Assessment of Multi-Drug Resistant Tuberculosis Patient's Satisfaction Level, Their Needs and Expectation: A Hospital Based Study in Bangladesh

[1]MD. ABU SAYEM[†], [2]TAHMEED AHMED[‡],
[3]MD.GOLAM HOSSAIN[‡], [4]KHALED HOSSAIN[*],
[5]SK. MD. SHAIDUL HASSAN[**], [6]MD. KAMRUZZAMAN[***]
[3]ZAHANGIR ALAM SAUD[****]

[1]*Institute of Biological Sciences, University of Rajshahi, Rajshahi 6205, Bangladesh*
[2]*Public Health Nutrition, James P. Grant School of Public Health, BRAC University, Mohakhali, Dhaka 1212, Bangladesh*
[3]*Department of Statistics, University of Rajshahi, Rajshahi 6205, Bangladesh*
[4]*Department of Biochemistry and Molecular Biology, University of Rajshahi, Rajshahi 6205, Bangladesh*
[5]*UNICEF Zonal Office, RDRS Office Complex, Radhaballav 5400, Rangpur, Bangladesh*
[6]*ACDI/VOCA, Jagorani Chakra Foundation Bhaban, Jashore 7400, Bangladesh*
E-mail: zasaud@ru.ac.bd

KEYWORDS: Assessment, Hospital, MDR-TB, Likert scale, Patient's Satisfaction.

ABSTRACT: Multi-drug resistant tuberculosis (MDR-TB) is a public health crisis due to its low detection rate, longer duration of treatment, high cost and patient's sufferings. The aim of study was to assess the level of MDR-TB patient's satisfaction, their needs and expectation during treatment in Chest Disease Hospital in Rajshahi, Bangladesh. A cross sectional study among 200 MDR-TB patients were conducted from June 2011 to October 2017 using stratified sampling technique. Five (5) point "Likert scale" was used in this study. T-test was utilized to find out the significant difference of satisfaction with socio-demographic and behavioral factors. The three fundamental areas were considered for this study such as satisfied with – 1. Behavior of care providers, 2. Hospital environment and 3. Hospital supplied food. The overall satisfaction level was 3.35±1.01. Patients demanded more tasted and diverse food and better hospital environment. These findings can be considered to improve the satisfaction level.

† Ph.D fellow
‡Professor
‡Professor
* Professor
**Nutrition officer
***Deputy Chief
****Professor

INTRODUCTION

Tuberculosis (TB) is one of the top 10 causes of death and it ranks as second leading cause of death from infectious disease worldwide (Bangladesh

national guidelines and operational manual for tuberculosis control, 5th edition, 2013). Globally 10.4 million new and 125000 MDR-TB and in Bangladesh, 209438 new and 880 MDR-TB cases were enrolled in 2015 (WHO global TB report 2016; Bangladesh NTP annual report 2017). MDR-TB is considered as most critical public health problem and challenging area of TB control program due to its complexities in diagnosis, longer treatment regimen, adverse drug reaction (ADR) and patient's compliance (Bangladesh national guidelines and operational manual for PMDT, 2nd edition, 2013). In Bangladesh, general TB that means drug susceptible TB patient usually start their treatment at home level; but drug resistant (i.e. MDR) TB patient must begin treatment from hospital as it requires additional care and support. Their satisfaction is a key considering factors for both management (i.e. evaluation of care level) and patient's health status. Studies suggest that patient's satisfaction is a key factor for treatment accomplishment and treatment adherence. Even it is much more effective than spending resources on default tracing (Nezenega *et al.*, 2013; Srivastav *et al.*, 2014). A satisfied patient can recommend others to get services from where he/she perceived quality of care. On the other hand, a primarily disappointed patient may discontinue treatment thus may cause more serious form of TB (i.e. XDR-TB) (Bangladesh national guidelines and operational manual for PMDT, 2nd edition, 2013).

The MDR-TB patient usually face more drugs side effects (i.e. ADR), longer duration of treatment through which there is more chance of being disappointed and dissatisfied. Subsequently, provider's negative attitude, improper food and hospital environment can irritate their psychological state. It is important for an administrator to understand the gaps in health care delivery including provider's attitude, needs and expectation of individual, patient's views on services to develop effective strategies to improve quality of care (Onyeonoro *et al.*, 2015). In Bangladesh, MDR-TB patients start treatment from hospital and stay at hospital for four months intensive phase then they move to home to continue additional five months treatment with supervision of a DR-TB DOT provider under community based programmatic management of drug resistant TB (cPMDT) (Bangladesh national guidelines and operational manual for PMDT, 2nd

edition, 2013). As behavior and attitude reflects once education and understanding level, patients become progressively ignored and disappointed in the community particularly by the poor, illiterate individual who bears false perception and wrong believe (Chowdhury *et al.*, 2015). Hence the patients perceives social isolation and inevitable death that makes them more frustrated. Even among literate portion of the community have inadequate knowledge on infectious and non-infectious state. It was reported that a poor knowledge about tuberculosis among non-medical university students reflecting their attitude on a TB patient (Rana *et al.*, 2015). Another study showed that more than 85% TB patients were stigmatized and they were neglected by family members particularly while taking meal with them, neglected by neighbors, relatives and colleagues (Chowdhury *et al.*, 2015). Though MDR-TB patients comparatively late to be non-infectious, most of the patients become non-infectious within two weeks of treatment with appropriate regimen and then they usually cannot spread TB to others (Bangladesh national guidelines and operational manual for PMDT, 2nd edition, 2013). But people neglect them throughout the full treatment period even after recovery. Therefore, it is important to ensure mass advocacy, communication and social mobilization (ACSM) to reduce stigma related to TB and to promote a favorable environment to make them satisfied and to promote human rights in both hospital and community settings. Correspondingly, it is additionally significant to observe the attitude and cooperation of care providers in hospital setting. The care providers are generally literate, well trained and skilled with experience compared to community people. Hence they usually do not avoid a patient due to their professional duties. But do they express sufficient cooperation? Are they properly trained to satisfy a patient? If trained, are they practice properly? Does the management monitoring their approach properly? Is the hospital's environment clean? Are the hospital supplied food and nutritional support satisfying all? A lot of questions which may help strengthening the tuberculosis control program effectively and efficiently. Furthermore, a satisfying patient can play an important role in advocacy in the community to reduce stigma, strengthen contact tracing and improve brand image of the program. National Tuberculosis

Control Program (NTP), Bangladesh is implementing cPMDT throughout the country in collaboration with multiple NGO partners. Along with govt. technical and field staffs, NGOs are also educating the patients on benefits of DOT, duration of treatment, possible ADR, infection control measures and other issues to adopt with the circumstances. Poverty, population density and malnutrition are common problem in Bangladesh which facilitate the favorable environment for developing TB and MDR-TB (BDHS, 2011). Considering the benefits of a large number of patients, health professional and policy maker needs to address such critical factors affecting patient's physical and mental health and wellbeing. The WHO End TB Strategy also recommend the supportive system including social protection, poverty alleviation and other determinants of TB such as mental support needed for TB patients (The End TB Strategy, 2015). Chest Diseases Hospital (CDH), Rajshahi is the oldest and biggest government hospital for TB and MDR-TB management where patients are coming from more than sixteen districts of north-west region of Bangladesh. However, to the best of our knowledge, there was no such study among MDR-TB patients in this region. Therefore, authors sensed the necessity to conduct this study to investigate the factors affecting patient's satisfaction, needs and expectation to strengthen TB control program in Bangladesh.

MATERIALS AND METHODS

It was a cross sectional study among 200 MDR-TB patients in Chest Diseases Hospital (CDH), Rajshahi. The patients were interviewed by first author from June 2011 to October 2017. The average 10 to 30 MDR-TB patients were available in each interview schedule. However, the patients were selected randomly with exclusion of age below 15 years and drug susceptible TB cases. Total patients were divided into two groups, group 1. 40 years and below (d"40) and group 2. above 40 years (>40). Though CDH is a 150 bedded hospital, only 50 beds were available for MDR-TB patient. Data of total 200 patients were collected in different time period following treatment quarters. Since the data of the study was collected from hospital, there were no ignored cases. Along with treatment and active care, different types of foods such as rice, vegetables, meat/ fish, lentil soup, egg, sugar, bread/roti, milk/banana were given to study patients as daily diet and cash taka 1000.00 was also provided for buying food/ fruits from outside as additional nutritional support in each month from the program. The MDR-TB patients were stayed in CDH for at least four months for being non-infectious, correction of ADR and adjustment with treatment. However, a semi-structured questionnaire was developed to collect data on socio-demographic, socio-economic, behavioral and cultural factors. Then data on behavior of care providers (i.e. doctors and nurses), hospital environment, and supplied food were collected through face to face interview following 5 point "Likert scale" for measuring the level of satisfaction where 1=highly dissatisfied, 2=dissatisfied, 3=neutral, 4=satisfied and 5=highly satisfied. Data on needs and expectation, behavior of support staffs and family member's visits, additional costs for food or travel of family members were also recorded. Diabetes and smoking status were also recorded because only MDR-TB patients has the opportunity to test diabetes mellitus in CDH. Finally, the overall satisfaction was also measured. The relevant variables were re-grouped into two for independent sample t-test. Questions were asked separately from providers and family members with special care to avoid risk of harm or discomfort.

Target area: Chest Diseases Hospital (CDH), Rajshahi, Bangladesh where MDR-TB patients being treated. CDH is a regional level government hospital famous for TB patients' management. CDH Rajshahi is the only hospital from where almost all MDR-TB patients in north-western part of Bangladesh is being diagnosed and start treatment.

Ethics statement: Ethical approval (No:49/320/ IAMEBBC/IBSC) for this study was taken from the Institutional Animal, Medical Ethics, Biosafety and Biosecurity Committee (IAMEBBC), Institute of Biological Sciences, University of Rajshahi, Bangladesh. In addition, a written approval for data collection was taken from hospital authority. The purpose of the study was discussed with respondents and taken written consent.

Sample size determination: We used the formula –

$$n=N/1+Nd^2$$

n=required sample, N=population size (here average MDR-TB was 350 from 2011 to 2017),

d=marginal error (we used o.o5). 95% confidence level was utilized for this study. The formula provided that 200 samples were sufficient for this study.

Sampling technique: Two-stage stratified random sampling was followed for both male and female MDR-TB patients. First, we separately selected words for male and female patients. Then we randomly selected 132 male and 68 female patients.

Outcome variable: The level of satisfaction on behavior of care providers (doctors and nurses), hospital environment and hospital supplied food and overall satisfaction of all areas were considered as outcome variable.

Statistical analysis: Statistical package for social sciences (SPSS) version 20.0 was used for data analysis. Data editing and coding was done accordingly. Independent sample t- test was utilized in this study to find out the association between satisfaction and socio-demographic and socio-cultural variables. The p value <0.05 was regarded as statistically significant in this study.

RESULTS

A total of 200 MDR-TB patients were enrolled in the present study. It was observed that 56% patients were young adults (age 20-40 years), and 66%, 80% and 85.5% were male, married and Muslim, respectively. More than 33% patients were illiterate and farmer and more than 60% came from low income family (monthly income 3000-9000 BDT). More than 48% and 23% patients were smokers and diabetic, respectively (Table1).

TABLE 1
Socio-demographic and socio-economic characteristics of MDR-TB patients

Characteristics	N=200 (%)	Characteristics	N=200 (%)
Age in years		Diabetes	
≤40 years	112 (56)	Yes	46 (23)
≥41 years	88 (44)	No	154 (77)
Gender		Smoking	
Male	132 (66)	Yes	97 (48.5)
Female	68 (34)	No	103 (51.5)
Marital Status		Monthly family income	
Married	160 (80)	3000-5000	50 (25)
Unmarried	38 (19)	6000-9000	73 (36.5)
Divorce	2 (1)	10000-12000	31 (15.5)
Others	0 (0)	>13000	46 (23)
Education		Occupation	
Illiterate	67 (33.5)	Agriculture	67 (33.5)
Primary	42 (21)	Business	32 (16)
Secondary	44 (22)	Service	23 (11.5)
Higher secondary	32 (16)	House wife	57 (28.5)
University	15 (7.5)	Student	21 (10.5)
Religion			
Muslim	171 (85.5)		
Hindu	28 (14)		
Others	1(0.5)		

Around 90% patients were satisfied with behavior and attitude of care providers (doctors and nurses) where the mean satisfaction level with standard deviation (SD) was 4.29±0.97, and among them 50.5% were highly satisfied. 47% patients were satisfied on hospital environment with mean and SD was 3.19±1.02. Alternatively, 27.5% patients were dissatisfied; and among them 3.5% were highly dissatisfied on hospital environment. A significant portion of patients (22%) were neutral. Poor level of satisfaction was also found on hospital supplied food and it was 24.5% with mean and SD was 2.56±1.02, and 66% patients were dissatisfied including 6.5% highly dissatisfied. In this study, it was found that the overall satisfaction level was 3.35±1.01 (Table 2).

TABLE 2
MDR-TB patient's satisfaction level and mean value in 5 point Likert scale

Traits	N=200	%	Mean ± SD for scale
Level of satisfaction on behavior and attitude			4.29±0.97
of care providers (Doctors and Nurses)			
Highly dissatisfied	5	2.5	Dissatisfied
14	7.0		
Neutral	1	0.5	
Satisfied	79	39.5	
Highly satisfied	101	50.5	
Level of satisfaction on hospital environment			3.19±1.02
Highly dissatisfied	7	3.5	
Dissatisfied	55	27.5	
Neutral	44	22.0	
Satisfied	82	41.0	
Highly satisfied	12	6.0	
Level of satisfaction on hospital supplied food			2.56±1.02
Highly dissatisfied	13	6.5	
Dissatisfied	119	59.5	
Neutral	19	9.5	
Satisfied	41	20.5	
Highly satisfied	8	4.0	
Overall satisfaction score			3.35±1.01

Table 3 shows the difference in level of satisfaction according to patients' characteristics. It was found that males' satisfaction level was significantly higher than that of female on hospital environment ($p<0.01$) and supplied food ($p<0.05$). The satisfaction level of patients who were doing service or business was more than hard labor on hospital environment ($p<0.05$) and supplied food ($p<0.01$). Smoker patients were more satisfied on hospital environment than that of non-smoker ($p<0.05$). The differences in satisfaction level between the other selected characteristics such as age group, education level, income, diabetes, religion and marital status were not statistically significant (Table 3).

TABLE 3
Bivariate Analysis of respondent's characteristics and their satisfaction score (Likert scale)

Variable	Group	Behavior of doctors and nurses Mean ±SD	Hospital environment Mean ±SD	Hospital supplied food Mean ±SD
Age	d"40 years	4.21±1.07	3.09±1.09	2.45±0.98
	>40 years	4.39±0.82	3.31±0.91	2.70±1.05
	P-value	0.190	0.134	0.074
Gender	Male	4.29±0.99	3.34±0.97	2.67±1.07
	Female	4.28±0.93	2.88±1.04	2.34±0.87
	P-value	0.953	0.002	0.026
Education	<Secondary	4.28±0.88	3.16±0.96	2.45±0.94
	e"Secondary	4.30±1.07	3.22±1.08	2.69±1.09
	P-value	0.876	0.660	0.092
Occupation	Hard Labor	4.22±1.01	3.08±0.99	2.42±0.94
	Service or Business	4.41±0.89	3.40±1.04	2.84±1.10
	P-value	0.185	0.034	0.005
Income	d"10,000 (Taka)	4.25±0.99	3.25±0.98	2.61±1.03
	>10,000 (Taka)	4.34±0.93	3.08±1.07	2.48±0.99
	P-value	0.544	0.240	0.383
Smoking	Smoker	4.34±0.96	3.36±0.92	2.67±1.04
	Non Smoker	4.23±0.98	3.02±1.08	2.46±0.99
	P-value	0.436	0.017	0.137
Diabetes	Yes	4.39±0.83	3.20±0.93	2.59±0.91
	No	4.25±1.01	3.18±1.04	2.55±1.05
	P-value	0.398	0.936	0.838
Religion	Muslim	4.27±0.96	3.18±1.03	2.59±1.03

Contd...

	Non Muslim	4.34±1.05	3.21±0.98	2.41±0.95
	P-value	0.720	0.901	0.403
Marital Status	Married	4.31±0.93	3.18±1.00	2.58±0.99
	Non married	4.18±1.01	3.20±1.09	2.48±1.09
	P-value	0.423	0.917	0.555

Table 4 shows the exclusively comments, needs and expectation on supplied food and support staffs cooperation. Bad taste (18%), everyday same and hybrid food (>16%) and anorexia (21%) made them dissatisfied. A portion of respondents comments on no evening snacks (>7%) and no weekly improve diet (>5%). Subsequently, most of the respondents expect good quality rice and mutton curry (27%), fruits plus milk (>25%), small indigenous fish (23%). In this study, 54% respondents positively comments on support staffs cooperation (Table 4).

TABLE 4

Needs and expectation and support staff cooperation status

Characteristics (Patient's needs and expectation)	N=200	%
Correction of anorexia and adverse drug reaction	42	21
Bad taste due to cocking	36	18
Everyday same food	33	16.5
No need	26	13
No comments	21	10.5
Avoiding supplied food	16	8
No evening snacks	15	7.5
No weekly improve diet	11	5.5
Good quality rice and mutton	54	27
Fruits plus milk	51	25.5
Small indigenous fish	46	23
Only fruits	30	15
Muri & Chira	16	8
No choice	3	1.5
Support staffs cooperation		
Yes	108	54
No	92	46

Figure 1 displays the extra family expenditure due to TB. More than 9%, 37%, 26.5%, 18.5% and 8.5% patients reported that they had monthly increased expenditure was 1000-2000, 2001-4000, 4001-6000, 6001-8000 and more than 8000 Taka respectively due to TB.
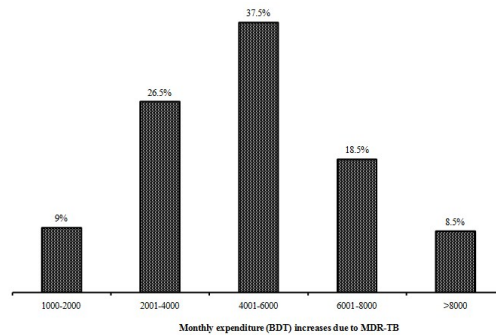

Figure. 1: Percentage of patients' family members faced excess cost due to MDR-TB

DISCUSSION

National Tuberculosis Control Program (NTP) is GO-NGO collaboration program through which Government of Bangladesh is supporting almost all costs of diagnostic tests, treatment, monitoring of treatment, care, food and financial support, anti-TB

drugs including ancillary drugs for all patients throughout the country. In Rajshahi region, Damien Foundation, an INGO is assisting the govt. particularly in diagnostic tests, follow up communication, availability of drugs and laboratory consumables, reporting, monitoring and sharing of findings with authorities for appropriate management. CDH Rajshahi is following 9th month treatment regimen for MDR-TB cases where four months intensive phase and five months continuation phase. The patients are generally staying in CDH in intensive phase of treatment. In this study, the level of satisfaction of MDR-TB patients on behavior of doctors and nurses, hospital environment and supplied food were explored. We also analyzed the cooperation of support staffs, comments, needs and expectation of the patients while on treatment. The study showed that 90% patients were satisfied on behavior of doctors and nurses. All were almost equally perceived and there was no significant ($p>0.05$) difference at satisfaction level irrespective of age, gender, education, income, occupation, marital status, smoking and diabetes status. According to five point "Likert scale", the mean satisfaction level and standard deviation (SD) was 4.29 ± 0.97. The overall satisfaction rate with TB treatment service was consistent with the study done in Ethiopia (Nezenega et al., 2013). However, 47% patients were satisfied with hospital environment including cleanness, toilet hygiene, living condition and ventilation. Among them, male patients were more satisfied ($p<0.002$) than female as they have separate words and toilet facilities. Similarly, service and business persons were more satisfied ($p<0.03$) than their counter parts. This might be due to administration provided them comparatively higher facilities than others. Interestingly, the smokers were more satisfied ($p<0.01$) than non-smoker. However, 22% patients were neutral. They did not express any comments. This may due to no hope of improvement or not willing to response against management as they are still staying in hospital. Another study in Intermountain Hospital, America also showed that 48% of patients were satisfied with hospital environment which was consisted with our study (Harris et al., 2002). Though they conducted online interview after 54 days of discharge, they found the above findings. This may indicate that most people are environment sensitive.

However, we found that, 24.5% patients were satisfied with hospital supplied foods. The majority of the patients were dissatisfied (66%) whereas 9.5% remained neutral. This might be due to every day same food, bad taste, loss of taste due to drug adverse effects; even 8% patients avoided the supplied food and bought foods from outside the hospital. Female were more dissatisfied ($p<0.05$) than male and hard workers were dissatisfied than service or business persons. As a consequence of hospital environment and supplied food, the overall mean satisfaction level was declined to 3.35 ± 1.01. A similar study conducted at General Hospital Makkah, Saudi Arabia revealed that their 56.8% patients were satisfied with taste of supplied foods (Abdelhafez et al., 2012). In our study, the age below 40 years were less satisfied in all three mentioned areas than their counter part. It was reported that young groups have higher expectation to have quick solutions and become more dissatisfied than their counter part (Prakash, 2010). However, our study demonstrated that less educated study subjects were less satisfied than higher educated. This might be due to chance of biasness or inequity. We also recorded the comments of the respondents as their needs and negative comments might be important clues to hospital management for overall improvement. Respondents were eager to express their views to meet their needs such as correction of anorexia, vomiting and ADR, improvement of cocked food, diverse food and vegetables with high quality rice. Most of the respondents (76%) expects good quality rice, mutton, small indigenous fish, different seasonal vegetables, fruits, milk. A portion of (8%) respondents expects traditional evening snakes (Muri and Chira) with tea. Note that milk was provided before 2013 instead of banana and after 2013, patients were getting one banana instead of 250 ml milk. However, they expect more fruits including milk. The support staffs such as word boy, aya, and sweepers are also a critical parts of the hospital management for satisfying a patient. In our study, 54% respondents were satisfied with support staffs cooperation. However, MDR-TB patients had a lot of personal or social contributing factors of being dissatisfied, family expenditure also impacts on it. To prevent and control of TB, "The End TB Strategy" sets some targets aligned with SDGs up to 2030 and End TB targets up to 2035, one of the targets is no any catastrophic costs for TB affected

families due to TB (WHO The End TB Strategy, 2015). Unfortunately, we found that, in spite of receiving taka 1000 per month, 64% patients family members facing excess cost of taka 2000-6000 due to TB. The costs are mostly for improved food and travel. Even 18.5% and 8.5% patients facing excess cost of taka 6001-8000 and > 8000 taka per month. The other behavioral and hereditary factors such as smoking and diabetes are also the causal or confounding factors for developing TB disease and impacts on depression or fatigue which may acts as synergistic effect on dissatisfaction. In our study, we found a significant number patients were smoker (48.5%) and diabetic (23%). However, smoking rate was higher among lower-middle and higher income group. Result was consistent with previous report of increased risk of tuberculosis among smokers and high income groups (Boon et al., 2005). Similarly the national guidelines also mentioned two to three times higher risk of developing TB among diabetes patients than normal individual indicates strong causal relationship (Bangladesh national guidelines for TB-Diabetes Mellitus co-morbidity, 1st edition, 2014).

CONCLUSION

In CDH Rajshahi, most of the respondents were satisfied with doctors and nurses attitude and behavior while on treatment. But other areas such as hospital environment, support staffs cooperation and supplied food did not satisfy them properly. Their needs and expectations were also mentioned the similar areas. So, intervention for improving MDR-TB services should focus on these areas through effective communication with Ministry of Health to meet the needs and expectation at maximum level, meaningful coordination, regular monitoring and correction of deviation by the management are also important. Periodic meeting with technical and support staffs would also help ensuring patient's friendly environment. Furthermore, during discharge time, keeping the patients and family member's suggestions would be good for all.

Limitation of the study: We identified several limitations such as (i) we did not include drug susceptible TB patients, (ii) did not compare with community level satisfaction, (iii) longer time period due to scarcity of respondents, (iv) we did not consider the other comorbidities beyond diabetes which may impacts on satisfaction level, (v) we did not mention managerial limitations. However, these limitations would be the potential clues to researchers for further study.

REFERENCES CITED

Abdelhafez, A. M., L. A. Qurashi, R. A. Ziyadi, A. Kuwair, M. Shobki and H. Mograbi. 2012. Analysis of factors affecting the satisfaction levels of patients towards food services at General Hospital in Makkah, Saudi Arabia. *American Journal of Medical and Medical Sciences*. 2:123-130.

Bangladesh Demographic Health Survey (BDHS), 2011.

Boon, S, S., W. P. van Lill, M. W. Borgdorff, S. Verver, E. D. Bateman, C. J. Lombard, D. A. Enarson and N. Beyers. 2005. Association between smoking and tuberculosis infection: a population survey in a high tuberculosis incidence area. *Thorax*. 60:555-557.

Chowdhury, R. K, M. S. Rahman, N. I. Mondal, M. A. Sayem and B. Billah. 2015. Social impact on stigma regarding tuberculosis hindering adhere to treatment. A cross sectional study carried out in tuberculosis patients at Rajshahi city, Bangladesh. *Japanese Journal of Infectious Disease*. 68:461-466.

Harris, P. B, G. McBride, C. Ross and L. Curtis. 2002. A place to heal: Environmental sources of satisfaction among hospital patients. *Journal of Applied Social Psychology*. 32:1276-1299.

National Guidelines and Operation Manual for Programmatic Management of Drug Resistant Tuberculosis (PMDT), Directorate General of Health Services (DGHS),

Bangladesh, 2nd edition, 2013

National Guidelines and Operational Manual for Tuberculosis Control, Directorate General of Health Services, Bangladesh, 5th edition, 2013.

National Guidelines for the Management of Tuberculosis (TB)-Diabetes mellitus (DM) Co-morbidity, Directorate General of Health Services (DGHS), Bangladesh, 1st edition 2014.

National Tuberculosis Control Program (NTP), Directorate General of Health Services (DGHS), Bangladesh, Annual report 2017.

Nezenega, Z. S., Y. H. Gacho and T. E. Tafere. 2013. Patient satisfaction on tuberculosis treatment service and adherence to treatment in public health facilities of Sidama zone, South Ethiopia. *BMC Health Service Research.* 13:110.

Prakash, B. 2010. Patient satisfaction. *Journal of Cutaneous and Aesthetic Surgery.* 3:151-155.

Ran, M., M. A. Sayem, R. Karim, N. Islam, R. Islam, T. K. Zaman and G. Hossain. 2015. Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh: a cross sectional study. *BMC Public Health.* 28:15:716.

Srivastav, S. and H. Mahajan. 2014. Satisfaction levels among patients availing DOTS services in Bundelkhand Region (UP), India: Evidence from patient exit-interviews. *Annals of Tropical Medicine and Public Health.* 7:116-9.

Onyeonoro, U. U., J. N. Chukwu, C. C. Nwafor, A. O. Meka, B. I Omotowo, O. N. Madichie, C. Ogbudebe, J. N. Ikebudu, D. C. Oshi, N. Ekeke, N. I. Paul and C. B. Duru. 2015. Evaluation of patient satisfaction with tuberculosis services in Southern Nigeria. *Health Services Insights.* 8:25-33.

WHO Global TB Report 2016.

WHO The End TB Strategy 2015.