health providers explain things in a way you can understand?	Never……1 Sometimes……...2 Usually……..…….3 Always…..…….4	☐	

1021	During your visits to this facility, how often do you have sufficient time to discuss your problems?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1022	During your visits to this facility, how often do health providers discuss with you how to deal with your problems?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1023	During your visits to this facility, how often do you experience discrimination because you have TB?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1024	During your visits to this facility, how often is your privacy respected during examination?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1025	Do health providers at this facility tell you how TB can affect your every day life?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
Section 10.4 Infrastructure				
1026	How often is this facility clean?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	

1027	Is there safe drinking water in this facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4		
1028	How often are the toilets in this facility usable?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4		
1029	How often do you find enough comfortable places to sit on in this facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4		
Section 10.5 Professional Competence				
1030	Does this facility offer services to examine your sputum?	Yes…….1 No……...……...2		
1031	Does this facility offer home based TB treatment?	Yes…….1 No……...……...2		
1032	Were you physically examined during your first visit to this health facility?	Yes…….1 No……...……...2		
1033	Was your sputum examined when you were diagnosed with TB?	Yes…….1 No……...……...2		
1034	How many working days were there between your first sputum submission and the time you got your results?	0-2 Working days…….…….1 3-4 Working days ……...……..2 More than 5 Working days..…3		

1035	In case of germs in your sputum that cause TB, were your close contacts examined by the TB facility?	Yes…….1 No……..……...2	☐	
1036	How often is there a treatment observer checking on your daily intake of TB drugs?	Never……1 Sometimes……...2 Usually……..…….3 Always….…….4	☐	
Section 10.6 Affordability				
1037	How often do you have to pay for your regular TB services (e.g. sputum tests, TB-drugs, X-rays, etc.)?	Never……1 Sometimes……...2 Usually……..…….3 Always….…….4	☐	
1038	How often do you have to pay a tip in order to receive TB services?	Never……1 Sometimes……...2 Usually……..…….3 Always….…….4	☐	
1039	How often do costs (e.g. transport) prevent you from getting to the health facility?	Never……1 Sometimes……...2 Usually……..…….3 Always….…….4	☐	
Section 10.7 Support				
1040	How often do you receive transport support from the health facility?	Never……1 Sometimes……...2 Usually……..…….3 Always….…….4	☐	

1041	How often do you receive food support from the health facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1042	How often do you receive financial assistance from the health facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
Section 10.8 Stigma				
1043	Does the health provider talk to you the same way you are spoken to when you receive services other than TB?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1044	Does the health provider welcome you into the health facility when you visit for TB services?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1045	Does the health provider turn his/her face away when speaking with you?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	
1046	Do you feel that you are treated with dignity when you visit the health facility?	Never……1 Sometimes……...2 Usually……...…….3 Always…..…….4	☐	

Section 11.0 Quality of Life

Section 11.1 Health Related Quality of Life (FACIT-TB Questionnaire)

How would you describe your level of feeling for the following statements: (record the number in the right column)		Not At All	Slightly	Moderately	Quite A Bit	Extremely	Response
A. Physical well-being							
1101	I feel ill	1	2	3	4	5	
1102	I get tired easily	1	2	3	4	5	
1103	I have a lack of energy	1	2	3	4	5	
1104	I have pain	1	2	3	4	5	
1105	I feel weak all over	1	2	3	4	5	
1106	I feel fatigued	1	2	3	4	5	
1107	I have been short of breath	1	2	3	4	5	
1108	I have nausea-"a sense of vomiting outbreak"	1	2	3	4	5	
1109	Because of my physical condition, I have trouble meeting the needs of my family	1	2	3	4	5	
1110	I am bothered by fever (episode of high body temperature)	1	2	3	4	5	
1111	I am forced to spend time in bed	1	2	3	4	5	
1112	I have discomfort or pain in my stomach area	1	2	3	4	5	
1113	I have had itching	1	2	3	4	5	

1114	I have a loss of appetite	1	2	3	4	5	
1115	I have been coughing	1	2	3	4	5	
1116	I am bothered by side effects of treatment	1	2	3	4	5	
1117	Dusts Worsen my symptoms	1	2	3	4	5	
B. Social and economic well-being							
1118	I feel close to my friends	1	2	3	4	5	
1119	I get emotional support from my family	1	2	3	4	5	
1120	I am satisfied with my family communication about my illness	1	2	3	4	5	
1121	My family has accepted my illness	1	2	3	4	5	
1122	I feel close to my partner (or the person who is my main support)	1	2	3	4	5	
1123	I get support from my friends	1	2	3	4	5	
1124	My physical condition and/or medical treatment cause me financial difficulties	1	2	3	4	5	
C. Emotional well-being/Stigma of having TB							
1125	I worry that my condition will get worse	1	2	3	4	5	
1126	I worry about dying	1	2	3	4	5	
1127	I am concerned about what the future holds for me	1	2	3	4	5	
1128	I am embarrassed by my illness	1	2	3	4	5	

1129	It is hard to tell other people about my infection	1	2	3	4	5	
1130	I am losing hope in the fight against my illness	1	2	3	4	5	
1131	I am bothered by the change in weight	1	2	3	4	5	
1132	I worry about spreading my infection	1	2	3	4	5	
1133	I feel nervous	1	2	3	4	5	
1134	I feel sad	1	2	3	4	5	
1135	I am satisfied with how I am coping with my illness	1	2	3	4	5	
D. Functional well-being							
1136	I am content with the quality of my life right now	1	2	3	4	5	
1137	My work (include work at home) is fulfilling	1	2	3	4	5	
1138	I am able to work (include work at home)	1	2	3	4	5	
1139	I am able to enjoy life	1	2	3	4	5	
1140	I am enjoying the things I usually do for fun	1	2	3	4	5	
1141	I have accepted my illness	1	2	3	4	5	
1142	I am sleeping well	1	2	3	4	5	
E. Spiritual well-being							
1143	I find strength in my faith or spiritual belief	1	2	3	4	5	
1144	My illness has strengthened my faith or spiritual belief	1	2	3	4	5	

1145	My life is still productive	1	2	3	4	5	

Section 11.2 EQ-5D-5L Questionnaire

Under each heading, please tick the ONE box that best describes your health TODAY.

Sl	Category	Options	Response
1146	Mobility	I have no problems in walking about.....1 I have slight problems in walking about.....2 I have moderate problems in walking about.....3 I have severe problems in walking about.....4 I am unable to walk about.....5	☐
1147	Self-Care	I have no problems washing or dressing myself.....1 I have slight problems washing or dressing myself.....2 I have moderate problems washing or dressing myself....3 I have severe problems washing or dressing myself.....4 I am unable to wash or dress myself.....5	☐
1148	Usual Activities (e.g., work, study, housework, family or leisure activities)	I have no problems doing my usual activities.....1 I have slight problems doing my usual activities.....2 I have moderate problems doing my usual activities.....3 I have severe problems doing my usual	☐

		activities.....4 I am unable to do my usual activities.....5	
1149	Pain/Discomfort	I have no pain or discomfort.....1 I have slight pain or discomfort.....2 I have moderate pain or discomfort.....3 I have severe pain or discomfort.....4 I have extreme pain or discomfort.....5	☐
1150	Anxiety/Depression	I am not anxious/depressed.....1 I am slightly anxious/depressed.....2 I am moderately anxious/depressed.....3 I am severely anxious/depressed.....4 I am extremely anxious/depressed.....5	☐
Section 11.3 SF-6D Questionnaire			
Under each heading, please tick the ONE box that best describes your health TODAY.			
Sl	**Category**	**Options**	**Response**
1151	Physical Functioning	My health does not limit me in vigorous activities.....1 My health limits me a little in vigorous activities.....2 My health limits me a little in moderate activities.....3	☐

		My health limits me a lot in moderate activities.....4 My health limits me a little in bathing and dressing.....5 My health limits me a lot in bathing and dressing.....6	
1152	Role Limitation	I have no problems with your work or other regular daily activities as a result of your physical health or any emotional problems.....1 I am limited in the kind of work or other activities as a result of your physical health.....2 I accomplish less than you would like as a result of emotional problems.....3 You are limited in the kind of work or other activities as a result of your physical health and accomplish less than you would like as a result of emotional problems.....4	☐
1153	Social Functioning	My health limits my social activities none of the time.....1 My health limits my social activities a little of the time.....2 My health limits my social activities some of the time.....3 My health limits my social activities most of the time.....4 My health limits my social activities all of the time.....5	☐
1154	Pain	I have no pain.....1 I have pain, but it does not interfere with my normal	☐

		work (both outside the home and housework)..... ..2 I have pain that interferes with your normal work (both outside the home and housework) a little bit.....3 I have pain that interferes with your normal work (both outside the home and housework) moderately..... ..4 I have pain that interferes with your normal work (both outside the home and housework) quite a bit.....5 I have pain that interferes with your normal work (both outside the home and housework) extremely..... .6	
1155	Mental Health	I feel tense or downhearted and low none of the time.....1 I feel tense or downhearted and low a little of the time.....2 I feel tense or downhearted and low some of the time.....3 I feel tense or downhearted and low most of the time.....4 I feel tense or downhearted and all of the time.....5	☐
1156	Vitality	I have a lot of energy all of the time.....1 I have a lot of energy most of the time.....2 I have a lot of energy some of the time.....3 I have a lot of energy a little of the time…….....4 I have a lot of energy none of the time…….....5	☐

Section 11.4 Visual Analog Scale

1157 Visual Analog Scale Score

1158	*Comments by interviewer on the interview*

1159	**INTERVIEWERS: CHECK YOUR FILLED IN QUESTIONNAIRE CAREFULLY BEFORE LEAVING THE RESPONDENTS AND END YOUR INTERVIEW BY GIVING THANKS TO THE RESPONDENT.**

RECORD THE END TIME OF THE INTERVIEW: Hour ☐☐ ☐☐ Minutes

APPENDIX D – PROVIDER QUESTIONNAIRE (DS-TB)

IDENTIFICATION	
DIVISION_____	☐☐
DISTRICT_____	☐☐
UPAZILA _____	☐☐
NAME OF THE FACILITY_____	☐☐
TYPE OF THE FACILITY_____ (Union Health Center =01, Upazila Health Complex =02, District Hospital =03)	☐☐
TYPE OF THE PROVIDER_____ (BRAC =01, Damien Foundation =02, Other =03, Please specify)	☐
NAME OF THE MANAGER_____	
LOCATION OF FACILITY: RURAL=1, URBAN=2	

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE				
INTERVIEWER'S NAME & CODE				CODE
RESULT CODE*				RESULT CODE
NEXT VISIT: DATE TIME				TOTAL NO. OF VISITS

***RESULT CODES:**

01 COMPLETED
02 NOT AVAILABLE
03 POSTPONED
04 REFUSED
05 PARTLY COMPLETED
96 OTHER_____
(SPECIFY)

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME_____ DATE _____	NAME_____ DATE _____	NAME_____ DATE _____	NAME_____ DATE _____

Section 1: Number of Personnel, their salary, and contribution to the TB Control Program

Collect data based on each staff working on the day of data collection during day-shift (9:00am- 5:00pm). This table is for collecting information on TB clinics open on day of the interview.

USE DECIMAL POINTS TO INDICATE PART-TIME WORK. FOR EXAMPLE, IF AN INDIVIDUAL WORKS IN TWO CLINICS, RECORD 0.5 FOR THIS PERSON IN BOTH

	A		B	C	D	E	F	G	H
SL#	**DESIGNATION**	**Number Employed**	**Monthly Salary**	**Monthly Benefits**	**TA/DA**	**Overtime**	**Incentive Payment**	**Total**	**% involvement with TB program**
101	Civil Surgeon								
102	Junior Consultant (Chest Clinic)								

103	Upazila Health and Family Planning Officer (UHFPO)								
104	Medical Officer (TB/Leprosy) Designated								
105	Medical Officer Chest Disease Clinic								
106	Medical Officer Disease Control (MODC)								
107	Medical Officer, NGOs								
108	Program Organizer								
109	Medical Technologist (Laboratory)								
110	Health Inspector								
111	Assistant Health Inspector								
112	Family Planning Inspector								
113	Health Assistant (HA)								
114	Medical Assistant (MA)								
115	NGO Community Health Workers								

116	Leprosy and TB Control Assistant								
117	Statistical Assistant								
118	Gene Xpert Technician								
119	Community Health Worker (CHW)								
120									
121									
122									
123									
124									
125									
126									
127									
128									
129									

130													

Section 2.0 Caseload (Number of New Patients Diagnosed, Number of Patients treated)

Please collect these information from Quarterly TB case finding reporting form (TB-10)

SL.	**Indicator**	**Number**											
		Quarter1 (Oct 2015-Dec 2015)			**Quarter 2 (Jan 2016-March 2016)**			**Quarter 3 (April 2016-June 2016)**			**Quarter 4 (July 2016-September 2016)**		
		Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
	TB Case Detection Rate	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
201	Total new pulmonary smear-positive cases notified												
202	Total new (relapses) smear positive cases notified												
203	Total new (failures) smear positive cases notified												
204	Total new (loss to follow up/after default) smear positive cases notified												
205	Xpert MTB/RIF positive RIF sensitive new cases												
206	Xpert MTB/RIF positive RIF sensitive previously treated cases												
207	Total new pulmonary smear-negative cases notified												
208	Total new extrapulmonary cases notified												
209	Total others previously treated* cases notified												
210	Total cases registered												

	Laboratory Activity (Sputum Smear Microscopy)												
211	Number of presumptive TB cases/suspects examined for diagnosis by sputum smear microscopy												
212	Number of presumptive TB cases/suspects with positive sputum smear microscopy												
	Laboratory Activity (GeneXpert Test)												
213	Number of presumptive TB cases/suspects examined for diagnosis by Xpert MTB/RIF												
214	Number of presumptive TB cases/suspects with positive Xpert MTB/RIF result												
	HIV Activities												
214	Number of People living with HIV/AIDS (PLHWA) tested for Acid Fast Bacilli (AFB)												
215	Number of AFB positive result among tested PLWHA												

Section 3.0 TB Patient Referral

Please enumerate the number of TB patients referred by different providers using TB Form-10

Sl.	TB Patient Referral	Number			
		Quarter 1	Quarter 2	Quarter 3	Quarter 4
		A	B	C	D
301	Private Practitioner (Graduate)				
302	Private Practitioner (Non-Graduate)				
303	Govt. field staff				
304	Shasthya Sebika (SS)/ Non-govt. field staff (NGFS)				
305	Village Doctor (VD)				
306	Community Volunteer (CV)				
307	Govt. Hospital				
308	Private Hospital				
309	Community Health Care Provider (CHCP)				
310	TB Patient				
311	Others (Please specify)				
312	Total				

Section 4.0 Treatment outcomes (TB Patients Registered 3-6 Months Earlier)

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
401	Smear Positive																	
402	Xpert MTB/RIF Positive																	
403	Smear Negative																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
404	Relapses																	
405	Treatment after failure																	
406	Treatment after loss to follow up/Default																	
407	Others																	
408	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
409	Smear Positive																	
410	Xpert MTB/RIF Positive																	
411	Smear Negative																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
412	Relapses																	
413	Treatment after failure																	
414	Treatment after loss to follow up/Default																	
415	Others																	
416	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
417	Smear Positive																	
418	Xpert MTB/RIF Positive																	
419	Smear Negative																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
420	Relapses																	
421	Treatment after failure																	
422	Treatment after loss to follow up/Default																	
423	Others																	
424	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
425	Smear Positive																	
426	Xpert MTB/RIF Positive																	
427	Smear Negative																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 3-6 MONTHS EARLIER (USING TB-12 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
428	Relapses																	
429	Treatment after failure																	
430	Treatment after loss to follow up/Default																	
431	Others																	
432	Total																	

Section 5.0 Treatment outcomes (TB Patients Registered 12-15 Months Earlier)
Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONRY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Cured		Treatment Completed		Died		Failure		Lost to Follow-up/Defaulted		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
501	Smear Positive																	
502	Xpert MTB/RIF Positive																	
503	Smear Negative																	
504	EP																	
506	Total																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
507	Relapses																	
508	Failures																	
509	Treatment after loss to follow up/default																	
510	Others																	
511	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONRY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Cured		Treatment Completed		Died		Failure		Lost to Follow-up/Defaulted		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
501	Smear Positive																	
502	Xpert MTB/RIF Positive																	
503	Smear Negative																	
504	EP																	
506	Total																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
507	Relapses																	
508	Failures																	
509	Treatment after loss to follow up/default																	
510	Others																	
511	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONRY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Cured		Treatment Completed		Died		Failure		Lost to Follow-up/Defaulted		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
501	Smear Positive																	
502	Xpert MTB/RIF Positive																	
503	Smear Negative																	
504	EP																	
506	Total																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
507	Relapses																	
508	Failures																	
509	Treatment after loss to follow up/default																	
510	Others																	
511	Total																	

Quarter |__|__| Year |__|__|

PLEASE COMPLETE THIS TABLE FOR PULMONRY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Cured		Treatment Completed		Died		Failure		Lost to Follow-up/Defaulted		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	New Cases	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
501	Smear Positive																	
502	Xpert MTB/RIF Positive																	
503	Smear Negative																	
504	EP																	
506	Total																	

PLEASE COMPLETE THIS TABLE FOR PULMONARY TB PATIENTS REGISTERED 12-15 MONTHS EARLIER (USING TB-11 FORM)

Sl.	Type of Patients	Smear Negative		Smear Positive		Died		Failure		Lost to Follow-up		Transferred Out		Not Evaluated		Grand Total		
	M= Male F=Female	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	Total
	Retreatment	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
507	Relapses																	
508	Failures																	
509	Treatment after loss to follow up/default																	
510	Others																	
511	Total																	

Section 6.0 Quantity and Cost of Drugs

Number of TB Drugs received by the facility last year (January 2016- December 2016-PLEASE CONSULT LAST TWO REQUISITION FORM TB-08)

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity measures	Quantity received from National TB Control Program (NTP) (units) CAT I Patients	Quantity received from National TB Control Program (NTP) (units) CAT II Patients	Total received in this quarter	Market price of drugs per unit
		A	B	C	D	E
601	4FDC					.
602	3FDC (R150/H75/E275)					.
603	2 FDC (R150/H75)					.
604	3 FDC (R60/H30/Z150) (Dispersible)					.
605	2FDC (R60/H60) (Dispersible)					.
606	2FDC (R60/H30) (Dispersible)					.
607	Z 400 mg (Dispersible)					.
608	H 100 mg (Dispersible)/For IPT					.
609	R 150 mg					.
610	H 300 mg					.
611	R 450 mg					.
612	Z 500 mg					.
613	E 400 mg					.

614	E 100 mg						.	
615	S 1g						.	
616	Inj. Water, 5 ml						.	
617	D/ Syringe 5 cc						.	
618	DST Liquid culture						.	
619	DST Solid Culture						.	
620							.	
621							.	
622							.	
623							.	
624							.	
625							.	

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients	Quantity received from National TB Control Program (NTP) (units) for CAT II Patients	Total received in this quarter
		E	F	G
601	4FDC			
602	3FDC (R150/H75/E275)			
603	2 FDC (R150/H75)			
604	3 FDC (R60/H30/Z150) (Dispersible)			

605	2FDC (R60/H60) (Dispersible)			
606	2FDC (R60/H30) (Dispersible)			
607	Z 400 mg (Dispersible)			
608	H 100 mg (Dispersible)/For IPT			
609	R 150 mg			
610	H 300 mg			
611	R 450 mg			
612	Z 500 mg			
613	E 400 mg			
614	E 100 mg			
615	S 1g			
616	Inj. Water, 5 ml			
617	D/ Syringe 5 cc			
618	DST Liquid culture			
619	DST Solid Culture			
620				
621				
622				
623				
624				
625				

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients	Quantity received from National TB Control Program (NTP) (units) for CAT II Patients	Total received in this quarter
		H	I	J
601	4FDC			
602	3FDC (R150/H75/E275)			
603	2 FDC (R150/H75)			
604	3 FDC (R60/H30/Z150) (Dispersible)			
605	2FDC (R60/H60) (Dispersible)			
606	2FDC (R60/H30) (Dispersible)			
607	Z 400 mg (Dispersible)			
608	H 100 mg (Dispersible)/For IPT			
609	R 150 mg			
610	H 300 mg			
611	R 450 mg			
612	Z 500 mg			
613	E 400 mg			
614	E 100 mg			
615	S 1g			
616	Inj. Water, 5 ml			

617	D/ Syringe 5 cc																							
618	DST Liquid culture																							
619	DST Solid Culture																							
620																								
621																								
622																								
623																								
624																								
625																								

Quarter |__|__| **Year** |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients						Quantity received from National TB Control Program (NTP) (units) for CAT II Patients						Total received in this quarter					
		K						L						M					
601	4FDC																		
602	3FDC (R150/H75/E275)																		
603	2 FDC (R150/H75)																		
604	3 FDC (R60/H30/Z150) (Dispersible)																		
605	2FDC (R60/H60) (Dispersible)																		
606	2FDC (R60/H30) (Dispersible)																		

607	**Z 400 mg (Dispersible)**																							
608	**H 100 mg (Dispersible)/For IPT**																							
609	**R 150 mg**																							
610	**H 300 mg**																							
611	**R 450 mg**																							
612	**Z 500 mg**																							
613	**E 400 mg**																							
614	**E 100 mg**																							
615	**S 1g**																							
616	**Inj. Water, 5 ml**																							
617	**D/ Syringe 5 cc**																							
618	**DST Liquid culture**																							
619	**DST Solid Culture**																							
620																								
621																								
622																								
623																								
624																								
625																								

Section 7.0 Quantity and Cost of Laboratory Reagents/Supplies/Equipment

Number of Laboratory reagents/ supplies received by the facility last year (October 2015-September 2016- Laboratory Request Form)
Quarter 4 (July 2016- September 2016)

SL#	Reagent/Lab supplies' name	Quantity measures per patient	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter	Market price of reagents per unit
		A	B	C	D	E
701	Carbol fuchsin (1%) Solution	3.0 ml /sm+				.
702	Methylene Blue (0.1%)	3.0 ml/sm+				.
703	Sulphuric Acid (25%)	6.0 ml/sm+				.
704	Burning Spirit	1.5 ml/sm+				.
705	Slides	1 pc/sm+				.
706	Sputum Containers	1 pc/sm+				.
707	Immersion Oil	0.05 ml/sm+				.
711	Filter Paper Pieces	100 pc/ clinic				.
712	Request Form (TB 05)	1 pc/person				.
713	Lab Register (TB 04)					.
714	Diamond Pencil					.
715	Slide Box					.
716						.
717						.
718						.
719						.

720						.	
721						.	
722						.	

Quarter 3 (April 2016- June 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		F	G	H
701	Carbol fuchsin (1%) Solution			
702	Methylene Blue (0.1%)			
703	Sulphuric Acid (25%)			
704	Burning Spirit			
705	Slides			
706	Sputum Containers			
707	Immersion Oil			
708	Filter Paper Pieces			
709	Request Form (TB 05)			
710	Lab Register (TB 04)			
711	Diamond Pencil			
712	Slide Box			
713	Filter Paper Pieces			
714				
715				

716				
717				
718				
719				
720				
721				
722				

Quarter 2 (January 2016- March 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		I	J	K
701	Carbol fuchsin (1%) Solution			
702	Methylene Blue (0.1%)			
703	Sulphuric Acid (25%)			
704	Burning Spirit			
705	Slides			
706	Sputum Containers			
707	Immersion Oil			
708	Filter Paper Pieces			
709	Request Form (TB 05)			
710	Lab Register (TB 04)			

711	Diamond Pencil																			
712	Slide Box																			
713	Filter Paper Pieces																			
714																				
715																				
716																				
717																				
718																				
719																				
720																				
721																				
722																				

Quarter 1 (October 2016- December 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		L	M	N
701	Carbol fuchsin (1%) Solution			
702	Methylene Blue (0.1%)			
703	Sulphuric Acid (25%)			
704	Burning Spirit			
705	Slides			

706	**Sputum Containers**																
707	**Immersion Oil**																
708	**Filter Paper Pieces**																
709	**Request Form (TB 05)**																
710	**Lab Register (TB 04)**																
711	**Diamond Pencil**																
712	**Slide Box**																
713	**Filter Paper Pieces**																
714																	
715																	
716																	
717																	
718																	
719																	
720																	
721																	
722																	

Section 8.0 Cost of Other Supplies

Number of Supplies received by the facility last year (October 2015-September 2016)

Quarter 4 (July 2016- September 2016)

SL#	Supplies' name	Quantity measures	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter	Market price of supplies per unit
		A	B	C	D	E
801	TB Register					.
802	Treatment Card					.
803	Pen					.
804	Paper					.
805	Box					.
806	Soap					.
807	Towel					.
808	Boxes					.
809	Tape					.
810	Raincoat					.
811	Torch light					.
812	Umbrella					.
813	Drug Baskets					.
814	Kit Bag					.
815	Poster					.
816	Sticker					.
817	Leaflet					.
818	Flip chart					.

819	Flash Chart						.		
820	Brochure						.		
821							.		
822							.		
823							.		
824							.		
825							.		
826							.		
827							.		
828							.		
829							.		
830							.		

Quarter 3 (April 2016- June 2016)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		F	G	H
801	TB Register			
802	Treatment Card			
803	Pen			
804	Paper			
805	Box			
806	Soap			
807	Towel			

808	**Boxes**																			
809	**Tape**																			
810	**Raincoat**																			
811	**Torch light**																			
812	**Umbrella**																			
813	**Drug Baskets**																			
814	**Kit Bag**																			
815	**Poster**																			
816	**Sticker**																			
817	**Leaflet**																			
818	**Flip chart**																			
819	**Flash Chart**																			
820	**Brochure**																			
821																				
822																				
823																				
824																				
825																				
826																				
827																				
828																				
829																				
830																				

Quarter 2 (January 2016- March 2016)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		I	J	K
801	TB Register			
802	Treatment Card			
803	Pen			
804	Paper			
805	Box			
806	Soap			
807	Towel			
808	Boxes			
809	Tape			
810	Raincoat			
811	Torch light			
812	Umbrella			
813	Drug Baskets			
814	Kit Bag			
815	Poster			
816	Sticker			
817	Leaflet			
818	Flip chart			
819	Flash Chart			
820	Brochure			

821																				
822																				
823																				
824																				
825																				
826																				
827																				
828																				
829																				
830																				

Quarter 4 (October 2015- December 2015)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)						Quantity purchased from market (units)						Total received in this quarter					
		L						M						N					
801	**TB Register**																		
802	**Treatment Card**																		
803	**Pen**																		
804	**Paper**																		
805	**Box**																		
806	**Soap**																		
807	**Towel**																		
808	**Boxes**																		
809	**Tape**																		

810	**Raincoat**																			
811	**Torch light**																			
812	**Umbrella**																			
813	**Drug Baskets**																			
814	**Kit Bag**																			
815	**Poster**																			
816	**Sticker**																			
817	**Leaflet**																			
818	**Flip chart**																			
819	**Flash Chart**																			
820	**Brochure**																			
821																				
822																				
823																				
824																				
825																				
826																				
827																				
828																				
829																				
830																				

Section 9.0 Other Capital Items
Number of Items used by the facility

SL#	Capital Items	Quantity (Unit)	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total is being used	Life time (In Years)	Market price of item per unit
		A	B	C	D	E	F
901	Microscope						
902	GeneXpert						
903	Weight Scale						
904	Signboard						
905	Computer						
906	Printer						
907	Smart Phone						
908	App development						
909	Motor Cycle						
910	Bicycle						
911	Car						
912	Ambulance						
913							
914							
915							
916							
917							
918							
919							

Section 10. Other Costs

Section 10.1 Cost of Supervision (facility supervisory visits conducted in last year (October 2015-September 2016)

SL #	Title of person conducting supervisory visit	Number of visits in last year (Oct 2015-Sep 2016)	Duration of visit (total for all visits in days)	Per Diem (total)	Travel expenses (total)	Other expenses	What % of costs paid by facility?
	A	B	C	D	E	F	H
1001							
1002							
1003							
1004							

Section 10.2 Travel cost for Drug /Attending Meeting/Training

SL #	Title of person conducting travel	Number of travel in last year (Oct 2015-Sep 2016)	Purpose of the travel (Use Code from below)^	Duration of visit (total for all visits in days)	Per Diem (total)	Travel expenses (total)	Other expenses	What % of costs paid by facility?
	A	B	C	D	E	F	H	I
1005								
1006								
1007								
1008								

^Code: 1. Receiving drug 2. Attending Meetings 3. Training 4. Others (Please specify)

Section 10.3 Cost of Other Activities

No	Questions and Filters	Coding categories	Record Response	Skip
1009	Was Health education on TB organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1011**
1010	If Health education on TB was organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1011	Was DOTS committee meeting organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1013**
1012	If DOTS committee meeting was organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1013	Were Contact Tracing activities organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1015**
1014	If Contact Tracing activities were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1015	Were Refresher training activities organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1017**
1016	If Refresher training activities were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1017	Were Other meetings organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1019**
1018	If Other meetings were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1019	Were Incentive payments were provided to the providers by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1021**

1020	If incentive payments were given to the providers, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1021	Were Incentive payments were provided to the patients by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔1023**
1022	If incentive payments were given to the patients, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
1023	Were Incentive payments were provided to the community members by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔END**
1024	If incentive payments were given to the community members, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	

Thank you for your cooperation! Is there anything you would like to ask or say?

Comments by Interviewer:

Date, Signature by Interviewer:

APPENDIX E – PROVIDER QUESTIONNAIRE (MDR-TB)

IDENTIFICATION	
DIVISION _____	☐☐
DISTRICT_____	☐☐
UPAZILA _____	☐☐
NAME OF THE FACILITY_____	
TYPE OF THE FACILITY_____ (NIDCH =01, District Chest Hospital =02, Damien Foundation Hospital =03, Other=04, Please Specify)	☐☐
DRUG REGIMEN FOLLOWED_____ (21 Month Regimen=1, 9 Month Regimen=02)	☐☐
NAME OF THE MANAGER_____	
LOCATION OF FACILITY: RURAL=1, URBAN=2	☐

INTERVIEWER VISITS				
	1	2	3	FINAL VISIT
DATE				
INTERVIEWER'S NAME & CODE				CODE
RESULT CODE*				RESULT CODE
NEXT VISIT: DATE				TOTAL NO. OF VISITS
TIME				

***RESULT CODES:**

01 COMPLETED
02 NOT AVAILABLE
03 POSTPONED
04 REFUSED
05 PARTLY COMPLETED
96 OTHER_____
(SPECIFY)

SUPERVISOR	FIELD EDITOR	OFFICE EDITOR	KEYED BY
NAME_____ DATE _____	NAME_____ DATE _____	NAME_____ DATE _____	NAME_____ DATE _____

Section 1: Number of Personnel, their salary, and contribution to the MDR-TB Control Program

Collect data based on each staff working on the day of data collection during day-shift (9:00am- 5:00pm). This table is for collecting information on TB clinics open on day of the interview.

USE DECIMAL POINTS TO INDICATE PART-TIME WORK. FOR EXAMPLE, IF AN INDIVIDUAL WORKS IN TWO CLINICS, RECORD 0.5 FOR THIS PERSON IN BOTH

	A		B	C	D	E	F	G	H
SL#	**DESIGNATION**	**Number Employed**	**Monthly Salary**	**Monthly Benefits**	**TA/DA**	**Overtime**	**Incentive Payment**	**Total**	**% involvement with TB program**
101	Professor								
102	Associate Professor								

103	Assistant Professor								
104	Consultant								
105	Registrar								
106	Assistant Registrar								
107	Medical Officer								
108	HMO								
109	Staff Nurse								
110	Program Organizer								
111	Medical Technologist (Laboratory)								
112	Health Inspector								
113	Assistant Health Inspector								
114	Family Planning Inspector								
115	Health Assistant (HA)								
116	Medical Assistant (MA)								
117	NGO Community Health Workers								
118	Leprosy and TB Conrol Assistant								
119	Statistical Assistant								
120	Gene Xpert Technician								

121	Community Health Worker (CHW)								
122									
123									
124									
125									
126									
127									
128									
129									
130									

Section 2.0 Caseload (Number of New Patients Diagnosed, Number of Patients treated) last year (October 2015-September 2016)

PLEASE COMPLETE THIS TABLE FROM QUARTERLY REPORT ON DR TB CASE REGISTRATION (FORM DR TB 08)

Sl.		Quarter I			Quarter II			Quarter III			Quarter IV		
	M=Male F=Female	M	F	Total	M	F	Total	M	F	Total	M	F	Total
		A	B	C	D	E	F	G	H	I	J	K	L
201	MDR												
202	XDR												
203	RR												
204	Other DR												
205	Total (Confirmed DR TB)												
206	Presumptive DR TB												
207	Grand Total												

PLEASE COMPLETE THIS TABLE FROM QUARTERLY REPORT ON DR TB CASE REGISTRATION (FORM DR TB 08)

Sl.	Patient registered in DR TB Register	Quarter I	Quarter II	Quarter III	Quarter IV
	Confirmed DR TB	A	B	C	D
208	New				
209	Failure after CAT I				
210	Failure after CAT II				
211	Relapse after CAT II				
212	Relapse after CAT I				
213	Treatment after lost to follow up CAT II				
214	Treatment after lost to follow up CAT I				
215	Delayed Converters CAT II				
216	Delayed Converters CAT I				
217	Close Contact of DR TB with S/S				

218	Total				
	Pulmonary Diagnosed				
219	New				
220	Previously treated				
221	Unknown TB treatment history				
	Extrapulmonary				
222	New				
223	Previously treated				
224	Unknown TB treatment history				
225	Total				
	Grand Total				

Section 3.0 Xpert MTB/RIF Result

Please enumerate the number of MDR-TB patients detected last year (October 2015-September 2016) USINF DR TB FORM 10A

Sl.	**MDR-TB Patient Referral**	**Month**											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
301	**Number of total presumptive DR VTB cases tested**												
302	**Number of MTB detected Rif resistance not detected (T)**												
303	**Number of MTB detected Rif resistance detected (RR)**												
304	**Number of MTB detected Rif resistance indeterminate (TI)**												
305	**Number of MTB not detected (N)**												
306	**Number of invalid/no result/ error (I)**												

Section 4.0 Treatment outcomes (MDR-TB Patients got treatment 24 to 36 months earlier)

PLEASE COMPLETE THIS TABLE FOR MDR TB PATIENTS GOT TREATMENT 24 TO 36 MONTHS EARLIER USING DR TB FORM 09

Quarter |__|__| Year |__|__|

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
401	MDR											
402	XDR											
403	RR											
404	Other											
405	Presumptive DR TB											
406	Total											

TREATMENT OUTCOME ACCORDING TO THE REGISTRATION GROUP

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K

407	New											
408	Failure after CAT I											
409	Failure after CAT II											
410	Relapse after CAT II											
411	Relapse after CAT I											
412	Treatment after lost to follow up CAT II											
413	Treatment after lost to follow up CAT I											
414	Delayed Converters CAT II											
415	Delayed Converters CAT I											
416	Close Contact of DR TB with S/S											
	Pulmonary Diagnosed											
417	New											
418	Previously treated											
419	Unknown TB treatment history											
	Extrapulmonary											
420	New											
421	Previously treated											
422	Unknown TB treatment history											

PLEASE COMPLETE THIS TABLE FOR MDR TB PATIENTS GOT TREATMENT 24 TO 36 MONTHS EARLIER USING DR TB FORM 09

Quarter |__|__| Year |__|__|

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
401	MDR											
402	XDR											
403	RR											
404	Other											
405	Presumptive DR TB											
406	Total											

TREATMENT OUTCOME ACCORDING TO THE REGISTRATION GROUP

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
407	New											

408	Failure after CAT I											
409	Failure after CAT II											
410	Relapse after CAT II											
411	Relapse after CAT I											
412	Treatment after lost to follow up CAT II											
413	Treatment after lost to follow up CAT I											
414	Delayed Converters CAT II											
415	Delayed Converters CAT I											
416	Close Contact of DR TB with S/S											
	Pulmonary Diagnosed											
417	New											
418	Previously treated											
419	Unknown TB treatment history											
	Extrapulmonary											
420	New											
421	Previously treated											
422	Unknown TB treatment history											

PLEASE COMPLETE THIS TABLE FOR MDR TB PATIENTS GOT TREATMENT 24 TO 36 MONTHS EARLIER USING DR TB FORM 09

Quarter |__|__| Year |__|__|

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
401	MDR											
402	XDR											
403	RR											
404	Other											
405	Presumptive DR TB											
406	Total											

TREATMENT OUTCOME ACCORDING TO THE REGISTRATION GROUP

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
407	New											

408	Failure after CAT I											
409	Failure after CAT II											
410	Relapse after CAT II											
411	Relapse after CAT I											
412	Treatment after lost to follow up CAT II											
413	Treatment after lost to follow up CAT I											
414	Delayed Converters CAT II											
415	Delayed Converters CAT I											
416	Close Contact of DR TB with S/S											
	Pulmonary Diagnosed											
417	New											
418	Previously treated											
419	Unknown TB treatment history											
	Extrapulmonary											
420	New											
421	Previously treated											
422	Unknown TB treatment history											

PLEASE COMPLETE THIS TABLE FOR MDR TB PATIENTS GOT TREATMENT 24 TO 36 MONTHS EARLIER USING DR TB FORM 09

Quarter |__|__| Year |__|__|

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
401	MDR											
402	XDR											
403	RR											
404	Other											
405	Presumptive DR TB											
406	Total											

TREATMENT OUTCOME ACCORDING TO THE REGISTRATION GROUP

Sl.	Patient Group	Total number of DR TB patients registered during the quarter	Number of confirmed DR TB patients registered during the quarter	Cured	Treatment Completed	Failure	Died	Lost to follow up	Transferred Out	Still on Treatment	Not Evaluated	Total
		A	B	C	D	E	F	G	H	I	J	K
407	New											

408	Failure after CAT I											
409	Failure after CAT II											
410	Relapse after CAT II											
411	Relapse after CAT I											
412	Treatment after lost to follow up CAT II											
413	Treatment after lost to follow up CAT I											
414	Delayed Converters CAT II											
415	Delayed Converters CAT I											
416	Close Contact of DR TB with S/S											
	Pulmonary Diagnosed											
417	New											
418	Previously treated											
419	Unknown TB treatment history											
	Extrapulmonary											
420	New											
421	Previously treated											
422	Unknown TB treatment history											

Section 5.0 Quantity and Cost of Drugs

Number of TB Drugs received by the facility last year (January 2016- December 2016-PLEASE CONSULT LAST TWO REQUISITION FORM DR TB-09)

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity measures	Quantity received from National TB Control Program (NTP) (units) CAT I Patients	Quantity received from National TB Control Program (NTP) (units) CAT II Patients	Total received in this quarter	Market price of drugs per unit
		A	B	C	D	E
501	Pyrazinamide 500 mg Tab					.
502	Kanamycin 1 gm Vial (Only for IP)					.
503	Ethionamide 250 mg Tab					.
504	Cycloserine 250 mg Tab					.
505	Ofloxacin 400 mg Tab					.
506	Levofloxacin 250 mg Tab					.
507	Moxifloxacin 400 mg Tab					.
508	Clofazimine (Cfz 50 mg Tab)					.
509	Amox/Clav 500/125 mg Tab					.
510	Linezolid (Lzd)					.
511	Capreomycin 1 gm Vial (Only for IP)					.
512	PAS 4 gm sachet					.
513	Omeprazole 20 mg Tab					.

514	Domperidone 10 mg Tab					
515	Pyridoxine 25 mg Tab					
516	Multivitamin					
517	Alprazolam 0.5 mg					
518						
519						
520						
521						
522						
523	Others					
524	Syringe, 5 cc					
525	Distilled Water, 3 cc					
526						
527						
528						
529						
530						
531						
532						
533						
534						
535						

Quarter |__|__| **Year** |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients	Quantity received from National TB Control Program (NTP) (units) for CAT II Patients	Total received in this quarter
		E	F	G
501	Pyrazinamide 500 mg Tab			
502	Kanamycin 1 gm Vial (Only for IP)			
503	Ethionamide 250 mg Tab			
504	Cycloserine 250 mg Tab			
505	Ofloxacin 400 mg Tab			
506	Levofloxacin 250 mg Tab			
507	Moxifloxacin 400 mg Tab			
508	Clofazimine (Cfz 50 mg Tab)			
509	Amox/Clav 500/125 mg Tab			
510	Linezolid (Lzd)			
511	Capreomycin 1 gm Vial (Only for IP)			
512	PAS 4 gm sachet			
513	Omeprazole 20 mg Tab			
514	Domperidone 10 mg Tab			
515	Pyridoxine 25 mg Tab			
516	Multivitamin			

517	**Alprazolam 0.5 mg**																				
518																					
519																					
520																					
521																					
522																					
523	**Others**																				
524	**Syringe, 5 cc**																				
525	**Distilled Water, 3 cc**																				
526																					
527																					
528																					
529																					
530																					
531																					
532																					
533																					
534																					
535																					

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients	Quantity received from National TB Control Program (NTP) (units) for CAT II Patients	Total received in this quarter
		H	I	J
501	Pyrazinamide 500 mg Tab			
502	Kanamycin 1 gm Vial (Only for IP)			
503	Ethionamide 250 mg Tab			
504	Cycloserine 250 mg Tab			
505	Ofloxacin 400 mg Tab			
506	Levofloxacin 250 mg Tab			
507	Moxifloxacin 400 mg Tab			
508	Clofazimine (Cfz 50 mg Tab)			
509	Amox/Clav 500/125 mg Tab			
510	Linezolid (Lzd)			
511	Capreomycin 1 gm Vial (Only for IP)			
512	PAS 4 gm sachet			
513	Omeprazole 20 mg Tab			
514	Domperidone 10 mg Tab			
515	Pyridoxine 25 mg Tab			

516	**Multivitamin**																				
517	**Alprazolam 0.5 mg**																				
518																					
519																					
520																					
521																					
522																					
523	**Others**																				
524	**Syringe, 5 cc**																				
525	**Distilled Water, 3 cc**																				
526																					
527																					
528																					
529																					
530																					
531																					
532																					
533																					
534																					
535																					

Quarter |__|__| Year |__|__|

SL#	Drug name	Quantity received from National TB Control Program (NTP) (units) for CAT I Patients	Quantity received from National TB Control Program (NTP) (units) for CAT II Patients	Total received in this quarter
		K	L	M
501	Pyrazinamide 500 mg Tab			
502	Kanamycin 1 gm Vial (Only for IP)			
503	Ethionamide 250 mg Tab			
504	Cycloserine 250 mg Tab			
505	Ofloxacin 400 mg Tab			
506	Levofloxacin 250 mg Tab			
507	Moxifloxacin 400 mg Tab			
508	Clofazimine (Cfz 50 mg Tab)			
509	Amox/Clav 500/125 mg Tab			
510	Linezolid (Lzd)			
511	Capreomycin 1 gm Vial (Only for IP)			
512	PAS 4 gm sachet			
513	Omeprazole 20 mg Tab			
514	Domperidone 10 mg Tab			
515	Pyridoxine 25 mg Tab			

516	**Multivitamin**																						
517	**Alprazolam 0.5 mg**																						
518																							
519																							
520																							
521																							
522																							
523	**Others**																						
524	**Syringe, 5 cc**																						
525	**Distilled Water, 3 cc**																						
526																							
527																							
528																							
529																							
530																							
531																							
532																							
533																							
534																							
535																							

Section 7.0 Quantity and Cost of Laboratory Reagents/Supplies/Equipment

Number of Laboratory reagents/ supplies received by the facility last year (October 2015-September 2016- Laboratory Request Form)

Quarter 4 (July 2016- September 2016)

SL#	Reagent/Lab supplies' name	Quantity measures per patient	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter	Market price of reagents per unit
		A	B	C	D	E
601	Basic fuchsin	1 gm/sm+				.
602	Phenol crystals	5 gm/sm+				.
603	Methanol (or denatured ethanol)	10 ml/sm+				.
604	Methylene Blue	0.1 gm/sm+				.
605	Sulphuric Acid conc.	33 ml/sm+				.
606	Burning Spirit	50 ml/sm+				.
607	Slides	36 pcs/sm+				.
608	Sputum Containers	36 pcs/sm+				.
609	Bamboo Sticks	36 pcs/sm+				.
610	Immersion Oil	2 ml/sm+				.
611	Xylene	25 ml/sm+				.
612	Toilet Paper Rolls	3 rolls/clinic				.
613	Filter Paper Pieces	20 pcs/ clinic				.
614	Culture Media (Solid)					.
615	Culture Media (Liquid)					.

616						.
617						.
618						.
619						.
620						.
621						.
622						.

Quarter 3 (April 2016- June 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		F	G	H
601	Basic fuchsin			
602	Phenol crystals			
603	Methanol (or denatured ethanol)			
604	Methylene Blue			
605	Sulphuric Acid conc.			
606	Burning Spirit			
607	Slides			
608	Sputum Containers			
609	Bamboo Sticks			
610	Immersion Oil			
611	Xylene			
612	Toilet Paper Rolls			

613	Filter Paper Pieces																			
614																				
615																				
616																				
617																				
618																				
619																				
620																				
621																				
622																				

Quarter 2 (January 2016- March 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		I	J	K
601	Basic fuchsin			
602	Phenol crystals			
603	Methanol (or denatured ethanol)			
604	Methylene Blue			
605	Sulphuric Acid conc.			
606	Burning Spirit			
607	Slides			

608	**Sputum Containers**																				
609	**Bamboo Sticks**																				
610	**Immersion Oil**																				
611	**Xylene**																				
612	**Toilet Paper Rolls**																				
613	**Filter Paper Pieces**																				
614																					
615																					
616																					
617																					
618																					
619																					
620																					
621																					
622																					

Quarter 1 (October 2016- December 2016)

SL#	Reagent/Lab supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		L	M	N
601	**Basic fuchsin**			
602	**Phenol crystals**			

603	**Methanol (or denatured ethanol)**																
604	**Methylene Blue**																
605	**Sulphuric Acid conc.**																
606	**Burning Spirit**																
607	**Slides**																
608	**Sputum Containers**																
609	**Bamboo Sticks**																
610	**Immersion Oil**																
611	**Xylene**																
612	**Toilet Paper Rolls**																
613	**Filter Paper Pieces**																
614																	
615																	
616																	
617																	
618																	
619																	
620																	
621																	
622																	

Section 8.0 Cost of Other Supplies

Number of Supplies received by the facility last year (October 2015-September 2016)

Quarter 4 (July 2016- September 2016)

SL#	Supplies' name	Quantity measures	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter	Market price of supplies per unit
		A	B	C	D	E
701	TB Register					.
702	Treatment Card					.
703	Pen					.
704	Paper					.
705	Box					.
706	Soap					.
707	Towel					.
708	Boxes					.
709	Tape					.
710	Raincoat					.
711	Torch light					.
712	Umbrella					.
713	Drug Baskets					.
714	Kit Bag					.
715	Poster					.
716	Sticker					.
717	Leaflet					.
718	Flip chart					.

719	Flash Chart					.	
720	Brochure					.	
721						.	
722						.	
723						.	
724						.	
725						.	
726						.	
727						.	
728						.	
729						.	
730						.	

Quarter 3 (April 2016- June 2016)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		F	G	H
701	TB Register			
702	Treatment Card			
703	Pen			
704	Paper			
705	Box			
706	Soap			
707	Towel			

708	**Boxes**																			
709	**Tape**																			
710	**Raincoat**																			
711	**Torch light**																			
712	**Umbrella**																			
713	**Drug Baskets**																			
714	**Kit Bag**																			
715	**Poster**																			
716	**Sticker**																			
717	**Leaflet**																			
718	**Flip chart**																			
719	**Flash Chart**																			
720	**Brochure**																			
721																				
722																				
723																				
724																				
725																				
726																				
727																				
728																				
729																				
730																				

Quarter 2 (January 2016- March 2016)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total received in this quarter
		I	J	K
701	TB Register			
702	Treatment Card			
703	Pen			
704	Paper			
705	Box			
706	Soap			
707	Towel			
708	Boxes			
709	Tape			
710	Raincoat			
711	Torch light			
712	Umbrella			
713	Drug Baskets			
714	Kit Bag			
715	Poster			
716	Sticker			
717	Leaflet			
718	Flip chart			
719	Flash Chart			
720	Brochure			

721																					
722																					
723																					
724																					
725																					
726																					
727																					
728																					
729																					
730																					

Quarter 4 (October 2015- December 2015)

SL#	Supplies' name	Quantity received from National TB Control Program (NTP) (units)						Quantity purchased from market (units)						Total received in this quarter					
		L						M						N					
701	TB Register																		
702	Treatment Card																		
703	Pen																		
704	Paper																		
705	Box																		
706	Soap																		
707	Towel																		
708	Boxes																		
709	Tape																		

710	**Raincoat**																			
711	**Torch light**																			
712	**Umbrella**																			
713	**Drug Baskets**																			
714	**Kit Bag**																			
715	**Poster**																			
716	**Sticker**																			
717	**Leaflet**																			
718	**Flip chart**																			
719	**Flash Chart**																			
720	**Brochure**																			
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Section 8.0 Other Capital Items
Number of Items used by the facility

SL#	Capital Items	Quantity (Unit)	Quantity received from National TB Control Program (NTP) (units)	Quantity purchased from market (units)	Total is being used	Life time (In Years)	Market price of item per unit
		A	B	C	D	E	F
801	Microscope						
802	GeneXpert						
803	Weight Scale						
804	Signboard						
805	Computer						
806	Printer						
807	Smart Phone						
808	App development						
809	Motor Cycle						
810	Bicycle						
811	Car						
812	Ambulance						
813	LPA						
814	LJ						
815	MGIT						
816							
817							
818							
819							

Section 9. Other Costs

Section 9.1 Cost of Supervision (facility supervisory visits conducted in last year (October 2015-September 2016)

SL #	Title of person conducting supervisory visit	Number of visits in last year (Oct 2015-Sep 2016)	Duration of visit (total for all visits in days)	Per Diem (total)	Travel expenses (total)	Other expenses	What % of costs paid by facility?
	A	B	C	D	E	F	H
901							
902							
903							
904							

Section 9.2 Travel cost for Drug /Attending Meeting/Training

SL #	Title of person conducting travel	Number of travel in last year (Oct 2015-Sep 2016)	Purpose of the travel (Use Code from below)^	Duration of visit (total for all visits in days)	Per Diem (total)	Travel expenses (total)	Other expenses	What % of costs paid by facility?
	A	B	C	D	E	F	H	I
905								
906								
907								
908								

^Code: 1. Receiving drug 2. Attending Meetings 3. Training 4. Others (Please specify)

Section 9.3 Cost of Other Activities

No	Questions and Filters	Coding categories	Record Response	Skip
909	Was Health education on TB organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔911**
910	If Health education on TB was organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
911	Was DOTS committee meeting organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔913**
912	If DOTS committee meeting was organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
913	Were Contact Tracing activities organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔915**
914	If Contact Tracing activities were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
915	Were Refresher training activities organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔917**
916	If Refresher training activities were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
917	Were Other meetings organized by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔919**
918	If Other meetings were organized, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS ACTIVITY WAS NOT ORGANIZED AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
919	Were Incentive payments were provided to the providers by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔921**

920	If incentive payments were given to the providers, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
921	Were Incentive payments were provided to the patients by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔923**
922	If incentive payments were given to the patients, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	
923	Were Incentive payments were provided to the community members by the DOTS center?	Yes……1 No……..……2	☐	**If 2 ➔END**
924	If incentive payments were given to the community members, How much money was paid for this activity in last year (October 2015-September 2016)?	IF THIS PAYMENT WAS NOT MADE AND/OR NO MONEY WAS PAID, RECORD "00000"	Taka ☐☐☐☐☐	

Thank you for your cooperation! Is there anything you would like to ask or say?

Comments by Interviewer:

Date, Signature by Interviewer: