Financial and Geographical Barriers to Accessing Tuberculosis Services: A Cross-Sectional Survey of Patients in Enugu State of Nigeria

Ochonma, Ogbonnia Godfrey (Ph.D)
Department of Health Administration and Management,
Faculty of Health Sciences and Technology,
College of Medicine, University of Nigeria,
Enugu Campus, Enugu State,
Nigeria.
ogbonnia.ochonma@unn.edu.ng, godoch002@yahoo.com

Nwodoh, Chijioke Oliver, Maduakolam, Ijeoma O. & Ogbonna, Pleasure Nwakego
Department of Nursing Sciences,
Faculty of Health Sciences and Technology,
College of Medicine, University of Nigeria,
Enugu Campus, Enugu State,
Nigeria.
chijioke.nwodoh@gmail.com, ijeoma.maduakolam@unn.edu.ng
Pleasure.ogbonna@unn.edu.ng

Ani, Goodman John
Department of Nursing Sciences,
College of Medical Sciences, University of Maiduguri,
Maiduguri, Borno State,
Nigeria.
anijohngoodman@gmail.com

Dyages, Ephraim Obadiah,
College of Nursing and Midwifery,
Kafanchan, Kaduna State,
Nigeria.
dyages@gmail.com

Abstract
Tuberculosis (TB) is a major public health problem in Nigeria and the country ranks fourth among 22 countries with high burden of TB. Patients' access to diagnosis and treatment of TB is hindered by financial and geographical barriers among others. This study aims at assessing how financial and geographical factors could pose barriers to accessing TB services in Nigeria. The study was a cross-sectional survey in which 125 patients who were receiving treatment at the University of Nigeria directly observed treatment strategy (DOTS) centre were interviewed using self-administered questionnaire. Data analysis was achieved through the use of SPSS statistical tool. Majority 78(62.4%) of the patients had no difficulty in accessing TB treatment because they did not have to pay for administrative fee charges, hotel accommodation and transportation fare in accessing services mostly because they were local residents. Those who experienced the least barriers in accessing TB services were those whose transportation fare was (₦2000-₦3000) (US$10.80--US$16.20) (93.5%). However,

the result showed that 9(29%) of the respondents whose residential distance was more than 30 kilometres to the DOTS facility faced the most geographical barriers to accessing services (X^2 =8.452.0.038). The study recommends decentralization of TB treatment centres to the peripheral health centres since some patients though in the minority experienced access difficulty due to long distance to the treatment centre.

Key words: *Financial barriers; geographical barrier; tuberculosis; Patients; Nigeria.*

Introduction

Tuberculosis (TB) is a major public health problem in the world with an estimated global incidence rate of 137 cases per 100 000 population in 2009 (WHO, 2011). Geographically, the burden of TB is highest in Asia and Africa; the South-East Asia and Western Pacific Regions of which they are a part account for 60% (WHO, 2010). The African Region has approximately one quarter of the world's cases, and the highest rates of cases and deaths relative to population (WHO, 2010). Currently, Nigeria ranks fourth among 22 countries with a 'high burden' of TB and 25% of TB patients are HIV co-infected (WHO, 2011). Although it reached 99 percent directly observed therapy strategy (DOTS) coverage in 2008 (FMoH, 2010), its current case detection rate is 40% and treatment success rate was 83% in 2012 (WHO, 2011). The TB epidemic in Nigeria is concentrated in densely populated rural areas (FMoH, 2007). With these enormous challenges, TB thus poses a significant epidemiological and economic burden on Nigeria (Bell, Rose and Sacks, 1999), (Itah and Udofia, 2005), (Umar et al; 2012).

Accessing TB services for diagnosis and treatment is important for prevention, management and cure of the disease. Prevention, management and cure of TB would also involve some financial and geographical barriers as treatment centres are concentrated mostly in the centres (bigger hospitals in the cities) of healthcare institutions rather than the peripherals (local primary hospitals) and some individuals would have to travel far distances to obtain services and would also purchase hotel accommodation and meet other collateral expenses (expenses that come with seeking care) as administrative charges on commencement of treatment. Administrative fee charges entail fees required to process and register a patient before commencement of treatment. Many patients have complained about the expenses they had to incur to access TB services even though TB diagnosis and treatment are said to be free-of-charge in Nigeria.

Though some works have been done to understanding TB economic costs (hospitalisation treatment, TB patients with HIV, time spent accessing service and productivity lost by patients, families and others due to tuberculosis illness) to accessing TB services in Nigeria, this study was particularly aimed at understanding if the collateral expenses to accessing TB treatment (geographical distance, transportation, accommodation and administrative fee charges) constituted barriers in accessing TB services in Nigeria. Geographical distance entails the distance between the TB treatment centre and patient's place of aboard which may discourage patients from accessing TB services if too far, transportation fare involves the financial costs encountered in getting to the treatment centre and back, accommodation costs involve the money spent on getting hotel accommodation for those travelling from afar and may not be able to get back to their homes after consultation the same day, while administrative fee charges involve the amount paid by patients for processing and registration before commencement of treatment.

The background per healthcare financing mechanism in Nigeria

Nigeria has a per capita gross domestic product (GDP) of US$1160 (Umar et al; 2012), (Eneji, MaiLafia and (Song, 2013) and high poverty and unemployment rates (Umar et al;

2012), (DFID, 2009), (Oleribe and Alasia, 2006). Approximately 41% of women and 18% of men aged 15–45 years are unemployed. The poor also face geographic, economic and health system barriers to accessing care (Umar et al; 2012), (Orubuloye, 1995) and (Nhlema et al; 2003) which cause delays in seeking health care, resulting in more advanced disease and continued transmission of TB in the community (Umar et al; 2012), (Davies, 2003) and (Rieder, 1999). As TB affects the most economically productive persons, it poses a significant economic burden on affected households (Umar et al; 2012), (Zhang et al; 2007), (Ahlburg, 2000) and (Lawn, Shattock, Griffin, 1997).

Also, Nigeria's health expenditure is relatively low, even when compared with other African countries. The total health expenditure (THE) as percentage of the gross domestic product (GDP) remains at less than 5% presently (Olakunde, 2012) and (Soyinbo, 2005). Out-of-pockets account for the highest proportion of health expenditure in Nigeria. Out-of-pocket expenditure as a proportion of (THE) remained at 74% as at 2013 (Olakunde, 2012) and (Soyinbo, Olaniyan, Lawanson, 2009). This implies that households bear the highest burden of health expenditure and equally shows the inability of the Nigerian government to totally absorb health care expenditure for individual patients (Olakunde, 2012) and (Soyinbo, Olaniyan and Lawanson, 2009). Financial costs incurred by patients were seen as a burden in the process of securing services related to TB diagnosis and treatment (Ibrahim et al; 2014). Among TB patients, Income lost among the hospitalised and non-hospitalised groups stood as estimated at $156/patient and $114/patient respectively (Umar et al; 2012). During stock-out of anti-TB drugs, only few of the patients could afford it while majority could not, they were financially handicapped (Bello, 2010). The Pre-diagnosis direct costs present a Median direct (out-of-pocket) expenditure of $49 per patient, which is considered high ([a]Ukwaja et al; 2013). Mean direct household payments for TB were fourteen percent of the average annual income ([b] Ukwaja et al, 2013). Transportation, hospitalization, and feeding accounted for the majority of costs during treatment ([b] Ukwaja et al, 2013). Results show that both household and individual incomes dropped due to TB (Mauch et al, 2011). Male and female TB suspects with low income were less likely to go to see a doctor than their high income counterparts (Zhang et al, 2007). Transport time of two hours on the average for each patient was among the contributing factors for increased patient delay to accessing TB services (Cambanis et al, 2005). Many migrant patients experienced high medical costs before and after their TB diagnosis (Wei et al, 2009).

Geographical distance presents a major barrier to accessing general health services and affects the poor disproportionately (WHO, 2005). Distance from the DOTS centre was established as a barrier to accessing TB services (Onyeonoro et al; 2014). Longer walking distance to the nearest public facility was associated with patient delay to TB diagnosis, treatment and adherence to drug regime **(**[c]Ukwaja et al; 2013). Geographical factors were identified as major sources of barrier inhibiting access to TB services due to its financial costs (Ayé et al; 2010). Living at distances greater than 10 Kilometres (Km) from the nearest TB diagnostic facility were significantly associated with longer patient delay when compared with other groups (Makwakwa et al; 2014). When patients have to travel long distances to access TB services, it constitutes another barrier in that the transportation fare may not be affordable, and will result in delays in completing TB treatment regime (Wei-Teng et al; 2014). From the background thus far, patients as shown in these studies are seen to confront geographical and financial barriers on their pathway to successful TB diagnosis and treatment.

Even though some studies in Nigeria have made in-roads to understanding the financial and geographical barriers to accessing TB services, no work has been done specifically in this part of the country as geographical and financial circumstances to accessing TB treatment may vary regionally and more so, this study was made specifically to understanding the impact of collateral expenses to accessing TB treatment (geographical distance, transportation, hotel

accommodation and administrative fee charges) which are different from the other studies found in the literature search. In the end, policy recommendations would be suggested to help ease and manage access to TB treatment and diagnosis based on our findings.

Methods

Study design:

This was a cross-sectional study and involved the use of questionnaire for the collection of data from the study participants (patients) on the collateral costs to accessing TB services at the DOTS centre at the University of Nigeria Teaching Hospital (UNTH) in Enugu, Nigeria.

Study Population:

The study population included all the registered TB patients—one hundred and eighty five (185) at the University of Nigeria Teaching Hospital (UNTH) chest clinic--old site as at this date (19th November, 2012) which was the date this study was commenced. The site for the study was conveniently selected. The study population was then receiving treatment at the DOTS centre. The clinic offers free services to TB patients and the drugs are provided by the global fund for Malaria, Tuberculosis and Leprosy (MTL). These patients were mostly residents of Enugu State and the adjoining states in Nigeria and were from varying backgrounds and socio-economic strata of the population. The patients were made up of urban and rural residents and many presented cases of 'human immunodeficiency virus' (HIV). The patients, regardless of gender, age, socio economic status and education were assessed and treated at the centre. Patients were treated on out-patient basis and those with acute or serious presentation of the disease are admitted into the hospital. Patients will normally submit for diagnosis if they suspect TB or are referred and results are provided on the spot.

Sampling and sample size

As at the date this study commenced--the 19th of November, 2012, the researchers were reliably provided with documents indicating that there were one hundred and eighty five (185) TB patients registered at the TB chest clinic, University of Nigeria, who were on active TB treatment. The study lasted through 20th of March, 2013. The patients were all registered for TB treatment at the site and were at the time of the study undergoing TB treatment. All the patients (total sample frame) were eligible for inclusion in the study. The sampling method included all the patients registered at the TB treatment facility in the hospital. A total of 185 patients were registered with the TB treatment facility as at the time of this study. All the patients were given equal opportunity to be included in the study sample, however only 125 respondents representing 68% of the patient population at the facility responded by filling and returning the questionnaire. Data was collected in 2013.

Sample size calculation/response rate

There was no sample size calculation in this study since all the patients (sample size) receiving treatment at the facility were all included in the study. There were 185 patients (sample size) receiving treatment at the facility as at the time of this study and were all included in the study. One hundred and twenty five (125) of the 185 patients were able to respond to our questionnaire. So we calculated the response rate by looking at the percentage of 125 of 185 which gave 67.56% and was rounded off to 68%.

Participants' recruitment

Eligibility for patients' participation in the study was a major concern for our study. We resolved that all the patients who were then diagnosed of TB and receiving treatment (185)

were to be given equal chance to be included in the study. These patients were informed by the chief nursing officer that they could choose to or not partake in the study. The potential participants were instructed on the nature of the study, how they will remain anonymous in the results and the overall benefits likely to accrue from the study. Informed consent was sought and obtained from participants before partaking in the study.

Methods of Data Analysis

Data analysis was achieved through the use of Statistical Package for Social Sciences (SPSS) statistical tool. The data was entered in Epi Info and was transferred to (SPSS 16) for analysis. The discrete data were described using frequencies and percentages, while the continuous variables were described using means and standard deviations. In addition, cross tabulations were done to establish the level of relationship or otherwise on key variables and to find out the factors that influenced variables outcomes. The level of relationship was elicited using the chi-square statistical test. The alpha was set at 0.05 and the researchers concluded a statistical significant relationship to exist when the P-value of the test statistics is less than or equal to 0.05.

Validity and Reliability

To ensure the validity and reliability of the study and also its result, the questionnaire was first pre-tested to measure patients' understanding of the contents of the questions and to measure how the understanding of the questions were agreeable and same among the respondents and the researchers. Questions that were confusing and did not make any sense to the patients were either amended or discarded.

Mode of administration/Data collection Methods

The investigators trained and supervised data collection clerks on the mode of questionnaire administration. Patient's consent was first obtained before the questionnaire administration. Patients who had difficulty understanding English language were helped by the students by translating the questions into *Igbo* (local language) *or Pidgin* English (the local variance of English language) as the case may be. The students had prior training on the translation technique.

Study variables

Some of the study variables are listed as questions below:

1. How often do you travel to the health facility/hospital for taking your TB drugs/check-ups?
2. From your home to the facility, how much does it cost if you take a transport to and fro?
3. If you go to a facility, how much do you spend on food on that day?
4. Do you have to pay administration fees when picking up your TB drugs /check-ups?
5. Do you have any accommodation costs when picking up your TB drug/check-ups?
6. Do you buy any supplements for your diet because of the TB illness, for example vitamins, energy drinks, soft drinks, fruits or medicine?
7. How much did you spend on these items last month approximately?

The exchange rate used in this study was ₦185.2 naira/ US$1.

Results

Table 1: Showing the socio-demographic composition of the respondents n=125

Socio demographic	Frequency n =125(%)
Age	**N**
Under 30	54(43.2)
31-40	25(20)
41-50	29(23.2)
Over 50	17(13.6)
Gender	
Male	63(50.4)
Female	62(49.6)
Education level	
No school	9(7.2)
Primary	38(30.4)
High school	40(32.0)
College/ University	38(30.4)
Employment status	
Yes	59(47.2)
No	66(52.8)

Table 1 showed that a total of one hundred and twenty five respondents were interviewed. Those aged thirty years and below (≥30) constituted the majority of the respondents 54(43.2%). Respondents who were fifty years and above (≤50) were 17(13.6%). The gender of the respondents was almost equally split with males constituting a little above fifty percent 63(50.4%) of the total respondents while the female respondents made up just above fourty nine percent 62(49.6%). The educational status of the respondents revealed that nine 9(7.2%) of the respondents had no formal education. Respondents with college/university education numbered thirty eight 38(30.4%). The employment status of the respondents showed that fifty nine 59(47.2%) were employed while sixty six 66(52.8%) had no employment.

Table 2: Showing levels of access difficulty and financial costs (in Naira) of accessing TB services n=125

Access barriers	Frequency (%)
Experienced difficulty in accessing TB treatment	
Have no difficulty	78(62.4)
Little difficulty	30(24)
Moderate difficulty	15(12)
Most difficulty	1(0.8)
May stop treatment due to difficulty	1(0.8)
Paid administrative fees	
No	120(96.0)
Yes	5(4.0)
Amount paid for administrative fees (₦)	
Below 500	4(80)
Above 500 but below 1000	1(20)
Paid accommodation fees	

No	119(95.2)
Yes	6(4.8)
Amount paid for accommodation	
Value to 1499	4(66.6)
1500-2000	1(16.7)
2000-2499	-
2500-2499	-
3000 and above	1(16.7)
Amount spent in the last one month feeding	
Below 500	46(36.8)
500-1000	79(63.2)

The table 2 showed that majority 78(62.4%) of the respondents had no difficulty in accessing TB treatment. It also showed that 30(24%) had little difficulty while less than one percent (0.8%) may want to stop TB treatment due to difficulty. Again the table showed that almost 120(96%) all of the respondents did not pay for one form of administrative fees or the other. Furthermore, it as well showed that majority of those who paid for the administrative fees, paid less than 500 naira (US$2.7). Again the table showed that nearly all 119(95.2%) of the respondents did not pay for accommodation each time they visited the DOTS facility for treatment.

Table 3: Scoring barriers to accessing TB related services

Table 3: Categorisation of patients' access difficulty level n=125

Access barriers categorized	**Frequency (%)**
No difficulty	108(86.4)
Experienced difficulty	17(13.6)

To be able to do a cross tabulation (**table 3**) on the likely factors that influenced access barriers to accessing TB services, the researchers decided to reduce the difficulty or access barriers to a more measurable unit. To achieve this, the researchers summed options one and two i.e. (Have no difficulty and little difficulty). These two options were considered as those who had no access barrier. However from options three to five were summed up i.e. (moderate difficulty, most difficulty and may stop treatment due to difficulty) and this gave the researchers those who experienced barriers in accessing TB treatment services. This was done to produce a more measurable basis for finding if access barrier was influenced by other variables.

Table 4: Assessing financial barriers to access

Table 4: A cross tabulation on whether cost (in Naira) was a barrier to accessing treatment services **n = 125**

	Experienced barriers to access		**Total n(%)**	**Chi-square (p-value)**
	No n(%)	**Yes n(%)**		
Perception of the cost of TB treatment				
Free	47(92.2)	4(7.8)	51(100)	6.644(0.084)
Reasonably priced	45(84.9)	8(15.1)	53(100)	
Moderately priced	12(85.7)	2(14.3)	14(100)	
Very expensive	4(57.1)	3(42.9)	7(100)	

Transportation fare to and fro	77(86.5)	12(13.5)	89(100)	12.212(0.007)
Below 1000	29(93.5)	2(6.5)	31(100)	
2000-3000	2(50)	2(50)	4(100)	
4000-5000	0(0)	1(100)	1(100)	
6000				
Expenditure on food	60(85.7)	10(14.3)	70(100)	11.507(0.009)
Below 500	1(25)	3(75.0)	4(100)	
500-999	4(100)	0(0)	4(100)	
1000-1499	2(100)	0(0)	2(100)	
2000 and above				
Amount spent last month	38(82.6)	8(17.4)	469(100)	0.890(0.345)
Below 500	70(88.6)	9(11.4)	79(100)	
500-100				

Table 4 above showed that those who experienced financial barriers to accessing TB services. The table showed that there was a little relationship between the perception of the cost of TB treatment and whether the respondent has experienced financial barrier. However, this relationship was not statistically significant because the test result produced a non-statistically significant result at 6.644(0.084). But it is still good to note that those that had the perception that TB treatment cost is free of charge had the least cost barrier to accessing TB services 4(7.8) while those that had the perception that TB treatment is very expensive had the most cost access barrier to accessing TB services 3(42.9). Also the table showed that the respondents who experienced the least barriers to accessing TB services were those whose transport fare was ₦2000-₦3000 (US$10.80- US$16.20) (93.5%). The result at this point showed statistical significance at x^2 = 12.212, p=0.007. Again the table also showed that the respondents who had the highest barriers to accessing TB services were those who spent between ₦500 - ₦999 (US$2.70-US$5.40) (75%) on food and the test result showed to be statistically significant at x^2 = 11.507, p=0.009.

Table 5: Showing geographical barriers experienced by the patients n = 125

Geographical variables	**Did you experience any access barrier**		**Total n (%)**	**Chi-square (P-value)**
	No difficulty n(%)	**Difficulty n(%)**		
Distance in kilometers			27(100.0)	8.452(0.038)
0-10	25(92.6)	2(7.4)	41(100.0)	
11-20	37(90.2)	4(9.8)	26(100.0)	
21-30	24(92.3)	2(7.7)	31(100.0)	
More than 30	22(71.0)	9(29.0)		
Transportation fare-Naira			89(100.0)	12.212(0.007)
Below 1000	77(86.5)	12(13.5)	31(100.0)	
2000-3000	29(93.5)	2(6.5)	4(100.0)	
4000-5000	2(50)	2(50)	1(100.0)	
6000	0(0)	1(100)		

***Accommodation costs (₦)**			100(100.0)	6.000(0.050)
None	100(100)	0(0)	4(100.0)	
1000-1499	4(100)	0(0)	1(100.0)	
1500-1999	1(100)	0(0)	-	
2000-2499	-	-	-	
2500-2499	-	-	-	
Above 3000	-	-		

***responses to the question were short by 20**

The **Table 5** above showed that the higher the distance to the health facility, the higher and the greater the difficulty faced by the respondents in accessing TB services. The table showed that 9(29%) of the respondents whose residential distance was more than 30 kilometers to the DOTS health facility faced the most geographical barriers to accessing TB services and the statistical test showed a significant value at X^2 =8.452.0.038. Also the table as well showed another geographical variable as it revealed that the percentage access barriers increased with increase in the transportation fare of the respondents. It showed that the respondents with the least transportation fare (below ₦ 1,000) (US$5.40) faced the next least percentage access barriers 12(13.5%) and this is against the respondents with the highest transportation fare where (1500-2000) (US$8.10-US$10.80) 1(100%) of them experienced access barrier. The test statistics produced a statistically significant result at x^2 =12.212, p=0.007. Finally the table as well showed another geographical barrier to access as it revealed that only the respondents that paid above ₦3000 (US$16.20) for accommodation when they visited the DOTS health facility had suffered barriers. It is seen from the table that 1(100%) of those who pay above ₦3000 (US$16.20) for accommodation when they visited DOTS centre suffered barriers to access and the test statistics revealed a statistical significance at x^2 =6.000, p=0.050.

Discussion

The results of this work showed that those aged thirty years and below (≥30) constituted the majority of the patients and accounted for a little above fourty three percent (43.2%) of those who were infected with TB. By this figure as presented, it could be seen that TB affects mostly those in their most productive work years. This finding was in line with (WHO; 2005) where majority of those infected with TB especially in the 22 TB endemic countries were within their most productive work years. Any health system like Nigeria's battling excessive TB infection as in the other TB endemic 22 countries must roll its sleeves and go to work so as to save its work force from the TB scourge. Improved education and management of TB tailored to each age group especially the productive age group, is highly recommended. Dependence on foreign donors alone may not be enough to fight the battle as improved national budgetary allocation to health must be encouraged to join the fight.

Results also showed that majority (62.4%) of the respondents had no financial difficulty in accessing TB treatment and services as almost (96%) of the respondents did not pay for one form of administrative fees or the other and nearly all (95.2%) of the respondents did not have to pay for accommodation each time they visited the DOTS facility for health care, indicating that most of the patients may have been local residents. The results also showed that the number of those experiencing barriers to accessing TB services had no influence on the perception of the cost of treatment of TB, because the study produced a non-statistically significant result at 6.644(0.084). From the results also, it could also be argued that most patients did not have to pay above normal transportation fares, since they may have been

mostly local residents. These results are unlike (Ibrahim et al; 2014) where patients identified transportation cost as a barrier to accessing TB services. Equally (Umar et al; 2012) identified that patients had to pay for hospitalization fees and only six (6%) percent of the patients could afford TB drugs during stock out. Unlike our study, ([a]Ukwaja et al; 2013), ([b] Ukwaja et al, 2013) identified pre-diagnosis, transportation costs as being enormous for the patients to bear. The variations in patients' experiences and perceptions with mostly transportation costs between this project's result and the others' results could be explained by the fact that most of the patients in this study were local residents who incurred minimum transportation fare to the DOTS centre which may not be the case in the other studies where patients could have been travelling from afar to the DOTS centres. This made the major difference in transportation cost between our study and the other studies.

All the other studies (Umar et al; 2012), ([b] Ukwaja et al; 2013), (Mauch et al; 2011) also concluded that although anti-tuberculosis treatment is supposed to be free in Nigeria, patients had to pay significant out-of-pocket costs to access diagnosis and treatment services, which is actually in negation to our findings and conclusion. Even though our result could be seen as being counter intuitive given the results from the other studies, the differences could be explained by the fact that the variable costs examined were different between our study and the others. While the other studies examined costs of hospitalisation treatment due to TB, costs associated with patients' TB/HIV status, time spent and productivity lost by patients, families and others due to TB illness, ours examined costs associated with geographical distance, transportation, accommodation and administrative fee charges. The variables examined were quite different and very much contributed to the differences in the cost amounts experienced by the patients. Most of the patients in our study, by all indications were local residents which do explain the low transportation fare and the relative small geographical distance they had to make to the DOTS centre. These reasons do explain the low amounts the patients had to pay to receive TB services in our study. Also, because the patients were local residents, majority did not have to pay for hotel accommodation when they do visit the TB clinic. More so, they did not have to pay for any form of administrative fee charges, since no noticeable charges were made in that regard to the patients. The drugs were provided free-of-charge and patients were only sometimes required to purchase vitamins which were of insignificant cost to them. But, unlike our study, hospitalisation costs due to TB and additional costs associated with patients' time off-work in the other studies were unavoidable and enormous for patients who were affected and these costs do not come within the free-treatment package for patients requiring TB services and as such had to be paid out-of-pocket by such patients, thereby increasing the costs the patients had to bear for treatment. The geographical distance, transportation and accommodation costs in our study were avoidable as majority of the patients were local residents, and as such many patients did not have to pay for them. The administrative fee charge was insignificant as majority of the patients did not have to pay for it also. All these, do explain the huge costs differences associated with TB services in our study and the others.

Results of this work also showed that the higher the distance to the DOTS health facility, the higher and the greater the difficulty faced by the respondents in accessing TB services, even though the distance differences were marginal. The result showed that 29% of the respondents whose residential distance was more than 30 kilometers to the health facility faced barriers to accessing services and the statistical test showed a significant value at X^2 =8.452.0.038. The result equally showed that percentage access barriers to DOTS centre increased with increase in the transportation fare of the respondents. Those with least transportation fare having to suffer least access barriers compared to those with highest transportation fare. Though the number that suffered geographical and transportation barriers were small and marginal, the finding still agrees with (Ibrahim et al; 2014), (Onyeonoro et al;

2014), **(**[c]Ukwaja et al; 2013) and (Ayé et al; 2010) where geographical (distance) factors were identified as major sources of barrier inhibiting access to TB services. The farther the DOTS centre from the patients' place of abode, the relative difficulty associated with accessing TB services concluded the other studies.

Geographical (distance) from the DOTS facility has been thoroughly established as barrier to accessing TB Services both in terms of the distance and financial costs involved even though the number is small. The government and the foreign partners involved in TB services could ease this difficulty to the barest minimum by improving on the number of available DOTS centres and if possible the provision of transportation to the economically disadvantaged individuals and households. Wherever possible, and without compromising quality, TB services should be brought to the peripheral levels (primary health) of the health services to reduce the distance travelled and costs associated with each health care service consultation. Decentralisation and health sector reforms are processes through which diagnosis and ambulatory treatment of TB could be brought closer to where patients live. But also in some very remote areas, rather than take treatment observation and DOTS support to patients, patients could be brought to treatment or observation centres, for example with the support of local governors, public transport vouchers were issued for TB patients in remote areas of India to access TB services (WHO, 2005).

Conclusion

In conclusion, this study found that majority (62.4%) of the respondents had no financial difficulty in accessing TB treatment and services as almost (96%) all the respondents did not pay for one form of administrative fee or the other and nearly all (95.2%) of the respondents did not have to pay for accommodation each time they visited the DOTS facility for health care. Results of this work also showed that the higher the distance to the DOTS health facility, the higher and the greater the difficulty faced by the respondents in accessing TB services.

The implication of our findings is that most of the TB patients may have been local residents and as such did not have to pay for accommodation each time they visited the DOTS centre for treatment, but yet a minor percentage of the patients experienced transportation fare problem having to travel from afar to the treatment centre. This problem has the potential of holding back some patients from completing their treatment regime and will result in relapse of the TB problem which may be more intensified and could result into more infections within the community the patients live as many more persons could be exposed to the virus. The economic consequence of this could be very enormous as many more community members will be out of work due to TB sickness and consequently dependent on their households because of their inability to live a productive live. Countering this problem will be to establish more DOTS centres at the peripheral (primary health) centres to reduce the distances patients will have travel to obtain treatment. Transportation could also be made available on specific days to and fro the DOTS centre or transportation vouchers made available to the economically deprived patients.

Ethics approval and consent to participate

University of Nigeria ethical review committee reviewed the questionnaire and protocols to ensure that the study procedures adequately protected the study participants. Ethical clearance was eventually obtained from the committee. The study was organized in accordance with the Helsinki Declaration and local legislations in protection of patients' rights. Patient's consent was sought and obtained before the administration of questionnaire. Those that did not consent to participate were not interviewed.

Authors' contributions

OGO thought and initiated the study; OCN, JCA and EOD supervised and provided the technical support needed for the completion of the project while IOM and PO supervised the analysis. All the authors read and approved the final manuscript.

Acknowledgements

We do acknowledge the assistance of the post graduate students who helped in the questionnaire administration.

References

Ahlburg, D. (2000). The economic impacts of tuberculosis. Geneva, Switzerland: World Health Organization.

Ayé, R; Wyss, K; Abdualimova, H; Saidaliev, S. (2010). Illness costs to households are a key barrier to access diagnostic and treatment services for tuberculosis in Tajikistan.BMC Research notes. 3:340

Bell, J C; Rose, D N; Sacks H S. (1999). Tuberculosis preventive therapy for HIV-infected people in sub-Saharan Africa is cost-effective. AIDS. 13: 1549–1556.

Bello, SI. (2010). Challenges of DOTS implementation strategy in the treatment of tuberculosis in a tertiary health institution, Ilorin, Nigeria. African Journal of Pharmacy and Pharmacology. Vol. 4(4). 158-164.

Cambanis, A; Yassin, MA; Ramsay, A; Squire, SB; Arbide, I; Cuevas, LE et al. (2005). Rural poverty and delayed presentation to tuberculosis services in Ethiopia. Tropical medicine and international Health 2005; Vol. 10, issue 4, pages 330-335.

Davies, P D O. (2003). The world-wide increase in tuberculosis: how demographic changes, HIV infection and increasing number in poverty are increasing tuberculosis. Ann Med. 35: 235–243.

Department for International Development. DFID report 2009. Fact sheet: Nigeria. London, UK: DFID, 2009.

Eneji, MA; MaiLafia, D; Song, W. (2013). Socio Economic Impact of Graduate Unemployment on Nigeria and the Vision 20:2020. Int J. Dev. Sustain. 2(1):1-22.

Federal Ministry of Health, Nigeria. Department of public health. National tuberculosis and Leprosy control programme (NTBLCP); 2010.

Federal Ministry of Health: *Guidelines for implementing community tuberculosis care in Nigeria*. Abuja: Federal Ministry of Health / National Tuberculosis and Leprosy Control Programme; 2007.

Ibrahim, LM; Hadejia, IS; Njoku, P; Dankli, R; Waziri, NE; Akhimien, MO et al: (2014). Factors associated with interruption of treatment among Pulmonary Tuberculosis patients in Plateau State, Nigeria. The Pan African Medical Journal. 17:78.

Itah, A Y; Udofia, S M.. (2005). Epidemiology and endemicity of pulmonary tuberculosis (PTB) in south eastern Nigeria. Southeast Asian J Trop Med Public Health. 36: 317 323.

Lawn, S D; Shattock, R J; Griffin, G E.(1997). Delays in the diagnosis of Tuberculosis: a great new cost. Int J Tuberc Lung Dis.1: 485–486.

Mauch, V; Woods, N; Kirubi, B; Kipruto, H; Sitienei, J; Klinkenberg, K et al (2011).. Assessing access barriers to tuberculosis care with the Tool to Estimate Patients' Costs: pilot results from two districts in Kenya. BMC Public Health. 11:43.

Makwakwa, L; Mei-ling, S; Chen-Yuan, C; Shoei-Loong, L; and Peter, W; Chang, PW (2014). Patient and health system delays in the diagnosis and treatment of new and retreatment pulmonary tuberculosis cases in Malawi. BMC Infectious Diseases. 20 14: 132

Nhlema, B M; Kemp, J R; Steenbergen, G; Theobald, S; Tang, S; Squire, S B. (2003). The state of existing knowledge about TB and poverty. Int J Tuberc Lung Dis. 7 (Suppl. 2): 116.

Olakunde, BO.(2012). Public health care financing in Nigeria: Which way forward?. Ann Nigerian Med. 6:4-10

Onyeonoro, UU; Chukwu, JN; Oshi, DC; Nwafor, CC; Meka, AO. (2014). Assessment of tuberculosis-related knowledge, attitudes and practices in Enugu, South East Nigeria. Journal of Infectious Diseases. Vol. 6(1) pp.1-9

Oleribe, E O; Alasia, D D. (2006). Socio-demographic variables and family health: a prospective study of a Katcha in north-central Nigeria. Niger J Med. 15: 427–429.

Orubuloye, I O. (1995). The demographic situation in Nigeria and prospects for fertility transition. J Int Dev. 7: 135–144.

Rieder, H. (1999). Epidemiologic basis of tuberculosis control. Paris, France: International Union Against Tuberculosis and Lung Disease.

Soyinbo, A. (2005). National Health Accounts of Nigeria 1999-2002. Final report submitted to World Health Organization. Ibadan: University of Ibadan.

Soyinbo, A; Olaniyan, O; Lawanson, AO. (2009). National Health Accounts of Nigeria 2003 2005: Incorporating Sub-National Health Accounts of States. Main report submitted to Federal Ministry of Health. Ibadan: University of Ibadan.

[a]Ukwaja, KN; Alobu, I; Igwenyi, C; Hopewell, PC. (2013). The High Cost of Free Tuberculosis Services: Patient and Household Costs in Ebonyi State, Nigeria. PLOS ON. Volume 8/issue 9.

[b]Ukwaja, KN; Alobu, I; Abimbola, S; and Hopewell, PC.(2013). Household Catastrophic payments for Tuberculosis Care in Nigeria: incidence, determinants, and policy implications for Universal health coverage. Infectious Diseases of poverty. 2**:** 21

[c]Ukwaja, KN**;** Alobu, I**;** Nweke, CO; and Ephraim, C O. (2013). Healthcare-seeking behavior, treatment delays and its determinants among pulmonary tuberculosis patients in rural Nigeria: a cross-sectional study. BMC Health Services Research. 13:25

Umar, NA; Abubakar, I; Fordham, R; Bachmann, M. (2013). Int J Tuberc Lung Dis. 2012; 16(6):835–840.

Umar, NA; Fordam, R; Abubakar, I; and Bachmann, M. (2012). The indirect cost due to pulmonary Tuberculosis in patients receiving treatment in Bauchi State-Nigeria. Cost effectiveness and Resource Allocation. 10:6

Wei, X; Chen, J; Chen, P; Newell, JN; Li, H.(2009). Barriers to TB care for rural-to-urban migrant TB patients in Shangai: a qualitative study. Tropical Medicine and International Health. vol. 4 issue7, pages 754-760.

Wei-Teng, Y; Gounder, CR; Akande, T; Jan-Walter, D N; McIntire, KN; Chandrasekhar, A; Alan, de Lima Pereira; Gummadi, P; Samanta, S; and Gupta, A.(2014). Barriers and Delays in Tuberculosis Diagnosis and Treatment Services: Does Gender Matter? Tuberculosis Research and Treatment. Article ID 461935, 15 pages.

World Health Organization: Addressing Poverty in TB Control. Geneva; 2005.

WHO: *Global Tuberculosis Control: WHO report*. Geneva: World Health Organisation; 2011.

World Health Organization. Global tuberculosis report 2010 Geneva. World Health organisation. 2010.

Zhang, T H; Tang, S L; Jun, G; Whitehead M. (2007). Persistent problems of access to appropriate, affordable TB services in rural China: experiences of different socio economic groups. BMC Public Health. 7: 19.

Zhang, T; Tang, S; Jun, G; Whitehead, M. (2007). Persistent problems of access to

appropriate, affordable TB services in rural China: experiences of different socio economic groups. BMC Public health. 7:19.