

## ORIGINAL ARTICLE

# Knowledge, Attitude and Preventive Practices Regarding Tuberculosis and Its Predictors among HIV Patients in General Hospital, Minna, North-Central, Nigeria

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## ABSTRACT

**Introduction:** Tuberculosis is the commonest cause of death among HIV patients in Nigeria. Though tuberculosis is common among HIV patients, their knowledge about transmission and prevention is poor. **Objective:** To determine knowledge, attitude and preventive practices regarding tuberculosis and its predictors among HIV patients receiving treatment. **Methods:** A cross sectional study was carried out involving 226 randomly selected HIV patients receiving care at General Hospital, Minna. Study duration was from June 2015 to July 2017. Data on socio-demographic characteristics, psychosocial factors, knowledge, attitude and preventive practices regarding tuberculosis was collected using a self-administered, WHO modified, pretested and validated questionnaires. Data collected was analysed using SPSS version 22. **Results:** Out of 226 respondents, 60(26.5%) had poor knowledge, 123(54.4%) had negative attitude and 48(21.2%) had poor preventive practices regarding tuberculosis. The predictors of knowledge were age ( $B=0.087$ ,  $95\%CI=0.031, 0.143$ ,  $p=0.002$ ), depression ( $B=-0.444$ ,  $95\%CI=-0.673,-0.214$ ,  $p<0.001$ ) monthly income ( $B=-0.058$ ,  $95\%CI=-0.095, -0.021$ ,  $p=0.002$ ) and marital status ( $B=-1.276$ ,  $95\%CI=-2.525,-0.025$ ,  $P=0.046$ ). The predictors of attitude were anxiety ( $B=-0.395$ ,  $95\%CI=-0.584, -0.206$ ,  $p<0.001$ ), cigarette smoking ( $B=4.473$ ,  $95\%CI=0.992, 7.954$ ,  $p=0.012$ ) and duration of HIV infection ( $B=0.371$ ,  $95\%CI=0.110, 0.631$ ,  $p=0.005$ ). The predictors of practice were depression ( $B=-0.176$ ,  $95\%CI=-0.276, -0.076$ ,  $p=0.001$ ), cigarette smoking ( $B=2.200$ ,  $95\%CI=0.926, 3.474$ ,  $p=0.001$ ) and duration of HIV infection ( $B=0.098$ ,  $95\%CI=0.003, 0.194$ ,  $p=0.043$ ). **Conclusion:** Overall, knowledge and practices regarding tuberculosis prevention were good, but attitude was poor. The predictors of knowledge, attitude and preventive practices were age, depression, anxiety, cigarette smoking, monthly income, marital status and duration of HIV infection.

**Keywords:** Tuberculosis, HIV, Knowledge, Attitude, Practice

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## INTRODUCTION

Tuberculosis is a disease of major public health concern and the leading cause of death in people living with HIV/AIDS (1). It is the most common opportunistic infection among HIV-infected persons (2). The probability of developing tuberculosis in HIV-infected persons is

much higher than those that are HIV negative (3), mainly because of their immune compromised status. Tuberculosis is a major health challenge worldwide, but most importantly in sub-Saharan Africa where there is a significant upsurge of the disease because of the HIV epidemic (4). Globally, in 2015 an estimated 1.2 million, representing 11% of all new tuberculosis cases were recorded among people living with HIV. Additionally, 400,000 deaths occurred due to TB among people living with HIV (5). HIV is the most important risk factor in the activation of latent TB and the development of active tuberculosis among people living with HIV (6). Nigeria

is among the tuberculosis high burden countries with an estimate of 586,000 new cases of TB in 2015. A total of 90,584 of all forms of TB were registered in 2015, out of which 14,846 cases were HIV positive (5).

The lack of knowledge amongst people living with HIV about tuberculosis is associated with high transmission and delay in health-seeking behaviour (7). Previous studies done to assess knowledge, attitude and practice regarding tuberculosis revealed that knowledge was poor and considered to be a serious challenge to tuberculosis control programs (8-10). Though the level of awareness about tuberculosis in Nigeria is as high as 93% (10), yet it has remained a major infectious disease of public health concern. There is paucity of research to determine TB knowledge, attitude and prevention practices among HIV patients in Nigeria. Parts of the research and the results of the study to determine the effectiveness of the intervention program have been submitted for publication elsewhere. This paper describes the baseline knowledge, attitude and preventive practices regarding tuberculosis and its predictors among HIV patients receiving treatment and care in General Hospital, Minna, North-Central Nigeria.

## MATERIALS AND METHODS

### Study location and study design

A cross sectional study involving 226 randomly selected HIV patients receiving treatment and care at General Hospital, Minna, was conducted from June 2015 to July 2017. The hospital is the largest referral hospital in the state, established in 1926. It is a 300-bed capacity hospital providing both secondary and tertiary health care services. The hospital provides comprehensive antiretroviral (ART) services including voluntary counselling and testing, prevention of mother to child transmission of HIV, pharmaceutical and laboratory services and capacity building. It also provides a wide range of tuberculosis services including Directly Observed Treatment Short Course Strategy (DOTS), sputum smear microscopy, radiological services, counselling and training. The comprehensive HIV/AIDS treatment centre is the first of its type in the state, established in May 2007, and has registered 8,426 HIV positive patients for treatment and care between 2007 – December, 2014.

### Sample size and sampling method

Sample size estimation was done using the two proportion formula for hypothesis testing as described by Lemeshow *et al*, 1990(11). Knowledge regarding tuberculosis was the outcome variable that provided the highest sample size of 95 per group (190 for the two arms). The sample size was increased to 226 to account for approximately 16% attrition taking into consideration of reports of dropout rates from similar studies (12 - 14). A simple random sampling method was used to select eligible participants. The sample frame comprised of

a list of 603 HIV patients receiving treatment and care in the preceding 2 years (from 1<sup>st</sup> July 2013 to 30<sup>th</sup> June 2015) at the study centre. Twenty-one respondents were dropped for not meeting eligibility criteria leaving 582 patients. The random sample was selected using a computer-based random number generator (<http://www.randomizer.org>) used by earlier researchers (15). The selection was achieved in two stages: in the first stage, 291 patients were randomly selected giving each respondent an equal chance of being selected. In the second stage, 226 respondents were finally selected from the 291 patients who were selected in the first stage, still ensuring an equal chance for each potential study participant using same computer generator program. Simple randomization technique was used to randomly allocate the 226 selected respondents into an intervention and a control group of 113 participants each. Written allocation was used with identification codes in sealed brown opaque envelopes. Baseline data that was used for this study was collected after randomising respondents into groups. The code numbers were used to identify participants on the questionnaire while maintaining confidentiality.

## Data collection

### Inclusion and exclusion criteria

The inclusion criteria were registered HIV patient's age 18 years and above accessing treatment and care at the Hospital. Those excluded were HIV patients co-infected with tuberculosis or psychiatric disorders or cognitively impaired persons.

## Variables

### Dependent variables

Knowledge, attitude and preventive practice regarding tuberculosis

### Independent variables

Age, gender, occupation, educational level, religion, monthly income, marital status, ethnicity, place of residence, smoking, duration of HIV infection and anxiety and depression.

## Instruments

A self-administered, validated and pre-tested questionnaire consisting of six sections was used for data collection. Baseline data that was used for this study was collected after randomising respondents into groups. Those that could not read or write were assisted and questions were read out to them in the local language (Hausa) using the translated version and filled according to their choice. Section A covered socio-demographic variables, Section B covered TB-related knowledge, Section C covered questions related to attitude towards TB, Section D covered preventive practices related to TB, Section E covered questions related to anxiety and depression and Section F covered

clinical and laboratory parameters. Section A had 13 statements on socio-demographic variables. Section B on TB knowledge had 24 statements with 'Yes' or 'No' options. Section C had 9 questions relating to the attitude of participants towards tuberculosis. The responses were on a 5-point Likert scale with the options: strongly agree, agree, neutral, disagree and strongly disagree. Section D had statements on the preventive practices of patients relating to tuberculosis prevention with 'Yes' or 'No' options. Section E had statements on the hospital anxiety and depression (HAD) scale with the options 0,1,2,3 for each statement. The last section E contained information relating to the patient clinical and laboratory parameters. The questionnaire was a modified version of WHO tool: a guide to developing knowledge, attitude and practice surveys (16). The section of the questionnaire on anxiety and depression was adopted from the study on the validation of Hospital anxiety and depression rating scale among HIV/AIDS patients at Kano, Nigeria (17). The questionnaire was face validated based on responses from 10 HIV patients that did not participate in the study. Out of 10 HIV patients, 9 rated the questionnaire as good. The questionnaire was reviewed by a panel of experts in HIV and TB-related research and through consensus agreed that the existing items in each section were valid and measured knowledge relating to TB, attitude toward TB and preventive practices regarding tuberculosis, anxiety and depression and clinical and laboratory parameters of respondents. Reliability assessment was carried out using the Cronbach's alpha reliability analysis for internal consistency. The results showed Cronbach's coefficient alpha for knowledge, attitude, preventive practices, anxiety, and depression of 0.847, 0.777, 0.792, 0.733 and 0.811 respectively.

### **Operational definitions**

**Knowledge:** meaning of TB infection, cause, transmission, prevention, and control, treatment, knowing reasons for treatment, duration of treatment and consequences of stopping treatment.

**Attitude:** feelings, or reaction of HIV patients regarding tuberculosis and TB patients.

**Preventive practices:** the use of protective devices such as face mask in overcrowded environment or hospital setting, use of isoniazid preventive therapy and routine screening for TB.

### **Ethics**

Ethical clearance to conduct the study was obtained from Universiti Putra Malaysia, Ethics Committee for Research Involving Human Subjects and Niger state Ministry of health human research ethics committees. Written informed consent was received from each participant before the conduct of the study. The consent form was made available in English and the widely spoken local Hausa language.

### **Data analysis**

Data analysis was conducted using SPSS version 22. The correct responses for knowledge of the respondents were assigned 1 and incorrect responses assigned 0. The responses were added together to generate a total knowledge score ranging from minimum of 0 to maximum 24 and the overall score was dichotomized using 50% as a cut-off value (18). Those who had 50% and above of correct responses to the questions were coded '1' for good knowledge and below 50% coded '0' for poor knowledge regarding tuberculosis. Similarly, the correct responses to preventive practices were assigned 1 and wrong responses assigned 0. This was summed up to generate practice score ranging from minimum of 0 to maximum of 9 and the overall score dichotomized using 50% as a cut-off value. Those with correct responses to the questions of 50% and above were coded as '1' for good preventive practices and those below 50% coded as '0' for poor preventive practices regarding tuberculosis. Responses to attitude were on a 5-point Likert scale and summed up to generate attitude score ranging from minimum of 9 and maximum of 45, and the overall score dichotomized using mean as the cut-off point (19). Those that had scores equal or above the mean score were considered to have positive attitude and those with scores below the mean score as having negative attitude. Anxiety and depression were also categorized into normal, borderline and probable cases using scores from 0-7, 8-10 and 11 and above respectively based on the classification of hospital anxiety and depression (HAD) scale (20).

Normality tests were conducted for all continuous variables using graphical and statistical methods. The normality test conducted on the outcome variables showed that the data was normally distributed among the respondents. Descriptive statistics in analysing socio-demographic variables and knowledge, attitude and preventive practices are presented in tabular form as frequencies, percentages and mean.

Simple linear regression analysis was conducted to determine the significant predictors for each of the outcome variables, including knowledge, attitude and preventive practices regarding tuberculosis. Independent variables regressed against the outcome variables with p-value < 0.25 recommended by Hosmer-Lemeshow (21) were selected to enter the multiple linear models for knowledge, attitude and practice respectively. Multiple linear regression analysis was conducted to determine the predictors of the outcome variables. The assumptions of multiple linear regression tested were normality of distribution of the outcome variables, linearity of independent and dependent variables, linearity of errors, multi-collinearity of independent variables and homogeneity of variances. These assumptions were met before the analysis was conducted. Dummies were created for categorical variables to allow their usage in regression analysis. The results of analysis were

expressed as unstandardized B coefficient with its 95% confidence intervals. The level of significance was set at 0.05. Stepwise, forward and backward variable selection methods were used to get the best final model.

**RESULTS**

A total of 226 respondents that were selected, all participated and completed the questionnaire giving a response rate of 100%. Table I shows that the mean age of respondents for this study was 38 years and ranged between 36.6 and 39.3 years. Out of the 226

respondents, 152 (67.3%) were females. The three (3) main indigenous ethnic groups Gwari, Nupe and Hausa constituted 135 (59.7%) of the sample population while the remaining 91 (40.3%) were other minor tribes. Majority 144 (63.3%) resided in urban areas, 135 (59.7%) were Muslims and 91 (40.3%) were Christians. Majority 162 (71.7%) of the respondents were married. The results also showed that 99 (44.8%) of the respondents have had either primary or have not had any formal education. The main occupations of respondents were trading 71 (31.4%), housewives 55 (24.3%) and 39 (17.4%) were civil servants.

**Table I.** Socio-demographic characteristics of the respondents (N=226)

Characteristics	Frequency (n)	Percentage (%)
<b>Age</b>		
<30	49	21.7
30 – 39	85	37.6
40 – 49	49	21.7
50 – 59	35	15.5
≥60	8	3.5
<b>Gender</b>		
Male	94	32.7
Female	152	67.3
<b>Ethnicity</b>		
Hausa	45	19.9
Nupe	44	19.5
Gwari	46	20.4
Others	91	40.3
<b>Educational level</b>		
No formal education	48	22.2
Primary	51	22.6
Secondary	84	37.2
College/University	43	19.0
<b>Religion</b>		
Islam	135	59.7
Christianity	91	40.3
<b>Occupation</b>		
Civil servant	39	17.3
Farmer	14	6.2
Housewife	55	24.3
Students	19	8.4
Trader	71	31.4
Not employed	23	10.2
Others	5	2.2
<b>Marital status</b>		
Single	30	13.3
Married	162	71.7
Separated	8	3.5
Divorced	4	1.8
Widowed	22	9.7

<b>Place of residence</b>		
Urban	144	63.7
Rural	82	36.3
<b>Smoke cigarette</b>		
Yes	8	3.5
No	218	96.5
<b>Duration of HIV infection</b>		
12 months and below	116	51.3
13 – 36 months	62	27.4
37 months and above	48	21.2
<b>Monthly income ('1000)</b>		
<18	137	60.6
>18.1	89	39.4

Table II shows that 108 (47.8%) and 72 (31.9%) of respondents are probable cases of anxiety and depression respectively. However, other respondents were classified as either normal or borderline based on the hospital anxiety and depression (HAD) scale.

**Table II.** Psychosocial factors (Anxiety and Depression) of the respondents (N=226)

Variables	Frequency (n)	Percentage (%)
<b>Anxiety</b>		
normal	54	23.9
borderline	64	28.3
Probable cases	108	47.8
<b>Depression</b>		
normal	46	20.4
borderline	108	47.8
Probable cases	72	31.9

Table III shows that out of 226 respondents, 60 (26.5%) of the respondents had poor knowledge regarding tuberculosis, 123 (54.4%) had negative attitude toward TB and 48 (21.2%) had poor preventive practices regarding tuberculosis.

**Table III.** Knowledge, attitude and practice scores categories

Variables	Frequency (n)	Percentage (%)
<b>Knowledge</b>		
Good knowledge ( $\geq 50\%$ )	166	73.5
Poor knowledge ( $< 50\%$ )	60	26.5
Total	226	100
<b>Attitude</b>		
Positive attitude (scores of 29 and 103 above)		45.6
Negative attitude (scores of 28 and 123 below)		54.4
Total	226	100
Mean = $29.3 \pm 5.28$		
<b>Preventive practice</b>		
Good practice $\geq 50\%$ )	178	78.8
Poor practice $< 50\%$ )	48	21.2
Total	226	100

Table IV shows the distribution of responses of the respondents to individual knowledge items

**Table IV.** Responses to tuberculosis knowledge items

Items	Yes (%)	No (%)
Tuberculosis is caused by germ/bacteria	170(75.2)	56(24.8)
Tuberculosis is caused by Witchcraft	157(59.5)	69(30.5)
TB is transmitted by eating with an infected person.	73(32.3)	153(67.5)
TB is transmitted by sharing same utensils.	69(30.5)	157(69.5)
TB is transmitted through air when a person with TB coughs or sneezes	178(78.8)	48 (21.2)
Cough lasting more than 3 weeks is a symptom of TB	148(65.5)	78(34.5)
Coughing up blood is a sign of TB	146(64.6)	80(35.4)
Weight loss is a sign of TB	137(60.6)	89(39.4)
Fever is a symptom of TB	156(69.0)	70(31.0)
Shortness of breath is a symptom of TB.	147(65.0)	79(35.0)
Everybody is at risk of getting infected with TB	81(35.8)	145(64.2)
Only poor people get infected with TB.	160(70.8)	66(29.2)
Only homeless people get infected with TB.	161(71.2)	65(28.8)
Only drug users t get infected with TB	152(67.2)	74(32.8)
Only people with HIV get infected with TB	135(59.7)	91(40.3)
Only people who have been in prison get infected with TB	152(67.2)	74(32.8)
TB is preventable by avoiding handshake	89(39.4)	137(60.6)
TB is preventable by avoiding sharing utensils	71(31.4)	155(68.6)
TB is curable	181(80.1)	45(19.9)
TB is curable in HIV patients	121(53.5)	105(46.6)
TB is curable by using medicine under the directly observed short course treatment (DOTS)	168(74.3)	58(25.7)
TB is curable by using herbal medicine	124(54.9)	102(45.1)
TB is curable by resting at home without medicines	173(76.5)	53(23.5)
Duration of treatment for TB is 6 months	158(69.9)	68(30.1)

Table V shows the distribution of responses to individual items regarding attitude toward TB

**Table V.** Responses to attitude toward tuberculosis items

Statement	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Total
I feel compassion and desire to help TB infected persons	22(9.5)	35(15.5)	19(8.4)	65(28.8)	85(37.6)	226(100)
I fear TB patients because they may infect me	29(12.8)	86(38.1)	20(8.1)	61(27.0)	30(13.3)	226(100)
HIV infected people should be concerned about TB	14(6.2)	14(6.2)	23(10.2)	97(42.9)	78(34.5)	226(100)
TB is a serious disease	9(3.9)	13(5.8)	29(12.8)	87(38.5)	88(38.9)	226(100)
I will be embarrassed if I am told I have TB	29(12.8)	88(38.9)	28(12.4)	60(26.5)	21(9.3)	226(100)
I will be sad and hopeless if I am told I have TB	24(10.6)	91(40.3)	19(8.4)	59(26.1)	33(14.6)	226(100)
I will be ashamed if I am told that I have TB	10(4.4)	71(31.4)	29(12.8)	67(29.6)	49(21.7)	226(100)
In my community, most people usually reject a person who has TB	30(13.3)	95(42)	22(9.7)	40(17.7)	39(17.3)	226(100)
In my community, most people are friendly to TB patients but try to avoid them.	46(20.3)	82(36.3)	20(8.8)	47(20.8)	31(13.7)	226(100)

Table VI shows the distribution of responses to individual items on practice regarding tuberculosis

**Table VI.** Responses to Practices regarding tuberculosis

Statement	Yes (%)	No (%)
I usually cover my nose and mouth when sneezing or coughing	195(86.3)	31(13.7)
I usually go to hospital or clinic if I am sick or to treat a general health problem	194(85.4)	33(14.6)
I usually go to the traditional healer if I am sick or to treat a general health problem	152(67.3)	74(32.8)
If I have symptoms of TB I will go to the health facility	125(77.4)	51(22.6)
As soon as I realized my symptoms are related to TB, I will go to the health facility	178(78.8)	48(32.2)
I will go to the health facility when symptoms that look like TB signs last for 3-4 weeks.	161(71.2)	65(28.7)
Do you take preventive TB treatment	101(44.7)	125(55.3)
Have you been tested for Tuberculosis or screened for TB before?	107(47.3)	119(52.6)
Do you usually stay in an overcrowded environment?	102(45.1)	124(54.9)

Table VII shows the results of multiple linear regression analysis conducted to determine the predictors of knowledge, attitude and preventive practices. Out of 15 variables, simple linear regression showed that seven (age, anxiety, depression, marital status, monthly income, monthly expenditure, duration of HIV infection), six (age, anxiety, religion, depression, duration of HIV infection and cigarette smoking) and six (age, anxiety, depression, duration of HIV infection, marital status and cigarette smoking) with p-value < 0.25 recommended by Hosmer-Lemeshow (21) were selected to enter the multiple linear models for knowledge, attitude and practice respectively.

The significant predictors ( $p < 0.05$ ) that were retained in the final model for knowledge were age, depression, monthly income and marital status. For every additional year of age, knowledge regarding tuberculosis increased by 0.087 ( $B = 0.087$ , 95% CI = 0.031, 0.143,  $p = 0.002$ ). For each unit increase in depression score, knowledge of respondents regarding TB decreased by 0.444 ( $B = -0.444$ , 95% CI = -0.673, -0.214,  $p < 0.001$ ). For every unit increase in monthly income ('1000), knowledge of respondents decreased by 0.058 ( $B = -0.058$ , 95% CI = -0.095, -0.021,  $p = 0.002$ ). Married respondents had on average 1.276 lower knowledge scores than single respondents ( $B = -1.276$ , 95% CI = -2.526, -0.025,  $p = 0.046$ ).

The significant predictors of attitude were age, cigarette smoking, duration of HIV infection and anxiety. Cigarette smokers had on average about 4.877 higher attitude score than non-smokers ( $B = 4.473$ , 95% CI = 0.992, 7.954,  $p = 0.012$ ). For every additional month lived with HIV infection, attitude score of respondents increased by 0.371 ( $B = 0.371$ , 95% CI = 0.110, 0.631,  $p = 0.005$ ). For every unit increase in anxiety score, attitude score of respondents decreased by 0.395 ( $B = -0.395$ , 95% CI = -0.584, -0.206,  $p < 0.001$ ). For every additional year of age attitude score of respondents regarding tuberculosis decreased by 0.074 ( $B = -0.074$ ,

95% CI = -0.137, -0.012,  $p = 0.020$ ).

Significant predictors of preventive practices of respondents were depression, cigarette smoking and duration of HIV infection. Cigarette smokers had on average about 2.200 higher practice score than non-smokers ( $B = 2.200$ , 95% CI = 0.926, 3.474,  $p = 0.001$ ). For every additional month lived with HIV infection, practice score of respondents increased by 0.098 ( $B = 0.098$ , 95% CI = 0.003, 0.194,  $p = 0.003$ ). For every unit increase in depression score, practice of respondents decreased by 0.176 ( $B = -0.176$ , 95% CI = -0.276, -0.076,  $p = 0.001$ ).

## DISCUSSION

In this study, the proportion of HIV patients with good knowledge regarding tuberculosis was 166 (73.5 %). This is in contrast to the study conducted in India which revealed that 30 - 55.4% of HIV-positive patients had good knowledge regarding tuberculosis (22, 23). This study also found that knowledge of respondents was higher than that reported from a study conducted in Ethiopia amongst HIV patients which assessed their knowledge on tuberculosis giving overall satisfactory knowledge level of 50.2% (24). Report of a study from southwestern Nigeria on knowledge and attitude regarding TB among community members revealed good knowledge of 44.9% (19), below the finding of this study. However, a study conducted among pastoralists also considered a high-risk group for TB reported an overall satisfactory knowledge of 87.6%, higher than the findings of the present study (18).

Despite long years of TB prevention and control in Nigeria, this and other studies have revealed that there is knowledge gap about TB both in the general public as well as high-risk groups especially HIV patients which can have serious consequences on TB control program generally. Mass media campaigns need to be

Table VII. Multiple linear regression analysis final model showing predictors of KAP

Variables	Unstandardized B coefficient	Std. error	Standardized coefficient (Beta)	t	95% CI for B	p
<b>Predictors of knowledge</b>						
Depression	-0.444	0.116	-0.239	-3.809	-0.673 -0.214	<0.001
Monthly income ('1000)	-0.058	0.019	-0.204	-3.088	-0.095	0.002
Age	0.087	0.028	0.202	3.073	-0.021	0.002
Marital status (married)	-1.276	0.634	-0.128	-2.011	0.031 0.143 -2.526 -0.025	0.046
<b>Predictors of attitude</b>						
Anxiety	-0.395	0.096	-0.262	-4.116	-0.584	<0.001
Cigarette smoking	4.473	1.766	0.157	2.533	-0.206 0.992 7.954	0.012
Duration of HIV infection	0.371	0.132	0.179	2.807	0.110 0.631	0.005
Age	-0.074	0.032	-0.146	-2.339	-0.137 -0.012	0.020
<b>Predictors of practice</b>						
Depression	-0.176	0.051	-0.224	-3.469	-0.276 -0.076	0.001
Cigarette smoking (smokers)	2.200	0.647	0.214	3.402	0.096 3.474	0.001
Duration of HIV infection	0.098	0.048	0.132	2.040	0.003 0.194	0.043

95% CI: 95% confidence interval, significant at  $p < 0.05$

Note - Knowledge:  $R^2 = 0.151$ , Attitude:  $R^2 = 0.166$ , Practice:  $R^2 = 0.127$

Variable selection method – Forward method.

intensified to raise awareness and sensitize the public through dissemination of messages about tuberculosis in electronic and print media and distribution of information, education and communication materials.

TB knowledge was further analysed looking at the responses of the participants to individual items which provided a clearer picture of their knowledge. In this study, 157 (59.5%) of the respondents believe that TB is caused by witchcraft. A report of a study in southwest Ethiopia on TB disclosed that 15.9% of the respondents believe TB is caused by witchcraft and 50.4% by 'evil eye' a superstitious belief (25), consistent with findings of the above report. Additionally, 48 (21.2%) do not believe that TB can be transmitted by coughing or sneezing, one of the major route of transmission of the disease. On the vulnerability of TB infection 81 (35.8%) don't believe that everybody is at risk of contracting tuberculosis which is worrisome considering the level of immunity of HIV patients. In this study, as high as 181(80.1%) responded that TB is curable. This is similar to the finding of a study in Ethiopia which showed a response rate of 95.4% on the curability of TB (24). However, in the same report above 82.5% of respondents believe that TB is curable in HIV patients contrary to the findings

of this study of which 105(46.6%) doubt the curability of TB in this group of patients. It is also possible that the high level of those doubting the curability of TB in HIV patients is because the success rate of TB treatment in HIV co-infected persons is less than in those that are HIV negative. To support the above statement, a study conducted in Abuja, Nigeria revealed that the success rate of TB treatment among HIV patients was 64% lower than 71% among HIV-negative individuals (26). Furthermore, the case fatality rate even after initiation of TB treatment among HIV patients can be as high as 58% compared to 20% of those that are HIV negative (27). Another source of concern is that as high as 124 (54.9%) responded that TB can be cured using herbal medication. This is in line with the study carried out in South Africa in which local communities in this era of the availability of effective TB medication are still largely dependent on herbal medicine for the treatment of tuberculosis (28). Fifty-eight (25.7%) of the respondents are not aware of directly observed treatment short course (DOTS) as a strategy for the treatment of tuberculosis and among those aware of the strategy, only 158 (66.9%) know the duration of treatment. This is in contrast to the study conducted in southeast Nigeria that revealed only 36.4% are aware of DOTS as a strategy for TB treatment (29):

Although the overall knowledge of respondents in this study was 73.5%, results to individual items revealed a significant knowledge gap about the cause, mode of transmission, prevention and treatment of TB among HIV patients. Inadequate knowledge about the causative agent and treatment of TB and traditional beliefs about the causes of TB may have a negative impact on patient attitude towards health care seeking behaviour and preventive practices as most people with such belief might not visit health care facilities and may consider traditional methods as an option. A structured health education intervention program targeted and specific for HIV patients is needed to improve their knowledge about TB.

Out of 226 respondents, 123 (54.4%) had negative attitude toward tuberculosis consistent with the report of a study from Edo state, Nigeria which disclosed prevalence of negative attitude among community members of 55.7% (19). In this study, despite the high level of negative attitude toward TB and TB patients, 66.4% of respondents were willing to help TB infected persons comparable to the report of a study from Nigeria on community knowledge of TB of which 76.4% indicated willingness to care for persons infected with TB (19). This study revealed that 175 (77.4%) of the respondents knew that TB is a serious disease. This is above 55.4% response of the knowledge of the seriousness of TB disease reported by an Ethiopian study (30). A report of a study from Bangladesh showed that 46.6 % respondents were discriminated by using separate utensils for food and water (31), similar to the findings of this research in which 71 (31.4%) of respondents believed that TB can be prevented by avoiding sharing utensils.

The prevalence of good preventative practices from this study was 140 (78.8%). Responses from individual items on the questionnaire showed that 152 (67.3%) of respondents said they will visit a traditional healer for a general health problem. This is in agreement with the report of a study from the Pacific island nation of Vanuatu which revealed that 54% of respondents with general health problem and 34% that had symptoms and signs of TB first consulted traditional healers (32). The implication is delay in seeking medical advice and treatment with its attendant consequences. Traditional healers, therefore, require sensitization about TB for timely referral of such cases to the hospital for treatment. A study on patients knowledge, attitude and practice regarding TB revealed that 66.6% of respondents were aware that covering mouth and nose when coughing is one of the ways of preventing the transmission of TB (33). This is consistent with the findings of this study in which 195 (86.3%) of the respondents said they cover their mouth and nose while coughing and sneezing.

In this study, 119 (52.6%) of the respondents were never screened for tuberculosis. The report of a study from

India revealed a prevalence of 17 % of pulmonary TB among 1012 HIV patients screened for TB attending ART clinic in a tertiary healthcare setting (34). Additionally, a study conducted to determine the risk of development of active TB among HIV patients discovered that 47% of the respondents had positive reaction to tuberculin test (35). A similar study to determine the incidence of TB among HIV patients in Gombe, Nigeria showed that 32.2% of the patients were TB positive (36). The finding of the present study and the reports of studies mentioned above is a pointer to the fact that every HIV positive individual should routinely be screened for tuberculosis. Apart from the current symptomatic screening and tuberculin test been conducted in hospitals for the screening of TB among HIV patients, it will be necessary to utilize other additional techniques such as chest X-ray and GeneXpert MTB/Rif test recently endorsed by WHO for the diagnosis of TB in HIV patients (37).

The findings of this study also revealed that 125 (55.3%) of the respondents have never taken isoniazid preventive treatment. This is in support of 2011 global TB report which indicated that Nigeria had isoniazid preventive therapy (IPT) coverage of only 3% (38). The same report revealed that IPT coverage was as low as 28.7% among HIV patients in Addis Ababa, Ethiopia (38). Ideally, every HIV patient without active tuberculosis is expected to receive isoniazid preventive treatment to reduce his chances of acquiring TB or the activation of latent TB.

Similar to the finding of the study conducted in Nigeria which identified age of respondents as a predictor of knowledge regarding tuberculosis (39), this study revealed that knowledge of respondents is better in older age group. This study also found that depression negatively affects respondent's knowledge regarding TB, similar to the report of a research which identified depression as a common condition among HIV patients which interferes with their quality of life and behaviour (40). Income was found to be a predictor of patient's knowledge, contrary to the report of the study from South Africa on the predictors of knowledge regarding tuberculosis among 18 -64 year old adults (41). This research has revealed that depression has negative effect on preventive practices of HIV patient regarding tuberculosis. However, those that have lived with HIV for years tend to have better preventive practices than new patients.

The strength of this study was that the response rate was high. However, there were some important limitations. One of this limitation was that as a self-administered questionnaire the truthfulness of responses depended solely on the respondents which may produce under or over reporting of true responses. Secondly, the results should be interpreted with caution since the study was done in only one health facility.

## CONCLUSION

The study revealed that over half of the respondents had good knowledge and preventives practices regarding tuberculosis transmission and prevention. However, attitude was poor. The predictors of knowledge, attitude and preventive practices regarding TB among HIV patients were age, depression, anxiety, monthly income, duration of HIV infection, marital status and cigarette smoking. Despite the findings of this study, interventions to address the effect of these predictors and improve knowledge and attitude of HIV patients regarding tuberculosis would assist improve preventive practices. Health education intervention program regarding TB targeted and specific for HIV patients in all health facilities that provide HIV/AIDS services is needed in Nigeria.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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