

< Original >

Factors Contributing to Tuberculosis (TB) Defaulter Rate in New Juaben Municipality in the Eastern Region of Ghana

Samuel Agyemang BOATENG¹⁾, Tomoko KODAMA²⁾,
Tomoko TACHIBANA³⁾, Nobuyuki HYOI⁴⁾

¹⁾ New Juaben Municipal, Eastern Regional Health Administration, Ghana

²⁾ Department of Human Resources Development, National Institute of Public Health

³⁾ Center for Information Research and Library, National Institute of Public Health

⁴⁾ Office of International Cooperation, National Institute of Public Health

Abstract

Objective To identify the factors that influence compliance with the DOTs system and examine the factors related to defaulting among TB patients in New Juaben Municipality, Ghana.

Methods A cross-sectional study was conducted in 2006 using a structured questionnaire on 165 TB patients who had registered in New Juaben District from January 2003 to December 2005. The odds ratios (OR) were calculated by comparing defaulters and non-defaulters in terms of sex, socio-demographic, and other relevant factors. Additional attitudes toward TB, and knowledge, and perception of TB among the patients were also evaluated.

Results The response rate for the questionnaire was 84.8% (n=140). Of the respondents, 78 (55.7%) were defaulters, while 62 (44.3%) were non-defaulters. Defaulting from treatment was significantly associated with males (OR 4.73; 95% CI 2.31-9.68), distance of patient from the treatment centre (OR 6.14; 95% CI 2.94-12.83), financial status (OR 4.14; 95% CI 2.037-8.41), family support (OR 0.29; 95% CI 0.14-0.59), the attitudes of service providers (OR 2.72; 95% CI 1.36-5.45), and adverse effect of drugs (OR 3.00; 95% CI 1.48-6.09).

Conclusion Treatment should be decentralized to the community level, and families of TB patients must be encouraged to fully support TB patients. There is a need for in-service training for staff to provide patients with effective counseling. Moreover social and financial support should be extended to the patients.

Keywords: tuberculosis (TB), directly observed treatment, short course (DOTs), defaulter rate, information education and communication (IEC).

(Accepted for publication, July 15, 2010)

1. Introduction

Tuberculosis still remains the single most infectious disease with the highest burden (mortality and morbidity) of the adult population world wide. Since the advent of HIV, the incidence of Tuberculosis has steadily increased (WHO report 2006, Global Tuberculosis Control, Surveillance, Planning, Financing) and is responsible for 26 percent of all avoidable adult deaths in the developing world¹⁾. It is estimated that in Ghana annually there are 30,000 cases of TB leading to 18,000 deaths.

New Juaben Municipality, the area of this study, is located

in the south-east area of the Eastern Region of Ghana and has 4 Sub-Municipalities. It has a population of 148,666 and its population density is 1,483 persons per km². The Directly Observed Treatment short course (DOTs) program in the New Juaben district has witnessed a high default rate, of above 40% in spite of the national default rate, which is not greater than 10% (2004)^{2,3)}. A high default rate leads to multiple drug resistance and therefore hampers the control of TB and thus increases the morbidity and mortality rates. In order to ensure compliance with TB treatment, DOTs has become operational in many parts of the country, including New Juaben Municipality in the Eastern Region of Ghana^{4,5)}.

Correspondence to: Samuel Agyemang BOATENG
New Juaben Municipal Health Directorate, P. O. Box 190
Koforidua, GHANA. West Africa.
E-mail: unikpharmacy@yahoo.com

This study aims to indicate the factors contributing to the high defaulting rate among TB patients in New Juaben Municipality.

II. Methods

A cross-sectional study was conducted in 2006 with a structured questionnaire on 165 TB patients who had registered in New Juaben District from January 2003 to December 2005 (TB Registry) and had fully completed their treatment during the time of the study. The questionnaire was carried out in June 2006 and consisted of questions on i) socio-demographic characteristic (age, sex, occupation, educational background, religion, and ethnicity), ii) attitude towards TB, and knowledge, attitude, and perception of TB, iii) Barriers to compliance of default with treatment (distance, family support, finance, duration of treatment, knowledge of the diagnosis, side-effects, etc). Defaulters were defined as patients whose treatment was interrupted for two or more consecutive months for any reason, in other words, patients who failed to adhere to their drug regimens. Non- defaulters were defined as patients who adhered to their drug regimens.

Data collection Data was collected from registered TB patients using a structured questionnaire. A two-day training program was provided for four people with previous experience in data collection. The program entailed formal talks on quantitative research and emphasized questionnaire implementation skills. During the training the questionnaire was translated into Twi (the native language). The team leader and data collectors thoroughly went over the translation, so as to ensure that the questions asked in Twi had the same meaning as they did in English. Pre-testing was done on the first day at the chest ward of Koforidua Regional Hospital. Operational definitions are described in the Appendix.

Data Analysis To examine the factors contributing to tuberculosis defaulting, the odds ratios (OR) and a 95% confidence interval (CI) were calculated by comparing defaulters and non-defaulters in terms of for sex, socio-demographic, knowledge, attitude, perception and other relevant factors. Stratified analysis by age (below and above 40 years old) was also conducted to obtain OR in those factors. Statistical significance was examined by using a chi-squared test with an alpha level of 0.05. Epi-info was used as statistical software.

Ethical consideration Informed consent was obtained from each patient involved in this study. The study was approved by the Municipal Director of health services, Regional TB coordinator and opinion leaders. Official approval was obtained from the Committee on Human

Research, Publication and Ethics of Eastern Regional Health Directorate (CHRPEERHD) as a part of "Community Tuberculosis Care as an Effective Intervention Strategy to Improve Treatment Outcomes in HIV Prevalent Areas."

III. Results

The response rate of this study was 84.8 % (140 out of 165), as shown in Table 1. There was a total of 99 (60%) and 66 non-defaulters (40%). Table 2 shows the characteristics was and OR of defaulting among respondents. The gender distribution of the patients subject to the questionnaire was 74 (52.9%) males and 66 (47.1%) females. The OR of defaulting is 4.73 (95% CI 2.31-9.68) times higher among male patients than female patients (Table 2). The mean age of the respondents was 35 years while the median and mode were 42 and 39 years respectively. The minimum and maximum ages were 35 and 65 years respectively, with a standard deviation of 6.6. The type of occupation most frequent among defaulters was farmer (62.8%) and whereas self-employed (64.5%) was most frequent among non-defaulters ($p=0.05$, $\chi^2=6.05$). The levels of education were similar among defaulters and non-defaulters, which was most frequently "None" (64.5% in non-defaulters, 66.7% in defaulters), but non-defaulters had a slightly higher percentage of patients with a middle educational level (21.0% vs. 15.4%). The religions of respondents were almost the same, the most frequent being Traditional (44.9%, 45.2%), followed by Christian (26.9%, 30.6%), and Moslem (20.5%, 24.2%) among defaulters and non-defaulters, respectively.

Table 1. Treatment outcome of registered TB patients in 2003-2005

	No	(%)
Total number of registered TB patients	165	
Total number of responded TB patients (Response rate: 84.8%)	140	
Male	74	(51.5)
Female	66	(48.5)
Defaulters		
Defaulters who were dead	10	(6.1)
Defaulters who have travelled outside the District	11	(6.7)
Defaulters who were traced or located and administered with the questionnaire	78	(47.3)
Total of defaulters	99	(60.0)
Non-defaulters		
Non-defaulters who have travelled outside the District	4	(2.4)
Non-defaulters who were located and administered with the questionnaires	62	(37.6)
Total of non-defaulters	66	(40.0)

The ethnicities were also similar between defaulters and non-defaulters, which were Krobo (39.7%, 45.2%), Akan (32.1%, 30.6%), and Ewe (21.8%, 19.4%).

Table 2. Characteristics and odds ratios of defaulters and non-defaulters among respondents

	Defaulters		Non -Defaulters		
	n	(%)	n	(%)	
Sex					
Male	54	(69.2)	20	(32.3)	p<0.001 (OR=4.73,95% CI=2.31-9.68)
Female	24	(30.8)	42	(67.7)	
Age					
20-29	15	(19.2)	11	(17.7)	p=0.94
30-39	23	(29.5)	21	(33.9)	
40-49	22	(28.2)	19	(30.6)	
50-59	10	(12.8)	6	(9.7)	
60-69	8	(10.3)	5	(8.1)	
Occupation					
Self -employed	26	(33.3)	32	(51.6)	p=0.05
Civil servant	3	(3.8)	4	(6.5)	
Farmer	49	(62.8)	26	(41.9)	
Education					
None	52	(66.7)	40	(64.5)	p=0.65
Primary	14	(17.9)	9	(14.5)	
middle	12	(15.4)	13	(21.0)	
Religion					
Christians	21	(26.9)	19	(30.6)	p=0.92
Traditional	35	(44.9)	28	(45.2)	
Moslem	16	(20.5)	15	(24.2)	
Unknown	6	(7.7)	0	-	
Ethnicity					
Akan	25	(32.1)	19	(30.6)	p=0.84
Krobo	31	(39.7)	28	(45.2)	
Ewe	17	(21.8)	12	(19.4)	
Unknown	5	(6.4)	0	-	

OR=Odds Ratio

CI=Confidence Interval

With regard to the patient related factors leading to default, the OR of defaulting is 6.14 (95% CI 2.94-12.83) times higher among TB patients whose houses are far from the chest clinic than those whose houses are close to the chest clinic (Table 3-1). This association is statistically significant. Another statistically significant association is that less patients who received family support defaulted than TB patients who did not receive adequate family support during treatment (OR=0.29; 95% CI 0.14-0.59) . The odds of defaulting are 4.14 (95% CI 2.04-8.41) times higher among TB patients who considered finance as a barrier during treatment than those who did not . Among the respondents, 60.3 % of patients with OR 2.40 (95% CI 1.21-4.75) were defaulters who said that TB patients are prevented from mixing with other people in the community, which reflects

Table 3-1. Patients related factors leading to default

	Defaulters		Non -Defaulters		OR	95 % CI
	n =78	(%)	n=62	(%)		
Distance from home to Chest Clinic						
Long (>=8km)	57	(73.1)	19	(30.6)	6.14	2.94 – 12.83
Short (<8km)	21	(26.9)	43	(69.4)		
Patients received family support during treatment						
Yes	27	(34.6)	40	(64.5)	0.29	0.14 – 0.59
No	51	(65.4)	22	(35.5)		
Finance as a barrier during treatment						
Yes	53	(67.9)	21	(33.9)	4.14	2.04 – 8.41
No	25	(32.1)	41	(66.1)		
TB Patients prevented from mixing with other people in the community (stigma)						
Yes	47	(60.3)	24	(38.7)	2.40	1.21 – 4.75
No	31	(39.7)	38	(61.3)		

the stigma commonly felt by defaulters.

Table 3-2 shows patient related factors leading to default, according to the age groups of 39 and below and 40 and above. Those factors more frequently seen among patients above 40 years old were “finance as a barrier” (OR=7.25 above 40 yrs, OR=4.67 below 39 yrs, respectively), “distance” (OR=7.25, OR=4.67), “TB was caused by witchcraft” (OR=8.04, OR=6.25), and “side effects” (OR=3.50, OR=2.56). The factors related to family support, attitude of service providers, and perception of duration of treatment had higher ORs among patients below 39 years old than among those older than 40 years old.

Attitudes toward TB, and knowledge and perceptions of TB among respondents are shown in Table 4. When they were asked whether a person who looks thin and sometimes coughs blood and complains of chest pains may be suffering from a disease called Tuberculosis or not, 63 (80.8%) of the defaulters and 59 (95.2%) of non-defaulters answered yes. The OR was 0.21 (95% CI 0.06-0.78), showing a preventive effect against defaulting, which indicates that defaulters did not have correct knowledge of TB. It was also remarkable that more defaulters than non-defaulters believed that TB was caused by witchcraft, which was a high OR of 18.66 (95% CI 7.86-44.28), and they did not realize that TB spreads from one person to another person (OR=7.0; 95% CI 3.30-14.86). None of the respondents believed that the cause of TB is an act of God. When respondents were asked whether TB is curable or not, 49 (62.8%) of defaulters and 47 (75.8%) of non-defaulters responded yes. The defaulters received other health care more than non-defaulters (OR=2.96, 95% CI 1.48-5.93). Among the patients who received other health care, 40% of them had seen Spiritualists and 60% had seen Traditionalists (Traditional healers) (Figure 1).

Among defaulters, 82.1 % agreed that they were given a diagnosis of their disease and the disease was Tuberculosis, whereas 96.8% of the non-defaulters agreed, which is an OR of 0.15 (95% CI 0.03-0.70), showing that the defaulters received a diagnosis less often (Table 5). Forty-nine (62.8 %) of the defaulters and 2 (3.26 %) of the non-defaulters answered that TB treatment was not available at the chest clinic, while 29 (37.2 %) of the defaulters and 60 (96.7%) of the non-defaulters said treatment was available. The OR was 0.02 (95% CI 0.01-0.09) and indicates that TB treatment was less available among the defaulters. Regarding the instructions after discharge, the respondents were told that they should take all the medication given to them at the chest clinic and come back later for review. They were also were informed that the TB treatment will take 8 months.

Table 3-2. Patients related factors leading to default, according to age groups of below and above 40 years old

	Respondents Below 39 years old		Respondents above 40 years old	
	Defaulters n=38	Non- defaulters n=32	Defaulters n=40	Non- defaulters n=30
Finance as a barrier				
Yes	28	12	25	9
No	10	20	15	21
	OR 4.67,	P <0.01	OR 7.25,	P<0.01
Distance				
Long (>=8km)	28	12	29	8
Short(<8km)	10	20	11	22
	OR 4.67 ,	P <0.01	OR 7.25,	P<0.01
Patient did not receive Family support				
Yes	26	12	25	10
No	12	20	15	20
	OR 3.61,	P< 0.01	OR 3.33,	P=0.02
Attitude of service providers				
Bad	20	8	24	12
Good	18	24	16	18
	OR 3.33 ,	P=0.02	OR 2.25,	P=0.10
Causes of TB				
It is caused by witchcraft	30	12	31	9
It is spread by droplets from sufferers	8	20	9	21
	OR 6.25,	P<0.01	OR 8.04,	P<0.01
Adverse effect				
Yes	19	9	24	9
No	19	28	16	21
	OR 2.56,	P=0.06	OR 3.50,	P=0.01
Perception about duration of treatment				
Long	26	12	24	12
Short	12	20	16	18
	OR 3.61,	P=0.01	OR 2.25,	P=0.10

(Statistical significance was examined by McNemar's χ^2 test)

These instructions were given to all the non-defaulters but 3.9% of the defaulters did not receive them. Compared to the non-defaulters, more of the defaulters suffered from side-effects (OR=3.0; 95% CI 1.48-6.09) mentioning drugs including the following as the causes: Red tab, Ethambutol, Streptomycin, HR and Pyrazinamide. The most common side effect mentioned was abdominal pain (62 %) when the drug is taken, a change in urine color, itching or skin irritation, and headaches (Figure 2). The OR was higher among defaulters who considered the duration of treatment a barrier (too long) , reaching 2.83 (95% CL 1.42-4.63). Another significant point is that, more defaulters than non-defaulters considered that the service providers had a bad attitude (OR=2.72; 95% CI 1.36-5.45).

Table 4. Knowledge, attitude and perception of TB among the patients

	Defaulters n=78 (%)	Non- Defaulters n=62 (%)	OR	95 % CI
A person who looks thin and sometimes coughs blood and complains of chest pains may be suffering from a disease called Tuberculosis				
Yes	63 (80.8)	59 (95.2)		
No	15 (19.2)	3 (4.8)	0.21	0.06-0.78
How people get TB				
It is caused by witchcraft	61 (78.2)	10 (16.1)		
It is spread by droplets from sufferers	17 (21.8)	52 (83.9)	18.66	7.86-44.28
Can TB be spread from one person to another person				
No	61 (78.2)	21 (33.9)		
Yes	17 (21.8)	41 (66.1)	7.0	3.30-14.86
Is Tuberculosis curable?				
Yes	49 (62.8)	47 (75.8)		
No	29 (37.2)	15 (24.2)	0.54	0.26-1.13
Patients received other health care				
Yes	47 (60.3)	21 (33.9)		
No	31 (39.7)	41 (66.1)	2.96	1.48-5.93
Complacent during treatment which could have led to default				
Yes	40 (51.3)	39 (62.9)		
No	38 (48.7)	24 (37.1)	0.62	0.31-1.23



Figure1. Source of other healthcare

Table 5: Service related factors leading to default

	Defaulters n=78 (%)	Non -Defaulters n=62 (%)	OR	95 % CI
Patient told diagnosis				
Yes	64 (82.1)	60 (96.8)	0.15	0.03 – 0.70
No	14 (17.9)	2 (3.2)		
Is TB treatment available at the Clinic?				
Yes	29 (37.2)	60 (96.8)	0.02	0.01 – 0.09
No	49 (62.8)	2 (3.2)		
Patient giving instructions after discharge				
Yes	75 (96.1)	62 (100)	-	
No	3 (3.9)	0 (0)		
Patients having side effect from anti-TB drugs				
Yes	43 (55.1)	18 (29.1)	3.0	1.48 – 6.09
No	35 (44.9)	44 (70.9)		
Duration of treatment is a barrier to treatment				
Yes	50 (64.1)	24 (38.7)	2.83	1.42 – 4.63
No	28 (35.9)	38 (61.3)		
Attitude of Service Providers				
Bad	44 (56.4)	20 (32.3)	2.72	1.36 – 5.45
Good	34 (43.6)	42 (67.7)		

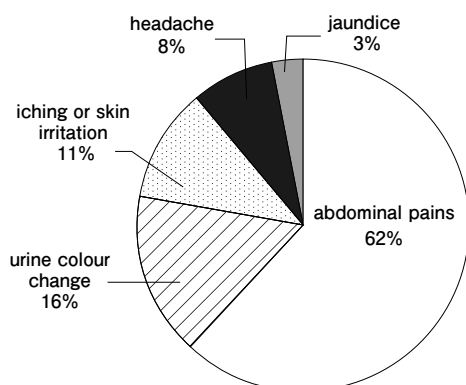


Figure 2. Side-effects reported by patients

IV. Discussion

The objectives of the study were to determine the patient, factors related to defaulting, along with the service-related factors and patients' attitudes toward tuberculosis, and knowledge and perceptions of tuberculosis in New Juaben Municipality. The study used such variables as geographical accessibility, financial status of the patient, family support, knowledge of TB, attitude of service providers, availability of treatment, side effect of TB drugs, and duration of treatment. From the study results, the odds ratio of defaulting is 4.73 times higher among male patients than female patients ($P < 0.01$). This means that male patients

are not so likely to follow the treatment regimen and hence face a higher risk of defaulting. Of the total of 70 patients younger than 40 years old, 38 (54 %) of them were defaulters and 32 (45%) were non defaulters. On the other hand, of the total of 70 patients 40 years old or older, 40 (57.1%) were defaulters and 30 (42.9%) were non-defaulters. This implies that the rate of defaulting increases with age, as older people find it difficult to follow their treatment regimen. The patients' education levels ranged from elementary to middle school level, but the majority (92; 65.7 %) had no formal education at all. This explains the low level of literacy in the study area and hence how difficult it is to provide health information to the public. It is necessary to intensify the education campaign on TB. Although the majority of the respondents knew the signs and symptoms of TB, they have different understandings of the causes and many believe that TB is caused by witchcraft. The respondents' low levels of education make TB difficult for them to accept scientific knowledge about TB.

As for occupation, 75 (53.6 %) of the respondents were farmers, 7(5%) were civil servants, and 58 (41.4%) were self-employed. This result almost has statistical significance ($p = 0.05$) as occupation has a direct bearing on financial status. Since farmers have a seasonal income, rather than a regular income, it makes it difficult for them to be financially sound throughout the year. Religion has a direct bearing on the beliefs and perceptions held by the people in the study area, and a large number of the respondents 63 (45%) were traditionalists, while 40 (28.6%) were Christians and 31 (22.1%) were Moslems. This result holds no statistical significance, but in real life, religion influences the health seeking behaviour of people.

Erhabor et al. reported that a long distance from the home to the chest clinic exposes a TB patient to a higher risk of defaulting and this study also attests to that⁽⁶⁾. As mentioned above, the homes of many TB patients are very far away from the chest clinics, sometimes at the periphery and others are staying outside the Juaben municipality⁽⁷⁻¹²⁾. In addition, many roads are inaccessible, especially during the rainy season, and this inhibits compliance with TB treatment; therefore, decentralized treatment is recommended. The study did not find out which phase of treatment was most likely to have more defaulters, but for the first two months, patients are expected to visit the treatment centre everyday to receive their medicine, while in the second phase the visits are weekly. There may be a tendency for patients to default more often in the later phase than in the initial phase, as the patients' conditions improve in the initial phase.

A lack of finance is 4.14 times higher among defaulters and this association is statistically significant in this study. This problem was found more frequently among patients above 40 years old than the patients below 39 years old. TB patients who can work harder and can do several income generating activities at the same time, such as poultry, basket weaving and making palm oil, earn more money.

People who are not well informed about TB tend to discriminate against TB patients. Also the low educational levels of the people coupled with strong traditional and religious beliefs make it difficult to send them materials *on TB* written *even in the local language*. They also believe that as TB patients are cursed, it is very dangerous to interact with them.

Most of the respondents 122 (87.1%), knew the signs and symptoms of TB, but 71 (50.7 %) said that TB is caused by witchcraft, which is due to their religion and beliefs. Eighty two (58.6 %) of the respondents said that TB cannot be transmitted from one person to another but 96 (68.6 %) of them said it can be cured after performing the necessary rituals. With these ideas in mind, 68 (48.7 %) respondents were inclined to accept other forms of health care from traditionalists and spiritualist, but the combination of orthodox medicine and herbal preparations can also be a source of unwanted side effects.¹³⁾ It is necessary to reconsider the approach of sending health information to these people as the majority of them can not read and write. Furthermore, the poor attitude of service providers generally exposes TB patients to a statistically significant 2.72 times the risk of defaulting, so there is a need to use other health care providers to provide TB care at the community level.¹⁴⁾

From this study, it can be deduced that the most influential contributing factors to defaulting were long distances from home to the chest clinic, a lack of finance, poor family support, bad staff attitude, and a lack of knowledge of TB. In drawing up action plans, the District Health Management Team (DHMT) must give the highest priority to these five crucial factors. It is necessary for the DHMT to expand DOTs services to all the sub-districts. This can be achieved by using other healthcare givers, such as private clinics and pharmacies, in other words, implementing Public Private Mix DOTs. Information, education and communication campaigns in schools, churches, mosques and at public forums should be intensified in order to reduce the myths and misconceptions about TB. DOTs strategies can also be strengthened by giving patients the opportunity to choose their treatment supporter from the communities where they live. Families of TB patients must be encouraged to fully

support TB patients.

Acknowledgement

I would like to express my appreciation to the government of Japan for providing me grants through JICA, which gave me the opportunity to study at the National Institute of Public Health, Japan and the Foundation for Public Health Promotion, Japan. I also thank Dr. Benjamin Aboagye Marfo, the New Juaben Municipal Director of Health Services, for his persistent support and encouragement, as well as all the health workers at the Municipal health Directorate for their assistance during data collection.

Reference

- 1) Tuberculosis: The worsening epidemic. WHO. SEARO, 2009.
- 2) National tuberculosis Programme, Ghana : Report, 2004.
- 3) Edoh D, Adjei R. Rapid assessment of a National Tuberculosis (TB) Control Programme in Eastern Ghana. *Afr J Health Sci* 2002 Jul-Dec;9(3-4):159-64.
- 4) World Health Organization. Tuberculosis, DOTS The internationally-recommended TB control strategy. www.who.int/gtb/dots/
- 5) Shargie EB, Lindsborg B. DOTS improves treatment outcomes and service coverage for tuberculosis in South Ethiopia: a retrospective trend analysis. *BMC Public Health* 2005 Jun 6; 6(1):62.
- 6) Erhabor GE, Aghanwa HS, Yusuph M, Adebayo RA, Argundade FA, Omidora A. Factors influencing compliance in patients with tuberculosis on directly observed therapy at Ile-Ife, Nigeria. *East Afr Med J* 2000 May;77(5):235-9.
- 7) Nuwaha F. Factors influencing completion of treatment among tuberculosis patients in Mbarara District, Uganda. *East Afr Med J* 1997 Nov;74(11):690-3.
- 8) Chang KC, Leung CC, Tam CM. Risk factors for defaulting from anti-tuberculosis treatment under directly observed treatment in Hong Kong. *Int J Tuberc Lung Dis* 2004 Dec;8(12):1492-8.
- 9) Demissie M, Kebede D. Defaulting from treatment at the Addis Ababa Tuberculosis Centre and factors associated with it. *Ethiop Med J* 1994 Apr;32(2):97-106.
- 10) Daniel OJ, Oladapo OT, Alausa OK. Default from tuberculosis treatment programme in Sagamu, Nigeria. *Niger J Med* 2006 Jan-Mar;15(1):63-7.
- 11) Reed JB, McCausland R, Elwood JM. Default in the outpatient treatment in two hospitals in Northern India. *J Epidemiol Community Health* 1990

Mar;44(1):20-3.

- 12) Jakubowiak WM, Bogorodskaya EM, Borisov ES, Danilova DI. Risk factors associated with default among new pulmonary TB patients and social support in six Russian regions. *Int J Tuberc Dis* 2007 Jan;11(1):46-53.
- 13) Steen TW, Mazonde. Pulmonary tuberculosis in

Kweneng District, Botswana: delays in diagnosis in 212 smear-positive patients. *Int J Tuberc Lung* 1998 Aug;2(8):627-34.

- 14) Lonnroth K, Thuong LM, Linh PD, Diwan VK. Utilization of private and public health-care providers for tuberculosis symptoms Ho Chi Minh, Vietnam. *Health Policy Plan* 2001 Mar;16(1):47-54.

Appendix

OPERATIONAL DEFINITIONS

Defaulter refers to patient whose treatment was interrupted for two or more consecutive months for any reason or in other words patients who fail to adhere to their drug. Non-defaulter refers to patient who adhered to their drug regimens.

Individual characteristics refer to socio-demographic attributes of individuals such as age, gender, occupation, education, ethnicity and religion.

Education is defined as formal education attendance of primary school, middle school, middle school, junior secondary school, senior secondary school and University.

Non-education refers to those who do not have any formal education and this category includes drop-outs from primary school.

Primary school education refers to those who complete a six year basic education and this category includes drop out from the middle school education.

Middle school education refers to those who complete ten years basic education and this category includes drop-outs from junior secondary school.

Occupation refers the job by which a respondent earns a living and this includes self-employed, civil servants and farmers.

Self-employed refers to those earning a living by working independently of an employer, either freelance or by running a business and this category includes un-employed who does any work that comes on his/her way for a living.

Civil servant refers to an employee in a government department.

Farmer refers to someone who owns or operates a farm and this category includes house wives who work on farms with their husbands.

Family support refers to social support, housing, food tokens, providing transport to treatment settings, peer assistance provided by family members.

Bad attitude of service providers refers to poorly developed health service, inadequate relationship between healthcare provider and patient, healthcare providers who are untrained, inadequately supervised or unsupervised in their tasks.

Good attitude of service providers refers to good relationship between patient and health providers, availability of expertise, links with patient support, and flexibility in the hours of operation.

Complacent refers to as satisfy, self-satisfied and unaware of possible dangers.

Distance refers to the interval between the homes of respondents and the treatment center and by WHO definition distance ≥ 8 km from a health facility is considered as a long distance and distances ≤ 8 km is considered as not long. This is because within the radius of 8km there should be a health facility for the people in that area.

Financial status refers to monetary state or the money at the disposal of the respondents.