Original Research Article

Knowledge, attitude and perception of tuberculosis management among tuberculosis-infected patients in resource constraint setting: field experience from Oyo state, South-West, Nigeria

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ABSTRACT

Background: Inadequate knowledge and misconceptions about tuberculosis (TB) contribute to the burden of the disease by influencing patients' behavior and attitude towards the disease and undermining infection control efforts. This study assesses the level of knowledge, attitude and perception of TB and its management among TB-infected patients.

Methods: A descriptive cross-sectional was used to interview 712 TB patients using a semi-structured questionnaire between June and October 2016. Bivariate and multivariate analyses were performed with SPSS version 20.

Results: About 70% had a good knowledge of TB. Patients' perception of stigma was high (37.5%). A high proportion of the patients had a poor perception of their illness (88%). Healthcare workers attitude was rated as satisfactory by 97.2% of respondents. Patients who had good knowledge about TB experienced high self-stigma (42%) compared to those who had poor knowledge (27.2%), p<0.05. Poor knowledge of TB was highest among relapse TB cases. Respondents with poor TB knowledge were less likely to be male (OR: 0.66; 95% CI: 0.46, 0.95), married (OR: 0.24; 95% CI: 0.10, 0.55; p=0.001) and have tertiary education (OR: 0.06; CI: 0.37, 0.87; p=0.010). Patients with good knowledge about HIV and in the richest wealth status were 91% less likely to have high perceived stigma (OR: 0.09, 95%CI: 0.02, 0.35; p=0.001).

Conclusions: The level of knowledge of TB among patients is satisfactory, however perception of illness is poor. Tuberculosis diagnosis can create self-stigma because of the fear of being isolated and discriminated which may determine the success of treatment.

Keywords: Knowledge, Attitude, Perception, Tuberculosis, Nigeria

INTRODUCTION

The end TB Strategy target is to accelerate the annual decline of TB incidence rates from 2% in 2015 to 10% per year by 2025.[1] This strategy addresses the challenges facing many countries with high tuberculosis (TB) burden including Nigeria, which remains one of the worst TB affected countries in the world.[2] Evidence suggests that the TB prevalence and mortality rates in Nigeria were previous underestimated.[3,4] Despite being ranked the 4th TB affected country in the world in 2009, it was estimated that 590,000 new TB cases were reported in 2015.[5,6] In order to stop the spread of TB in the country, the government of Nigeria has implemented various interventions aimed at early detection of TB and overall TB control.[7] Although these initiatives contribute greatly to the management of TB, several studies carried out in Nigeria and other countries have presented TB related challenges.[8-10] This includes patients' related factors such as inadequate TB knowledge as well as perceptions and attitude towards treatment.[10-12] Consistently, inadequate knowledge of TB treatment especially treatment duration has been associated with treatment interruption.[13] Sub-optimal patients' compliance is a practical implication of poor TB knowledge. In real terms, when patients observe improvement in their health arising from the effective use of TB-medications within few weeks of treatment at the DOT centres, they stop taking medication.[12] Patients whose treatment is interrupted remain infectious for longer period. They are more likely to relapse or succumb to tuberculosis as a result of treatment failure, hence foster the emergence of drug-resistant tuberculosis.[14]

Due to the serious negative consequences of TB on defaulters and its implications on the overall management of the disease, it is important to assess TB knowledge, attitude and perception among TB infected patients from a resource constraint setting in Nigeria. This information is important in providing insight on how added interventions and patient support can be provided to ensure that TB incidence and defaulting rates are reduced. With this in mind, this study sought to assess the level of knowledge, attitude and perception of TB among TB patients.

METHODS

This survey was a cross-sectional study of 712 TB patients sampled through a multistage sampling process. The first stage included the selection of local government areas (LGAs) from a sample frame of all the 16 LGAs in Ibadan and classifying the LGAs into strata with similar geographical and population characteristics before randomly selecting the LGAs. In the next stage, 25 DOT centres were randomly selected from the 16 selected LGAs. Consenting TB patients attending the DOT facility at the hospitals/health facilities were then recruited for the study. This study was conducted between June and October 2016. Data were collected with a pretested semi-structured questionnaire, which elicited information on socio-demographic characteristics of the patients, clinical profile of patients, TB knowledge and awareness, perceived TB illness and stigma, attitude of patients, health-seeking behavior and patients' satisfaction about TB services.

Selection criteria

Inclusion criteria

Inclusion criteria were patients 18 year-old or more; signed informed consent form after due explanations of the study purpose; participants currently on TB treatment; participant with all forms of TB including extra pulmonary TB (EP TB).

Exclusion criteria

Exclusion criteria were age less than 18 years old; unable to provide informed consent (e.g. unfamiliarity with language of patient information/consent forms mentally impaired).

Data management and analysis

The overall TB knowledge was assessed by summing TB knowledge related questions into a single knowledge variable. The questions about knowledge included: (1) availability of cure for TB, knowledge about vaccination for TB, if vaccination can protect against TB, knowledge of mode of TB transmission (through air when coughing or sneezing), knowledge of other preventions (covering mouth and nose when coughing or sneezing, good nutrition, but not by praying, closing windows at home, and to avoid shaking hands), ability to enumerate more than four of the following signs and symptoms for TB - cough that lasts longer than 3 weeks, coughing up blood, weight loss, fever, chest pain, shortness of breath.[2-6] A score of one (1) was given to correct responses and zero (0) for incorrect/do not know responses. Responses were added together for each respondent to generate a knowledge score ranging from a minimum of 0 to maximum of 6. Knowledge variables were then dichotomized as poor (score: 0-3) and good (score: 4-6). Similarly, patients' perceived stigma variable was computed using 10 questions that asked about the patients' thoughts or feelings about their social experiences or the reactions of others from having TB. The patients whose response was 'Yes' to a negative social experience or reaction were scored '1' and those who said 'No' were scored '0', with a total score of 10 points. Overall, perceived stigma was dichotomized as low stigma (Score: 0-5) and high stigma (score: 6-10). Illness perception of patients was evaluated using a 9-item illness perception of 5-point Likert scale. TB service was assessed by asking the patients about the quality of TB services offered, satisfaction with the environment, and health care workers attitude.

Data were analyzed with the statistical package IBM SPSS 20. Univariate analysis was conducted to describe all variables, while bivariate analyses were performed with Chi-Square test. The dependent variables were knowledge, perceived stigma and quality of service perception. A multivariate analysis employed backward step-wise model of binary logistic regression to identify predictors of the dependent variables. Statistical significance for association was set at $p<0.05$.

RESULTS

The mean age of respondent was 37.8 (SD: 13.7) years. Majority of respondents in the study were female (61.7%). The socio-demographic characteristics of respondents are presented in Table 1. Majority of the respondents in the study were either married or cohabiting, followed by those who were never married. Respondents who had secondary education as their highest level of education predominated the study (40.7%), followed by those who had primary education (25.4%) and tertiary education (25.4%). The respondents of Yoruba tribe predominated the study with 94.4%. The majority were in the poorer (47.5%) and middle wealth categories.

Table 2 presents the clinical profile of the patients. Out of the patients in the study, 7.4% were reactive to HIV. Majority of the patients (85.9%) were new TB cases on treatment, 7.4% were retreatment cases, while 6.7% were relapsed cases. Most (89.1%) of the patents were diagnosed of TB through microscopy, 3.7% through GeneXpert, 5.2% through Culture and 2% through molecular Line probe assay. More than 50% of the patients had been on treatment for 6-8 months, while 44.8% were on treatment for about ≤5 months, and 3% had been on treatment for more ≥9 months.

Table 3 presents information about knowledge of TB among the patients. Most respondents reported that they first learnt about TB from a health worker (32.2%). Other sources of information were radio (24.4%) and family, friend neighbor or colleagues (12.6%). More than two third of respondents reported that the information about TB was fully understandable (67.2%), and 26% said the information was partly understandable, while 6% could not understand the information. Of the respondents who said that the information was partly or not understandable, 31.5% felt that the information was too much and 28.6% said the information was not clear. Only about half (51.4%) reported that the information they received about TB was adequate. About 28.5% of the respondents perceived that TB infection is a common disease in their community. About 89% of the respondents said that TB diseases could be cured while the remaining proportion did not know if it could be cured. In addition, only about 60% believed that the TB vaccine could protect against TB. More than a third of patients (35%) did not have good knowledge of the mode

of transmission of TB; 16.3% had poor knowledge of ways to prevent the transmission of TB. Knowledge of signs and symptoms of TB was good among 68.3% of the respondents.

Majority of respondents (88%) reported that treatment for TB patients is accessible at government hospital. About 87.2% of the respondents said that 6 months was the duration of treatment for TB, while 2% reported 9 months duration for TB treatment. Overall, the percentage of respondents who had good knowledge about TB was approximately 70%. More male (74.6%) than female (66.5%) had significantly good knowledge about TB.

Few respondents had misconception about TB (Table 4). Some patients felt that TB could be transmitted by sharing dishes (13.9%), eating from the same plate (13.5%), and by touching items in public places. The misconceptions about preventions were; avoiding sharing dishes (19.5%) and hand washing after touching items in public places (36.5%).

Figures 1 and 2 present the stigma attitude among TB patients. It was observed that more than a quarter of the respondents (37.5%) experienced high stigma against 62.5% who experienced low stigma. About 59.7% of respondents felt ashamed of having TB; 72.9% were of the opinion that people who have HIV should be concerned about TB. Most of the respondents felt that TB could affect their social relations (50.7%), their work (54.2%) and even their marital relations (36%). Also, 32.4% felt that TB could affect their chances of getting married. Some of the patients however preferred to be isolated (18.4%). A high proportion (38.6%) felt that TB affects their family responsibilities. Most of the patients (88%) had a poor perception of their illness.

Table 5 presents the health-seeking behavior of the respondents. More than half (64.6%) reported that they usually seek care at a government clinic or hospital when ill, while 28.7% said they sought care at private clinics. Majority of the respondents (42.1%) reported that they generally seek health care at clinic or hospital monthly. Majority of the respondent rated the services offered at the TB Centre's as excellent (60.4%), very good (29.4%) and good (8.7%), only 1.5% rated the services as bad. Similarly, majority of the respondents rated the attitude of TB health care workers as positive (97.2%). More than a third (36.1%) reported that there were usually too many people taking treatment at the TB centres.

Bivariate and multivariate results

Table 6 shows results of association between independent factors and the dependent factors TB knowledge indicator and patient's self-stigma level. Age did not show any significant association with both TB knowledge and patient's stigma level. Educational status of patients was associated with TB knowledge, as poor knowledge about

TB was higher among those who had no formal education. Patient's whose home was more than 10 km away from a health facility had a greater proportion of patients who had poor TB knowledge compared to patients who lived closer to a health facility. Patients who were in the poorest wealth quintile had a higher tendency to experience high stigma compared to those who were either in the rich and richest wealth categories.

Table 1: Socio-demographic characteristic of the respondents stratified by sex.

	Frequency (n=712)	Percentage (%)	Male	Female	P value
Sex			38.3	61.7	
Age group					
18-24	107	15.6	15.9	15.8	
25-34	194	28.5	28.7	28.1	0.109
40-44	190	27.9	23.4	30.9	
≥45	190	27.9	32.1	25.3	
Marital status					
Never married	185	26.0	25.7	26.0	
Married/co-habiting	495	69.5	69.9	69.5	0.993
Separated/widowed/widower	32	4.5	4.4	4.6	
Family type					
a) Monogamous	468	65.7			
b) Polygamous	244	34.3			0.630
Total	712	100.0			
Educational status					
No formal education	60	8.4	9.6	7.7	
Primary	181	25.4	24.3	26.2	0.776
Secondary	290	40.7	41.5	40.1	
Tertiary	181	25.4	24.6	26.0	
Occupation					
a) Unemployed	50	7.0	9.9	5.2	
b) Student	102	14.3	13.6	14.8	
c) Trading	282	39.6	34.9	42.4	
d) Farming	32	4.5	5.1	4.1	0.039
e) Self-employed	177	24.9	23.9	25.5	
f) Civil servant	42	5.9	8.5	4.3	
g) Employed with private organization	27	3.8	4.0	3.6	
Religious					
a) Christian	339	47.6	49.3	46.5	
b) Islam	370	52.0	50.4	53.1	0.762
c) Traditional worshiper	3	0.4	0.4	0.5	
Ethnic group					
a) Yoruba	672	94.4	91.5	96.1	
b) Igbo	26	3.7	6.2	2.1	0.014
c) Hausa	14	2.0	2.2	1.8	
Distance from home to facility					
a) <5 km	261	36.7	37.9	36.0	
b) 5 km – 10 km	262	36.8	39.0	35.5	0.288
c) >10 km	189	26.5	23.2	28.5	
Wealth quintile					
Poorest	58	8.1	8.5	8.0	
Poorer	338	47.5	47.1	47.8	
Middle	232	32.6	32.4	32.6	0.710
Richer	63	8.8	8.1	9.3	
Richest	21	2.9	4.0	2.3	

Table 2: Clinical profile of the respondents.

	Frequency (n=712)	Percentage (%)	Male	Female	P value
HIV serostatus					
Reactive	50	7.4	8.6	6.7	
Non-reactive	582	86.2	85.6	86.8	0.650
Don't know	43	6.4	5.8	6.5	
Treatment classification					
Retreatment	49	7.4	7.9	6.9	
Relapse	44	6.7	6.3	6.9	0.863
New treatment	566	85.9	85.8	86.2	
Method of diagnosis					
Microscopy	583	89.1	89.1	89.1	
Genexpert	24	3.7	2.8	4.2	0.720
Culture	34	5.2	6.0	4.7	
LPA	13	2.0	2.0	2.0	
Duration of treatment					
0-5 months	296	44.8	43.	45.6	
6-8 months	343	52.0	51.8	52.2	0.183
>9 months	21	3.2	4.8	2.2	

Table 3: Patients knowledge about TB.

	Frequency	Percentage (%)	Male	Female	P value
Where respondent first learnt about TB					
Newspapers and magazines	44	6.2	5.5	6.4	
Radio	174	24.4	25.0	24.1	
TV	46	6.5	7.4	5.9	
Brochures, posters and other printed materials	60	8.4	8.1	8.7	
Health workers	229	32.2	31.6	34.6	0.705
Family, friends, neighbors and colleagues	90	12.6	14.3	11.6	
Religious leaders	9	1.3	0.4	1.8	
Teachers	20	2.8	3.3	2.5	
Others	40	5.6	4.4	4.3	
Information got about TB was understandable					
Yes fully	460	67.2	66.0	68.0	
Yes partly	178	26.0	26.0	25.8	0.636
No	47	6.9	8.0	6.2	
Why information about TB was partly or not understandable					
The information language used was difficult	37	15.4	15.2	15.5	
The information is not clear	69	28.6	23.9	31.1	
Too much information	76	31.5	27.2	34.5	0.133
Information was incorrect	9	3.7	5.4	2.7	
Information not complete	50	20.7	28.3	16.2	
Adequacy of information got about TB					
Adequate	366	51.4	51.5	51.5	
Not adequate	272	38.2	40.8	36.7	0.171
Don't know	74	10.4	7.7	11.8	
TB a common disease in the community					
Yes	203	28.5	34.2	25.1	
No	395	55.5	50.0	59.0	0.025
Don't know	114	16.0	15.8	15.9	
Total	712	100.0			

Continued.

	Frequency	Percentage (%)	Male	Female	P value
TB can be cured					
Yes	631	88.6	88.6	88.6	
No	42	5.9	7.0	5.2	0.408
Don't know	39	5.5	4.4	6.2	
Total	712	100.0			
There is vaccination against TB					
Yes	424	59.6	63.6	57.2	
No	174	24.4	23.2	25.3	0.180
Don't know	114	16.0	13.2	17.5	
Total	712	100.0			
TB vaccination protects against TB					
Yes	349	49.0	51.8	47.4	
No	186	26.1	26.1	26.2	0.373
Don't know	177	24.9	22.1	26.4	
Total	712	100.0			
Knowledge of mode of transmission					
Do not have good knowledge of transmission	249	35.0			
Have good knowledge of transmission	463	65.0			
Knowledge of transmission prevention					
Poor	116	16.3	15.4	16.6	0.676
Good	596	83.7	84.6	83.4	
Knowledge of Signs and symptoms of TB					
Poor knowledge of symptoms	226	31.7	28.7	33.5	0.180
Good knowledge of symptoms	486	68.3	71.3	66.5	
Any family member has TB					
Yes	81	11.4	13.2	10.3	
No	555	77.9	78.3	77.9	0.207
Don't know	76	10.7	8.5	11.8	
Any neighbors has TB					
Yes	97	13.6	14.7	13.0	
No	465	65.3	65.8	65.1	0.660
Don't know	150	21.1	19.5	21.9	
Any friend has TB					
Yes	96	13.5	14.0	13.2	
No	475	66.7	67.6	66.3	0.778
Don't know	141	19.8	18.4	20.5	
Knowledge of seriousness of TB disease					
Very serious	563	79.1	79.8	78.8	
Somewhat serious	60	8.4	7.0	9.1	0.450
Not very serious	49	6.9	6.2	7.3	
I have no idea	40	5.6	7.0	4.8	
Knowledge of Seriousness of problem of TB in the county or region					
Very serious	403	56.6	59.6	54.9	
Somewhat serious	137	19.2	19.5	19.1	0.492
Not very serious	61	8.6	7.4	9.1	
I have no idea	111	15.6	13.6	16.9	
Knowledge of number of types of TB					
One type	247	36.0	34.0	37.3	
Two types	270	39.3	40.4	38.7	
More than two	170	24.7	25.7	24.0	0.671
Total	687	100.0			
System	25				

	Frequency	Percentage (%)	Male	Female	P value
Where can TB patient get treatment					
Governmental hospital	629	88.3	88.6	88.2	
Private hospitals	10	1.4	1.8	1.1	0.795
Non-government organization clinic	20	2.8	2.9	2.7	
Don't know	53	7.4	6.6	8.0	
Reaction when diagnosed of TB					
Fear	379	55.7	53.8	56.8	
Surprise	173	25.4	26.5	24.7	
Shame	24	3.5	3.1	3.8	0.534
Embarrassment	45	6.6	8.5	5.5	
Sadness/hopelessness	60	8.8	8.1	9.3	
Who did you talk to about your illness					
Doctor or other medical workers	289	42.6	39.8	44.1	
Spouse	125	18.4	18.4	18.5	
Parent	129	19.0	21.1	17.7	
Children	24	3.5	3.8	3.4	0.608
Other family members	36	5.3	5.4	5.3	
Close friend	68	10.0	11.1	9.4	
No one	8	1.2	0.4	1.7	
Total	679	100.0			
Knowledge of duration of treatment of TB					
Less than 3 months	20	2.9	3.0	2.8	
3 months	24	3.5	2.7	3.8	
6 months	601	87.2	89.0	86.3	0.743
9 months	11	1.6	1.1	1.9	
Year	11	1.6	1.9	1.4	
Don't know	22	3.2	2.3	3.8	
TB knowledge indicator					
Good knowledge	495	69.5	74.6	66.5	0.022
Poor knowledge	217	30.5	25.4	33.5	

Table 4: **Respondent misconception about TB.**

	Frequency	Percentage (%)
TB transmitted through handshake	47	6.6
TB transmitted by sharing dishes	99	13.9
TB transmitted through eating from the same plate	96	13.5
TB transmitted through touching items in public	78	11.0
Prevented by avoiding to shake hands	48	6.7
Prevented by avoiding sharing dishes	139	19.5
Washing hands after touching items in public places	260	36.5
Prevented by praying	65	9.1
TB can be cured by herbal remedies	16	2.2
TB can be cured by praying	60	8.4

Knowledge of TB was significantly associated with self-stigma attitude of patients, as patients who had good knowledge about TB experienced high self-stigma (42%) compared to those who had poor knowledge (27.2%). The result showed that TB quality of service as perceived by the patients was associated with knowledge of TB and patient's self-stigma (Table 6).

Table 7 showed that there was an association between the treatment classifications of patients with TB knowledge.

Among the patients with poor knowledge, the relapse cases were significantly higher (52.3%) than those who were on either new treatment (28.6%) or retreatment (36.7%). Table 8 shows that knowledge and stigma attitude was related with perception of quality of service.

Table 9 shows the predictors of poor knowledge of TB among patients. There was a significantly lower odds of having poor TB knowledge among males (OR: 0.66; 95% CI: 0.46, 0.95; p=0.027), married/cohabiting respondents

(OR: 0.24; CI: 0.10, 0.55; p=0.001) and either separated and or patients who lost a spouse (OR: 0.30; CI: 0.14, 0.66; p=0.003) compared to those who were never married. Patients who had tertiary education as their highest level of education were significantly less likely to have poor TB knowledge. With respect to self-stigma of the patients, only wealth quintile remained significant in predicting high self-stigma of the patients (Table 10). Patients in the richest wealth category had a much lesser odds of experiencing high self-stigma compared to respondents in the poorest wealth category (OR: 0.091, CI: 0.02, 0.35; p=0.001).

Table 5: Health seeking behavior and TB service assessment.

	Frequency	Valid percentage (%)
Where do you usually go if you are sick		
Private clinic	204	28.7
Government clinic or hospital	460	64.6
Traditional healer	41	5.8
Clinic run by non-governmental organization	7	1.0
Total	712	100.0
How often do you generally seek health care at a clinic or hospital		
Monthly or more	300	42.1
Four times a year or more	134	18.8
Twice a year or more	109	15.3
Once per year	84	11.8
Less than once a year but at least twice in past 5 years	22	3.1
Once in past 5 years	26	3.7
Never in past 5 years	37	5.2
Total	712	100.0
What do you think about TB center services offered		
Excellent	430	60.4
Very good	209	29.4
Good	62	8.7
Bad	11	1.5
Total	712	100.0
What do you think about TB health care workers attitude		
Positive	692	97.2
Negative	20	2.8
Total	712	100.0
What do you think about TB center appearance		
Excellent	326	45.8
Very good	237	33.3
Good	138	19.4
Bad	11	1.5
Total	712	100.0
What do you think about number of people seeking treatment in TB center		
Too many	257	36.1
Many	286	40.2
Few	159	22.3
Very few	10	1.4
Total	712	100.0
What do you think about waiting time in TB center		
15 minutes	312	45.9
15 – 30 minutes	247	36.4
30 minutes – 1 hour	106	15.6
More than 2 hours	14	2.1
Total	679	100.0
TB service assessments		
Poor service	181	25.4
Good service	531	74.6

Table 6: Association between socio-demographic factors and TB knowledge and patients' perceived stigma level.

	General knowledge about TB			Patients perceived-stigma level		
	Good	Poor	Chi-square (df)	Low stigma	High stigma	P value
Sex						
Male	41.0	59.0	p=0.022	37.2	62.8	0.439
Female	31.9	68.1		40.1	59.9	
Age group						
18-24	74.0	26.0	P=0.329	65.2	34.8	0.962
25-34	71.2	28.8		63.4	36.6	
35-44	69.5	30.5		62.3	37.7	
≥45	66.8	33.2		61.1	38.9	
Total						
Marital status						
Never married	71.9	28.1	P=0.001	62.7	37.3	0.998
Married/co-habiting	70.5	29.5		62.4	37.6	
Separated/widowed/widower	40.6	59.4		62.5	37.5	
Total						
Family type						
a) Monogamous	65.4	34.6	P=0.001	63.7	36.3	0.370
b) Polygamous	77.5	22.5		60.2	39.8	
Total						
Educational status						
No formal education	63.3	36.7	P=0.023	56.7	43.3	0.201
Primary	66.3	33.7		57.5	42.5	
Secondary	75.9	24.1		64.1	35.9	
Tertiary	64.6	35.4		66.9	33.1	
Total						
Occupation						
a) Unemployed	72.0	28.0	P=0.739	46.0	54.0	0.175
b) Student	74.5	25.5		62.7	37.3	
c) Trading	68.4	31.6		63.1	36.9	
d) Farming	71.9	28.1		62.5	37.5	
e) Self-employed	65.5	34.5		64.4	35.6	
f) Civil servant	73.8	26.2		73.8	26.2	
g) Employed with private organization	74.1	25.9		55.6	44.4	
Total						
Religious						
a) Christian	69.0	31.0	P=0.506	59.3	40.7	0.112
b) Islam	69.7	30.3		65.1	34.9	
c) Traditional worshiper	100.0			100.0		
Total						
Distance from home to facility						
a) <5 km	70.5	29.5	P=0.001	62.1	37.9	0.535
b) 5 km – 10 km	75.6	24.4		64.9	35.1	
c) >10 km	59.8	40.2		59.8	40.2	
Total						
Wealth quintile						
Poorest	72.4	27.6	P=0.424	36.2	63.8	<0.001
Poorer	67.2	32.8		63.9	36.1	
Middle	70.7	29.3		66.8	33.2	
Richer	69.8	30.2		57.1	42.9	
Richest	85.7	14.3		81.0	19.0	
Total						
TB knowledge indicator						
Good knowledge				58.0	42.0	<0.001
Poor knowledge				72.8	27.2	

Table 7: Association between patients' clinical profile and TB knowledge.

	TB knowledge		
	Good	Poor	P value
HIV serostatus			
Reactive	76.0	24.0	0.267
Non-reactive	69.4	30.6	
Don't know	60.5	39.5	
Treatment classification			
Retreatment	63.3	36.7	0003
Relapse	47.7	52.3	
New treatment	71.4	28.6	
Method of diagnosis			
Microscopy	69.8	30.2	0.009
Genexpert	50.0	50.0	
Culture	85.3	14.7	
LPA	46.2	53.8	
Duration of treatment			
0-5 months	66.9	33.1	0.282
6-8 months	72.0	28.0	
>9 months	61.9	38.1	

Table 8: Association between TB knowledge and patients' perceived stigma level with TB quality of service perception.

	TB quality of service perception		
	Poor perception	Good perception	P value
TB knowledge indicator			
Good	28.3	71.7	0.008
Poor	18.9	81.1	
Patient's perceived-stigma level			
Low stigma	22.5	77.5	0.020
High stigma	30.3	69.7	

Table 9: Predictors of poor knowledge of TB.

	AOR	90% confidence interval	P value
Male sex	0.66	0.46, 0.95	0.027
Marital status			
Never married	1		0.004
Married/co-habiting	0.244	0.10, 0.55	0.001
Seperated/widowed	0.306	0.14, 0.66	0.003
Family type			
Monogamous family type	1.80	1.23, 2.64	0.002
Educational status			
No formal education	1		0.050
Primary	1.01	0.52, 1.96	0.969
Secondary	0.84	0.52, 1.37	0.504
Tertiary	0.56	0.37, 0.87	0.010
Distance from home to facility			
a) <5 km	1		0.008
b) 5 km – 10 km	0.67	0.43, 1.02	0.064
c) >10 km	0.53	0.34, 0.81	0.002

Chi-s = 46.332, df=12, p=0.000, Nagelkerke R-square =0.093; Note: Factors in the equation include sex, age group, marital status, family type, educational status, occupation and distance from facility.

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Table 10: Predictors for high perceived-stigma.

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	AOR	90% confidence interval	P value
Wealth quintile			
Poorest	1		0.000
Poorer	0.308	0.16, 0.56	0.000
Middle	0.267	0.14, 0.50	0.000
Richer	0.377	0.17, 0.81	0.012
Richest	0.091	0.02, 0.35	0.001
Poor knowledge of TB	0.511	0.35, 0.73	0.000

Chi-square = 36.568,df=6, p=0.000, Nagelkerke R-square =0.071; Note: Factors in the equation include sex, age group, marital status, family type, educational status, occupation and distance from facility, and knowledge of TB.

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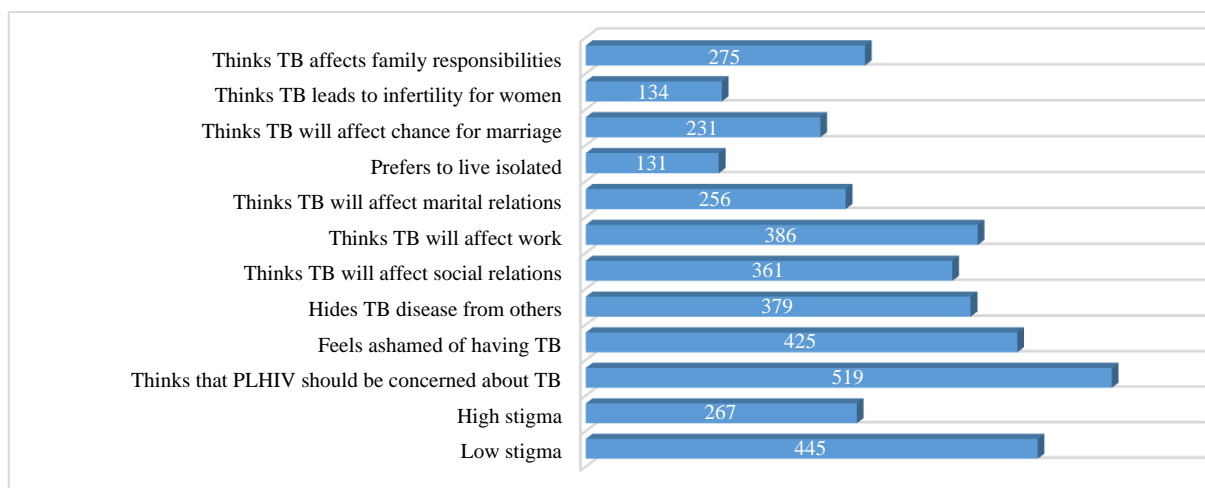
Figure 1: Patients perceived-stigma attitude and perception.

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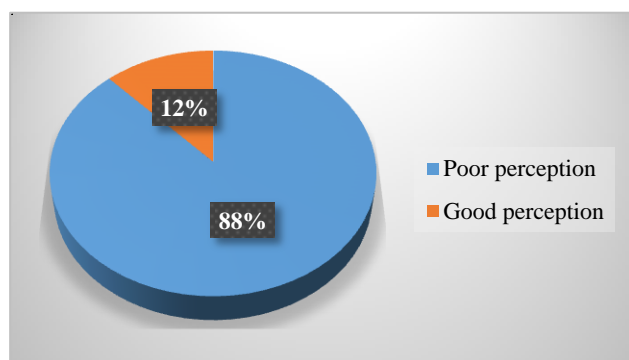
Figure 2: Patients illness perception.

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DISCUSSION

We observed that the level of knowledge of patients about TB in the study was high. This finding is contrary to some studies conducted in northern Nigeria.[13,14] However, studies have shown that poor knowledge of TB could contribute to high burden of TB due to patients' poor health seeking behavior such as looking for inappropriate care.[15,16] Although many patients understand the need to seek care in approved health institutions, it has been shown that they do not fully assimilate the information they are receiving from the health care providers. This could be linked to lack of comprehension on TB information on the part of either the patient or nurse due to insufficient training on TB.[17,18] In a setting where the knowledge of healthcare staff is limited, this may in turn limit the extent of information that is communicated, and how well the information is communicated to the patients. Ibrahim et al has shown a link between knowledge of health care workers and patients' acceptability of counselling and treatment compliance.[19]

The high proportion of poor perception of TB illness observed in this study is striking. This can have very adverse influence on health and recovery of patients because it can hugely influence treatment compliance.

More than a third of patients in the present study did not have good knowledge of the mode of transmission of TB. This finding correlates with other findings.[20] Similar to other studies, our study found that sharing of toothbrushes, handshakes, sharing of dishes, touching of items in public places, and through sexual intercourse were reported as modes of transmission of TB.[21,22] Nonetheless, a high proportion of the patients noted that TB is a curable disease. The awareness that TB disease has a cure can create motivation to continue to take treatment. Another fair proportion affirmed that there is a

vaccine for TB. The Bacillus-Calmette Guerin (BCG) is a vaccine primarily used to protect against tuberculosis among children. BCG is however, not normally given to adult except people who are at very high risk of exposure to TB. The BCG vaccine does not prevent primary infection and, more importantly, does not prevent reactivation of latent pulmonary infection, the principal source of bacillary spread in the community.[23] Educating people about TB infection will enhance their knowledge or experience of the disease which will ultimately dispel myths and promote prevention habits.

The socio-demographic factors such as marital status, educational status, family type and distance to facility of patients were significant predictors for poor knowledge of TB after controlling for other factors. Age group, marital status, family type, educational status, occupation and distance from facilities. Patients who have been married before are less likely to have poor knowledge of TB compared to the never married patients after controlling for age group, family type, educational status, occupation and distance from facility. On the one hand, this finding might be attributed to the fact that married patients or those who have been married before and lost their spouses have had additional information from their partners during their interactions. On other hand, being married or in union creates the need or interest in seeking for answers to health issues and solutions.

Stigma is often recognized as an important barrier to successful care of people affected by tuberculosis. Tuberculosis has been and is still considered as a 'dirty disease', 'a death penalty' or as affecting 'guilty people'.[24,25] We found that more than a third of patients experienced self-stigma in this study. Continuous patients' counselling is important in reducing self-stigmatization.[19,26] It is disturbing to find that having knowledge about TB disease is not a protective factor to how patients perceive stigma. This might be because patients' awareness and deeper understanding of their illness might predispose them to negative psychological feelings like anxiety, depression and fear. It is thus highly recommended that pre-diagnostic and treatment counselling be taken very seriously in management of TB patients. This will eliminate the perception of anxiety and fear of stigma resulting from understanding of their disease. Perceived stigma was also associated with the wealth status of patients. Patients who are better off economically could easily whether off stigma.

Patients' satisfaction of quality of service is a testimonial of a more effective and efficient service delivery for TB management in the city. Majority of patients observed that TB quality of service was good. However, the perception of quality of service can be influenced by several factors.

In conclusion, the level of TB knowledge among TB-infected patients is satisfactory but perception of illness is poor. The high level of self-stigma observed in this study could create fear of being isolated and discriminated which may negatively affect treatment outcomes. The factors that predispose to poor TB knowledge are educational status, marital status and family type. Wealth status and poor knowledge are risk factors for perceived self-stigma. Programmes that are implementing intervention for TB need to be sensitive to the psycho-social environment of their patients in order to improve TB treatment outcomes.

REFERENCES

1. Word Health Organization (WHO). Tuberculosis Fact Sheet (No. 104) 2000. Available at: www who int/mediacentre/factsheets/who104/en/index.html. 2016.
2. Onyedum CC, Alobu I, Ukwaja KN. Prevalence of drug-resistant tuberculosis in Nigeria: A systematic review and meta-analysis. PloS One. 2017;12(7):e0180996.
3. Adamu AL, Gadanya MA, Abubakar IS, Jibo AM, Bello MM, Gajida AU, et al. High mortality among tuberculosis patients on treatment in Nigeria: a retrospective cohort study. BMC infectious diseases. 2017;17(1):170.
4. World health Organization (WHO). Global tuberculosis report 2013: World Health Organization; 2013.
5. Pathmanathan I, Dokubo EK, Shiraishi RW, Agolory SG, Auld AF, Onotu D, et al. Incidence and predictors of tuberculosis among HIV-infected adults after initiation of antiretroviral therapy in Nigeria, 2004-2012. PloS one. 2017;12(3):e0173309.

6. World Health Organization (WH0). Global tuberculosis control: a short update to the 2009 report. 2009.
7. Agho KE, Hall J, Ewald B. Determinants of the knowledge of and attitude towards tuberculosis in Nigeria. J Health, Population, Nutrition. 2014;32(3):520.
8. Kigozi G, Heunis C, Chikobvu P, Botha S, van Rensburg D. Factors influencing treatment default among tuberculosis patients in a high burden province of South Africa. Int J Infect Dis. 2017;54:95-102.
9. Akeju OO, Wright SC, Maja TM. Lived experience of patients on tuberculosis treatment in Tshwane, Gauteng province. Health SA Gesondheid (Online). 2017;22:259-67.
10. Alobu I, Oshi SN, Oshi DC, Ukwaja KN. Risk factors of treatment default and death among tuberculosis patients in a resource-limited setting. Asian Pacific J Trop Med. 2014;7(12):977-84.
11. Kebede EB, Sambi M. Treatment defaulter rate and associated factors among tuberculosis patients on follow up attending justh tuberculosis clinic. Journal of Infectious Diseases and Immunity. 2017;9(1):1-6.
12. Fatiregun AA, Ojo AS, Bamgboye AE. Treatment outcomes among pulmonary tuberculosis patients at treatment centres in Ibadan, Nigeria. Annals of African Med. 2009;8(2).
13. Ibrahim LM, Hadejia IS, Nguku P, Dankoli R, Waziri NE, Akhimien MO, et al. Factors associated with interruption of treatment among Pulmonary Tuberculosis patients in Plateau State, Nigeria. Pan African Med J. 2014;17(1):78.
14. Jibrin YB, Gwalabe SA, Dunga JA, Abdull MM. Treatment outcome of pulmonary tuberculosis patients in a tertiary hospital in Bauchi Northeastern Nigeria. J Med Med Sci. 2017;8(3):25-30.
15. Van Cutsem G, Isaakidis P, Farley J, Nardell E, Volchenkov G, Cox H. Infection control for drug-resistant tuberculosis: early diagnosis and treatment is the key. Clin Infect Dis. 2016;62(3):238-43.
16. Edginton M, Sekatane C, Goldstein S. PatientsÕ beliefs: do they affect tuberculosis control? A study in a rural district of South Africa. Int J Tuberculosis Lung Dis. 2002;6(12):1075-82.
17. Abebe G, Deribew A, Apers L, Woldemichael K, Shiffa J, Tesfaye M, et al. Knowledge, health seeking behavior and perceived stigma towards tuberculosis among tuberculosis suspects in a rural community in southwest Ethiopia. PloS one. 2010;5(10):e13339.
18. Tobin-West CI, Isodje A. Quality and rural-urban comparison of tuberculosis care in Rivers State, Nigeria. Pan African Med J. 2016;24(1):60.
19. Ibrahim LM, Hadjia IS, Nguku P, Waziri NE, Akhimien MO, Patrobas P, et al. Health care workers' knowledge and attitude towards TB patients under Direct Observation of Treatment in Plateau state Nigeria, 2011. Pan African Medical J. 2014;18(1):8.
20. Mulogo EM, Nahabwe C, Bagenda F, Batwala V. Determinants of treatment completion among rural smear positive pulmonary tuberculosis patients: a cross-sectional survey conducted in south-western Uganda. Infectious diseases of poverty. 2017;6(1):104.
21. World Health Organization. Global tuberculosis report 2016. 2016.
22. Kigozi NG, Heunis JC, Engelbrecht MC, van Rensburg APJ, van Rensburg HD. Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. BMC Public Health. 2017;17(1):795.
23. Tasnim S, Rahman A, Hoque F. Patient's knowledge and attitude towards tuberculosis in an urban setting. Pulmonary Med. 2012;2012.
24. Wandwalo E, Mørkve O. Knowledge of disease and treatment among tuberculosis patients in Mwanza, Tanzania. Int J Tuberculosis Lung Dis. 2000;4(11):1041-6.
25. Wang J, Fei Y, Shen H, Xu B. Gender difference in knowledge of tuberculosis and associated health-care seeking behaviors: a cross-sectional study in a rural area of China. BMC Public Health. 2008;8(1):354.
26. Hoa NP, Thorson AE, Long NH, Diwan VK. Knowledge of tuberculosis and associated health-seeking behaviour among rural Vietnamese adults with a cough for at least three weeks. Scandinavian J Public Health. 2003;31(62):59-65.