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Knowledge and attitudes towards tuberculosis (TB) prevention among people living with HIV in Lagos, Nigeria

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Tuberculosis (TB) is the most potent opportunistic infection and a leading cause of death among Persons Living with Human Immunodeficiency Virus (PLHIV), particularly in sub-Saharan African and Asian countries, where it is highly prevalent. Knowing the TB status of an HIV client is very important and is considered an entry point for comprehensive HIV treatment and care. However, the knowledge and attitude of PLHIV to TB prevention are critical to the risk of TB infection and death. This study aimed to assess the knowledge and attitude to TB prevention among PLHIV in Lagos State, Nigeria. This cross-sectional study used a multi-stage sampling technique to select respondents in Lagos State. A semi-structured questionnaire was used to collect data from PLHIV to ascertain their knowledge and attitudes on TB prevention from December, 2017 to June, 2018. Of the 606 respondents interviewed, 220 (36.3%) are males while 386 (63.7%) are females. Majority (40.4%) of the respondents were aged 28 to 37 years and 36.1% had tertiary education. Overall, 411 (67.8%) had sufficient knowledge of TB, while 423 (69.8%) had a positive attitude to TB prevention practices. Age, gender, and level of education were associated with sufficient knowledge and attitude towards TB prevention. The general knowledge of TB prevention was high among PLHIV in Lagos. The respondents aged 38 years and above had a more positive attitude to TB prevention measures. Those with secondary and tertiary education showed a high level of TB prevention knowledge and attitude.

Key words: Persons living with human immunodeficiency virus (PLHIV), tuberculosis (TB) prevention, knowledge, attitude, practice.

INTRODUCTION

Tuberculosis (TB) is the most potent opportunistic infection and a leading cause of death among Persons Living with Human Immunodeficiency Virus (PLHIV), particularly in sub-Saharan Africa and Asian countries,

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where HIV is highly prevalent (Bastian and Krause, 2008; Yamada and Nagai, 2009; World Health Organization, 2012). Since the advent of HIV, TB has been difficult to control in countries with a high prevalence of HIV infections resulting in approximately 12-14 million people becoming infected with both *Mycobacterium tuberculosis* and HIV worldwide per year (Bekker and Wood, 2010). Between 1990 and 2005, TB incidence increased at an average rate of 7% yearly in countries with high HIV prevalence (prevalence rate ≥5%) compared to 1.3% in countries with low HIV prevalence (prevalence rate ≤5%) among adults (Friedland et al., 2007). People living with HIV have nearly ten times the risk of TB in their lifetime compared with HIV-negative individuals (Bastian and Krause, 2011). Also, in the management of both diseases, there are challenges of drug interactions between some anti-TB and anti-retroviral therapy.

It is estimated that one-third of the 40 million people living with HIV/AIDS are co-infected with TB. In sub-Saharan Africa, about 50% of TB patients are co-infected with HIV in some countries (Carter, 2010). Nigeria ranks sixth among the high TB burden countries globally and the first in Africa, hence, controlling TB is a top priority for the nation (World Health Organization, 2021; Federal Ministry of Health, 2021). In 2019, Nigeria had an HIV prevalence rate of 1.4%, which is considered high due to the national population, and it is one of the main contributing factors to increasing TB cases (National Agency for the Control of AIDS, 2019). TB case notification was 52/100 000 population, with an HIV co-infection rate of 23% (Federal Ministry of Health, 2012; National Agency for the Control of AIDS, 2013). The dual burden has raised the need for effective collaboration between TB/HIV programs to reduce the burden of TB among PLHIV and the burden of HIV among TB patients, particularly as most of these patients became aware of their TB status while already having active TB. In 2015, 190,950 new HIV/AIDS infections were recorded in Nigeria, only 67% were screened for TB and 33% had TB (United Nations Children's Fund, 2018). It is expected that if an HIV-positive client understands the relationship between TB and HIV, such a person can change to less risky behaviour or daily preventive practices.

HIV-positive clients knowing their TB status is essential and is considered an entry point for comprehensive treatment and care. A drawback to this process is poor attitude due to stigma associated with HIV and low awareness of TB leading to a low index of TB suspicion among persons infected with HIV and healthcare workers (Ottmani et al., 2008). Also, persons who seek care at health facilities may face barriers relating to gender distance to the nearest health facility, lack of trained healthcare workers, age, and socioeconomic factors, These factors have all been associated with patient and health system delays to treatment initiation from the onset of illness (Meintjes et al., 2008; Ukwaja et al., 2013;

Storla et al., 2008). To improve TB infection prevention and control among persons living with HIV, it is vital to understand their level of knowledge and attitude towards TB prevention and health-seeking behaviour. This information will provide evidence on which strategies or interventions to address the gaps in TB infection prevention and control practices. Therefore, this study aims to assess the knowledge and attitude toward TB prevention among PLHIV in Lagos State, Nigeria.

METHODOLOGY

Study design

This cross-sectional study involved PLHIV clients receiving anti-retroviral therapy in seven health facilities in Lagos State, Nigeria. A structured questionnaire was used to collect data from PLHIV clients to ascertain their knowledge and attitudes on TB prevention from December 2017 to June 2018.

Study area and sampling

The study was conducted in Lagos State, located in the Southwest region of Nigeria. The estimated study population was based on the average number of HIV patients aged 18 years and older registered in Lagos State per year. In 2015, there were 1,537 newly registered HIV-positive patients, while in 2016, the number increased to 1,843 patients, giving an average of 1,690 HIV-positive clients. Thus, the estimated study population was 1,690 HIV patients.

Sample size estimation

Based on the population size of 1,690 and a confidence level of 95%, the sample size of 381 was calculated using Leslie Fisher's procedure. A multi-stage sampling technique with a 3-level approach was used to select participants for this study. There are 20 local government areas (LGAs) across the three senatorial zones in Lagos State, five LGAs in Lagos-East, ten LGAs Lagos-West and five LGAs in Lagos-Central zones. Two LGAs each were selected from each of the 3 senatorial zones, giving a total of 6 LGAs in the state. Shomolu and Kosofe LGAs were selected from Lagos-East senatorial zone, Agege and Ajeromi LGAs were selected from the Lagos-West zone and Surulere and Apapa LGAs were selected from the Lagos-Central zone. Health facilities were stratified based on the level of care into tertiary, secondary and primary health facilities. The one tertiary facility located in the LGAs was automatically selected. Four secondary health facilities were selected out of all the secondary health facilities in the selected LGAs using random sampling by balloting while the two primary health facilities offering comprehensive HIV treatment and care services were automatically selected given a total of seven health facilities that participated in the study. Selection of people living with HIV on anti-retroviral therapy for at least six months was done using systematic random sampling until the desired sample size was obtained. HIV clients who were on ART for less than 6 months and those who are less than 18 years of age were excluded from the study.

The study theoretical framework

The Health Belief Model suggests that perceived susceptibility is

Individual Perception	Modifying Factors	Likelihood of Action

Age, Sex, Ethnicity
Personality
Socio-Economic
Knowledge

Perceived benefits
versus
Barriers to behavioural
change

Perceived susceptibility/
seriousness of disease

Perceived threats of
disease

Likelihood of behavioural
change

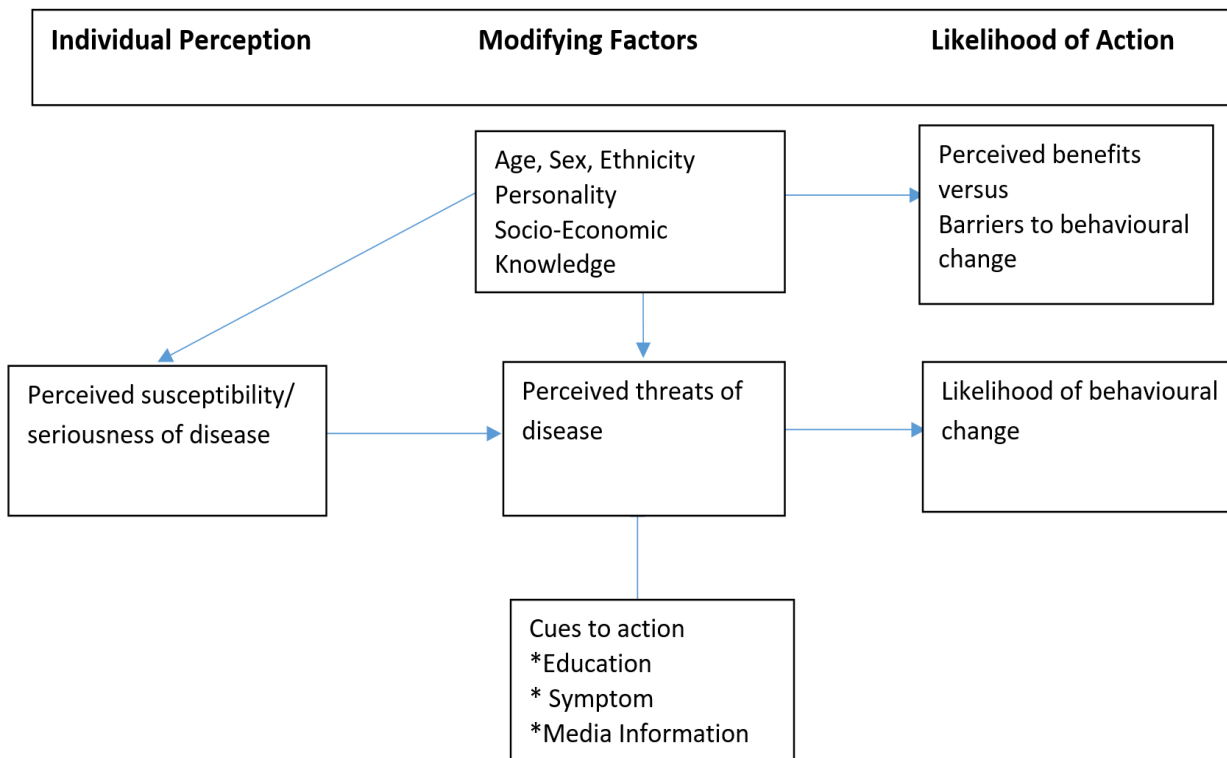Cues to action
*Education
* Symptom
*Media Information

Figure 1. Glanz, K., Rimer, B., & Lewis, F 2012 Model of Health Behaviour and Health Education (adapted)
Source: Ladoke Akintola University of Technology, College of Health Sciences.

necessary for individuals who display high-risk behaviours before committing to changing the risky behaviours (Glanz et al., 2012). In this study, the Health Belief Model was applied to identify beliefs that influence an individual's decision to undertake specific health-related actions. Based on the model (Figure 1), it is assumed, for example, that if an HIV patient practices TB infection prevention and control strategies to avoid being infected, the HIV-positive patient without signs of TB will take IPT to prevent TB infection.

Quantitative method using a semi-structured questionnaire

A structured questionnaire was administered to participants. The questionnaire was designed to seek information about the HIV-positive patients' socio-demographic characteristics, knowledge about TB infection prevention and control strategies, questions on the attitude and practices of patients concerning TB prevention strategies and their expectations for accessing TB screening services. Research assistants were engaged and trained. The research assistants served as field workers supporting health facilities in the delivery of community HIV screening and are familiar with HIV patients and the area.

Pretesting of research instrument

The validity of the research instrument was ensured by pre-testing the questionnaires among HIV-positive patients attending health facilities in Lagos State General Hospital, which was not among the selected facilities.

Data collection and management

Questionnaires were sorted out and checked for omissions and errors at the end of the data collection and analyzed using Statistical Package for Social Sciences (SPSS). Summary statistics were generated from variables, while cross-tabulation and test statistics were performed as appropriate. Chi-square was used to compare proportions, while Fisher's exact test was used when cells had expected values less than 5. Student T-test (normal distribution) was used to determine the association between the continuous variables. The statistical significance level was set at 0.05.

Measurement of outcome variables

The question about knowledge and attitude was scored. For questions with yes or no responses, a correct answer was scored 1 and a wrong answer was scored 0. Regarding questions with three responses (Yes, No and I don't know), the correct response was scored 2, don't know or no idea scored 1 and the wrong response was scored 0. The mean value of the maximum score for knowledge and attitude, respectively was calculated. The respondents who scored below the mean value were regarded as having poor knowledge or a negative attitude while those who scored up to or above the mean were regarded as having sufficient knowledge

Table 1. Socio-demographic characteristics of the participants.

Variable	Category	Frequency	Percentage
Total	-	606	-
Age (years)	18-27	149	24.6
	28-37	245	40.4
	38 years and more	212	35.0
Gender	Male	220	36.3
	Female	386	63.7
Highest level of education	No education	28	4.6
	Primary education	140	23.1
	Secondary education	219	36.1
	Tertiary education	219	36.1
Marital status	Single	169	27.9
	Married	381	62.9
	Divorced	10	1.7
	Separated	17	2.8
	Others	29	4.8
Occupation	Professional	118	19.5
	Skilled	354	58.4
	Unskilled	69	11.4
	Housewife	15	2.5
	Unemployed	27	4.5
	Others	23	3.8

Source: SPSS (IBM Corp).

or a positive attitude.

Ethical consideration

Ethical approval for the study was obtained from the Head of Department, Community Medicine and permission to conduct the study was obtained from the respective head of health facilities where participants were interviewed. All the respondents gave written informed consent to participate in the study.

RESULTS

Socio-demographic characteristics

A total of 606 PLHIV completed the survey. Of these, 456 (75.4%) were above the age 27 years and 386 (63.7%) were female (Table 1). Two hundred and nineteen (36.1%) had tertiary and secondary level of education each, 118 (19.5%) were professionals, and 354 (58.4%) were into skilled labour. Also, 27 (4.5%) and 23 (3.8%) were unemployed and other occupations, respectively while 381 (62.9%) were married.

Knowledge of tuberculosis and prevention practices

Table 2 shows the knowledge of TB and TB prevention among the respondents. Majority (65.7%) of the respondents knew that TB is an airborne infection, while 37.0% said it is transmitted through contact with someone who had TB. Only 5.1% attributed it to smoking. The common symptoms known by the respondents were cough (56.9%), coughing out blood (51.8%), weight loss (40.9%) and fever (8.4%). Knowledge of TB prevention was high, 63.2% knew that TB is prevented by covering one's mouth when coughing or sneezing. Only 37.8% of the respondents who have heard of TB said it is prevented by avoiding contact with someone who had TB, while 44.6% think TB can be prevented by constant clinic visits to check for symptoms of TB.

Attitude of respondents on tuberculosis prevention

Only 36.4% of the respondents said they are willing to take a TB test. The higher proportion, 55.3% said they would allow a household member to test for TB (Table 3).

Table 2. Knowledge of TB and prevention practices of the respondents.

Variable	Frequency	Percentage
Transmission		
Air	398	65.7
Contact with somebody who has TB	224	37.0
Smoking	127	21.0
Poison	24	4.0
Witchcraft	11	1.8
Food	6	1.0
Water	5	0.8
Others	31	5.1
Don't know	8	1.3
Symptoms		
Cough	345	56.9
Coughing out blood	314	51.8
Weight loss	248	40.9
Fever	51	8.4
Headache	35	5.8
Night sweat	22	3.6
Vomiting	7	1.2
Others	43	7.1
Don't know	16	2.6
Prevention		
Covering one's mouth while coughing or sneezing	383	63.2
Avoiding contact with somebody with TB	229	37.8
Ensuring adequate ventilation	192	31.7
Constant clinic visit to check for symptoms of TB	270	44.6
Eating good food	119	19.6
Immunizing children	15	2.5
Others	29	4.8
Don't know	69	11.4

Source: SPSS (IBM Corp).

Regarding treatment for TB, 72.3% admitted willingness to take TB treatment while 60.4 and 63.5% have had TB treatment and prophylactic treatment for TB, respectively in the past. Following suspicion of TB, the common measure taken by the respondents was visit to a healthcare facility (64.9%). Thirty-eight percent of the respondents visited a Pharmacy/Patient Medicine vendor, while 30.5% visited a Religious/Traditional healer.

The relationships between the socio-demographic characteristics of the respondents and their knowledge of TB are shown in Table 4. Sufficient knowledge of TB prevention was associated with age (p<0.001) and gender (p=0.014) and level of education (p<0.001) categories. However, sufficient knowledge did not differ according to occupation and marital status.

The relationship between the socio-demographic characteristics of the respondents and their attitude regarding TB prevention is shown in Table 5. The respondents' attitude regarding TB prevention was associated with age (p<0.001), gender (p=0.013), level of education (p=0.001) and occupation (<0.001). Positive attitude to TB prevention was higher among the participants who are married (71.6%) compared with those who are single (16.9%), divorcee (1.1%), separated (7.7%) or others (2.7%), but this difference was not statistically significant (p=0.711).

DISCUSSION

In this study, we found that the PLHIV in Lagos State had good knowledge of TB transmission and symptoms

Table 3. Attitude and practices of respondents on tuberculosis prevention.

Variable	Frequency	Percentage
Attitudes towards prevention		
Willingness to take TB test	221	36.4
Willingness to allow a household member to test for TB	335	55.3
Willingness to accept TB treatment	438	72.3
Have taken Isoniazid Prophylaxis treatment*	44	8.8
Have taken TB treatment	366	60.4
Willingness to recommend TB test for anybody coughing	249	41.1
Willingness to wear a mask when coughing	293	48.3
Never willing to do any of the above	61	10.1
Place visited for TB treatment		
Health facility	393	64.9
Pharmacy/Patient Medicine vendor	235	38.8
Self-medication	144	23.8
Religious/Traditional healer	185	30.5
Others	38	6.3

*499 eligible respondents.
Source: SPSS (IBM Corp)

Table 4. Association between socio-demographic characteristics and knowledge of TB prevention.

Variable	Category	Poor Knowledge (%)	Good Knowledge (%)	X^2	p-value*
Total		195 (32.2)	411 (67.8)		
Age group	18-27 years	63 (32.3)	86 (20.9)	28.8	<0.001
	28-37 years	96 (49.2)	149 (36.3)		
	38 years and more	36 (18.5)	176 (42.8)		
Gender	Male	57 (29.2)	163 (39.7)	6.2	0.014
	Female	138 (70.8)	248 (60.3)		
Highest level of education	No education	25 (12.8)	3 (0.7)	43.5	<0.001
	Primary education	88 (45.1)	52 (12.7)		
	Secondary education	51 (26.2)	168 (40.9)		
	Tertiary education	31 (15.9)	188 (45.7)		
Marital status	Single	43 (22.1)	126 (30.7)	0.11	0.739
	Married	115 (59.0)	266 (64.7)		
	Divorcee	4 (2.1)	6 (1.5)		
	Separated	12 (6.2)	5 (1.2)		
	Others	21 (10.8)	8 (1.9)		
Occupation	Professional	56 (28.7)	62 (15.1)	0.06	0.807
	Skilled	83 (42.6)	271 (65.9)		
	Unskilled	32 (16.4)	37 (9.0)		
	Housewife	13 (6.7)	2 (0.5)		
	Unemployed	4 (2.1)	23 (5.6)		
	Others	7 (3.6)	16 (3.9)		

*p-value based on Fisher's exact test.
Source: SPSS (IBM Corp)

Table 5. Association between Socio-demographic Characteristics and attitude to TB prevention

Variable	Category	Appropriate Attitude	Poor Attitude	X^2	p-value*
Total		423 (69.8)	183 (30.2)		
Age	18-27	92 (21.7)	57 (31.1)	35.2	<0.001
	28-37	151 (35.7)	94 (51.4)		
	38	180 (42.6)	32 (17.5)		
Gender	Male	167 (39.5)	53 (29)	6.11	0.013
	Female	256 (60.5)	130 (51)		
Highest level of education	No education	5 (1.2)	23 (12.6)	95.7	0.001
	Primary education	70 (16.5)	70 (38.3)		
	Secondary education	189 (44.7)	30 (16.4)		
	Tertiary education	150 (35.5)	60 (32.8)		
Marital status	Single	138 (32.6)	31 (16.9)	9.32	0.711
	Married	250 (59.1)	131 (71.6)		
	Divorcee	8 (1.9)	2 (1.1)		
	Separated	3 (0.7)	14 (7.7)		
	Others	24 (5.7)	5 (2.7)		
Occupation	Professional	62 (14.7)	56 (30.6)	88.84	<0.001
	Skilled	272 (64.3)	82 (44.8)		
	Unskilled	37 (8.7)	32 (17.5)		
	Housewife	2 (5)	13 (7.1)		
	Unemployed	27 (6.4)	0 (0)		
	Others	23 (5.4)	0 (0)		

*p-value based on Fisher's exact test.
Source: SPSS (IBM Corp)

similar to the findings of a previous study in South Africa, which had reported a higher (72%) knowledge of TB among HIV/TB co-infected patients (Shamu et al., 2019). However, a major knowledge deficit is not knowing that fever and night sweat are symptoms of TB. This finding is consistent with the results of the Federal Ministry of Health [Nigeria] TB KAP (Knowledge, Attitude and Practice) survey of the general population in Lagos State in 2012, which indicated that a lower proportion of people are aware of the signs and symptoms of TB (Federal Ministry of Health, 2012). The World Health Organization's (WHO) global TB control policy recommends the four symptoms, cough, weight loss, fever and night sweat, as four key symptoms (W4SS) for clinical suspicion of TB. Despite the relatively lower efficiency of the W4SS TB screening method in the general population, it is endorsed as the most suitable for large-scale public health efforts because it is easy to implement, cheaper, highly acceptable to clients, and accurate (World Health Organization, 2021).

Also, we have shown that most of the study participants had the right attitude to TB prevention. Although, we found that appropriate practices regarding ensuring adequate ventilation and eating good food are poor. Regarding the uptake of preventive therapy, more than half of the eligible respondents have had Isoniazid Prophylaxis treatment (IPT) in the past. For those who were co-infected with TB and had anti-TB treatment, 60.4% have not had their household members screened for TB. In this study, uptake of IPT was low among respondents who are eligible for this therapy compared to the national average (Odume et al., 2020). The reason for the low IPT update is not clear. IPT is offered to eligible HIV-positive patients who do not have TB, with a national target of 100% uptake (National Agency for the Control of AIDS (2013). The low uptake could be due to attitudinal problems, as Lagos State has a well-structured public health system with dominant private health sector players compared to most cities in Nigeria (Abt Associates Inc., 2008).

Most of the respondents are unwilling to take TB test because of the fear of being stigmatized. A similar study in the Western Cape, South Africa that evaluated the uptake of TB testing among PLHIV reported a slightly higher proportion of patients willing to take a TB test (Jittimanee et al., 2009). It can be argued that healthcare providers need to enhance awareness and education on the benefits of routine TB screening and testing, as well as continuous counselling on TB screening among PLHIV by healthcare providers during clinic visits. Women reported higher levels of TB knowledge and appropriate attitude to TB prevention. The association between gender and good knowledge of TB could indicate the difference in gender-specific health habits and factors affecting the utilization of healthcare services including routine health education services provided by healthcare providers. But understanding gender preferences among PLHIV can help optimize appropriate TB awareness and education services. Regarding age, most respondents fell within the active age group of 28 to 37 years. The 2012 National Agency for Control of HIV/AIDS Annual Report reported similar results in Lagos State, where the majority of PLHIV who had TB was in the age group 25 to 44 years (National Agency for the Control of AIDS, 2013). This also follows the trend in the general age distribution of the Nigerian population based on the results of the 2006 National Census which also revealed a higher percentage of adults aged 25-40 years in the Nigerian population (National Population Commission, 2009).

However, only 4.6% of the respondents never attended school, while the rest attained a certain level of schooling with 36.1% gaining tertiary education. This indicates a high literacy level in the State. The National Population Census revealed that 75% of the population had a certain form of education (National Population Commission, 2009). Our findings also showed that most of the respondents were employed, the majority of whom areskilled workers, while less than a third of the respondents are professionals. There is a general perception that people with some form of income are less likely to suffer a condition that can lead to exposure to TB infection since TB predominantly affects poor and disadvantaged people (Bastian and Krause, 2011). However, with the advent of HIV, income has become a contributing factor to risky sexual behaviour, which can lead to transmission of HIV infection and, consequently, to TB infection.

Most of the respondents had sufficient knowledge of TB and its prevention. This finding suggests that the knowledge on the prevention of TB infection is high among most PLHIV in Lagos State. Perhaps, the high awareness of prevention could be due to ongoing health education campaigns on TB and HIV prevention in the state. Also, we found a significant relationship between education and the level of knowledge on TB prevention. This suggests that the level of education influences the knowledge on TB prevention. This indicates that education enables one to access and process information and knowledge, including TB and HIV prevention. The mean level of attitude of respondents towards TB prevention is favourable in most of the respondents, which suggests a positive attitude towards TB prevention. This may be explained by the fact that most of the respondents were aware of the benefits of accessing TB screening and testing services.

In this study, differences in gender of respondents did influence their attitude towards TB prevention. Female respondents were more likely to exhibit sufficient practices towards TB prevention and screening than male respondents. Most respondents had a positive attitude towards TB prevention programs such as IPT and TB treatment. This suggests that the positive attitude of HIV-positive patients in Lagos State could be because the patients have been exposed to prevention and care programs through counselling and testing. The patients, therefore, understood the benefits of the programs. Also, there was a significant association between good practice towards TB prevention and care with education and occupation. This suggests that education and occupation influence the willingness to be tested for TB and practice good TB prevention measures. Likewise, age and education level positively influence health-seeking behaviour for TB services and prevention measures.

The study has some limitations. While it was expected that participants would provide honest answers and with integrity, it is also possible that some of them might hide the truth when responding to the questions. This was considered a potential study limitation as it might affect the study results. Also, the study may be subject to recall bias. Second, the result of this study captures the knowledge and attitudes of people living with HIV who were accessing care across public and private hospitals providing various degrees of health services and may be representative of the practice of the high-end performing health facilities in Lagos.

Conclusion

The knowledge of TB prevention was found to be high among the respondents. Respondents aged 38 years and above had a more positive attitude toward TB prevention measures. Those with secondary and tertiary education showed a high level of TB prevention knowledge and attitude. Also, compared to male respondents, females had a higher knowledge and positive attitude to TB prevention. Most of the respondents had a positive attitude toward TB prevention.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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