Texila International Journal of Public Health
Volume 6, Issue 4, Dec 2018

Factors Associated with Health-care Service Delay in Diagnosis among Tuberculosis Patients in National Tuberculosis and Leprosy Training Centre in Zaria-Nigeria

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Abstract

Background: *Any delay in diagnosis and consequently treatment of TB patients not only increases the infectivity of the disease in the community, but may lead to more advance disease state, which may result in more complications and expose patients to higher risk of death.* ***Objectives*** *To assess delays in diagnosing new TB patients and the factors associated with these delays in* NTBLTC Zaria, *Nigeria.* ***Methods:*** *The study population was TB patients attending the* NTBLTC, *Zaria. Analysis of contingency tables was done and Chi-square statistics were used to test for association between variables and level of significance. Logistic regression was used to calculate the odd ratio.* ***Results:*** *Age, marital status, economic status, sex, education, and alcohol consumption were significantly (P<0.05) associated with patient delays while smoking and CD4 count were statistically not significant with patient delays. Female (OR=1.046; 1.04-2.17), literacy (OR=1.02; 0.29-1.98) and single (OR=1.00; 0.14-4.67) were the major determinants that influence extended patient delay. Age, economic status, education, smoking and alcohol consumption were significantly (P<0.05) associated with health system delays while sex, marital status and CD4 count were statistically not significant with health system delays.* ***Conclusion:*** *Factors associated with delay in seeking health care for more than 30 days included age, sex, marital status, economic status, education, smoking and alcohol intake while for patient delay includes age, sex, marital status, economic status, education and alcohol intake. This factor should be taken into consideration for policy planning to help the containment of the spread of the disease.*

Keywords: Health care service delay, cross-sectional, odd ratio, tuberculosis, Logistic regression, patient delay.

Acronyms

HIV	Human Immunodeficiency Virus
OR	Odd ratio
SPSS	Statistical Package for Social Scientist
TB	Tuberculosis
WHO	World Health Organization

Background

Tuberculosis (TB) ranks among the most infectious diseases in the World. Nigeria was rated the third (3rd) highest Tuberculosis (TB)-burden country in the World and number one (1st) in Africa (WHO, 2015). Given the recent 16 per cent TB cases awareness rate in the Global survey report, the country's TB treatment gap has also become the highest, accounting for 15 per cent of the global gap. Report from WHO (2015) at the lunch of 1st Nigeria, National Strategic Plan for TB Control opined that the current rate of transmission and development of Tuberculosis had reach a threshold and over four million cases are forecasted to occur in Nigeria between 2015 and the end of 2020. According to the Global TB report, an approximated one million of the over four million cases would be co infected with HIV, while 200,000 was expected to have multi-drug resistant TB.

DOI: 10.21522/TIJPH.2013.06.04.Art002
ISSN: 2520-3134

Many health care systems in Nigeria continue to grapple with lengthy waiting time for patients. Lengthy waiting time for patients before given treatments have predominated our health care system. Studies in the United States have found the average waiting times to be twice the recommended time for acute patients (Horwitz *et al.*, 2010). In addition, a report in 2014, from the Centre for Disease Control found that the average patient treatment time was 90 minutes. Another international survey conducted by the Canadian Institute of Health information in 2012, showed that at least half of the patients take four hours to be given treatment. Consequences of patient delay in the health facilities have been linked to weak responses (Yeboah and Thomas, 2009). In a hospital in Nigeria, a study carried out in an outpatient unit showed low correlation between waiting time and patient satisfaction. Most patients found a waiting time of less than 30 minutes acceptable while more than 60 minutes was reported as not acceptable (Umar *et al.*, 2011). The Institute of Medicine recommends that patients should be attended to within 30 minutes of their arrival to the facility or their appointment (Musinguzi, 2015).

Timely diagnosis and adequate treatment of patients are key for effective control of tuberculosis (WHO, 2006). Therefore, there are high likelihood that the time of infectiousness is importance to the risk of the population becoming exposed to such a case. The fraction of contacts found to be infected at the time of diagnosis of a smear-positive index case is around 30%–40%. If the case were not detected and placed on adequate chemotherapy, a large segment of the population would remain susceptible to new infection. Therefore, early case detection and treatment with suitable anti-tuberculosis drugs would reduce the time of infectiousness of this case in the community and hence the number of new individuals exposed and infected.

Yeboah & Thomas (2009) observed that the result of long waiting times is dissatisfaction and poor compliance to drug regimens leading to poor clinical outcomes. Also, patients who waited for doctor in Pumwani Maternity hospital less than 30 minutes were more satisfied than those who waited for more than 60 minutes and therefore longer patient waiting time was found to affect patient satisfaction (Wandera *et al.*, 2014).

In sub Saharan Africa, mean waiting time in facilities of more than four hours has been reported. A study of patient flow efficiency in three HIV clinics in Uganda reported a mean waiting time of up to 4.6 hours (Wanyenze et al., 2010). Several factors have been identified to be leading to the long waiting hours in many outpatients' units within and without hospitals in developing countries. Some of these could be attributed to few health personnel, and a high patient load (Maluwa et al., 2012). Out of these causes, lack of adequate staff has emerged the main reason for long stay in clinics (Oche & Adamu 2013). A study done in Indonesia found that managing the flow of patients in a health facility can improve the time a patient spends on the queue (Mardiah & Basri, 2013).

In the Nigerian health system, services are provided at three levels namely: primary, secondary and tertiary. The local government areas (LGAs) provides the primary level of care; state governments the secondary level of care and provision of technical guidance to the LGAs, and the federal government is responsible for the tertiary level of care as well as policy formulation and technical guidance to the states (Federal Ministry of Health Nigeria, 2010). Long waiting time in Nigerian outpatient clinic negatively affect the perception of service provision and clinic experience by patients (Oche & Adamu 2013).

Delays in tuberculosis (TB) diagnosis and treatment is a major barrier to effective management of the disease. Determining the factors associated with patient and treatment in Nigeria may contribute to TB prevention and control. The main control strategy in the country is passive case finding whereby people with symptoms are expected to go to health facilities for further investigation. Currently, there is delay in seeking care among the teeming Nigeria populace, thereby leading to delay in case detection and treatment which may worsen the prognosis of the disease and spread of infection. As these factors can vary in different populations and health systems, it is important to evaluate factors affecting patient/health system delay in specific settings.

The general objective of this study was to assess the patient waiting time and identify associated factors that affect patient waiting time at NTBLTC Zaria.

The specific objectives were to

(1) To assess the demographic, risk and clinical factors associated with patient health system delays in NTBLTC Zaria.

(2) To assess the demographic, risk and clinical factors associated with patient delays in NTBLTC Zaria.

Methods

The NTBLTC Zaria, Kaduna State, Nigeria was used for this study. NTBLTC was established about twenty-five years ago, precisely in 1991. It has three mandates, patient care, training and research on TB and Leprosy. The NTBLTC is located on latitude 11^0 9' 45'' N and longitude 7^0 38' 8'' E, at an altitude of 610m above sea level. The temperature of the area ranges between 26-40^{o}C depending on the season while the relative humidity during the dry and wet seasons are 21 and 72% respectively. The wet periods in Zaria are between May and October with annual rainfall of about 1500mm (IAR, 2013).

Structurally, the institution has recently been upgraded with enough facilities to handle international trainings on TB/HIV/AIDS. There are recently built clinics, laboratories, training classrooms, conference hall, library, hostel- they are designed to meet the standard of infection control in the facility. The study target TB patients attending the National tuberculosis and Leprosy Training Centre, Zaria. There were 400 TB patients enrolled in the clinics of National tuberculosis and Leprosy Training Centre, Zaria during the study period.

Sample size determination

The sample size was calculated by using the Shuster (1990) formula for determining the sample size when the population is less than 10,000. The confidence interval was set at 95% and a margin error of 5%.

$$n = \frac{z^2 p (1-p)}{\varepsilon^2}$$

Whereby z = level of confidence (1.96 for 95% confidence level)

p = expected proportion of patient with TB and HIV coinfection, in this case was unknown therefore p was taken as 100 – 95 = 5% = 5/100 = 0.05

ε = margin of error equal 0.06

Therefore, $\frac{1.96 \times 1.96 \times 0.05 (1 - 0.05)}{0.06 \times 0.06} = 267$

In order to minimize design effect in multistage random sampling the sample size was multiplied by 1.5 to get 400.

Data collection

All tuberculosis patients attending clinics during study period were included in a study. This research employed a cross sectional analytical study. A cross-sectional study, a type of descriptive, observational study, involves measuring different variables in the population of interest at a single point in time. Delay in seeking care for tuberculosis patients. This was obtained by asking patients the time interval between onset of symptom and presentation to a health care facility. Thirty days was used as cut-off point for delay. Age, education, occupation, economic status, marital status were all classified as demographical factors while CD4 count was the only clinical variables, smoking and alcohol were all categorized as clinical factors. An interview schedule was used to capture data from tuberculosis patients attending TB clinics. Some of the statements used were adapted from the ‘’diagnostic and treatment delay in tuberculosis, an in-depth analysis of the health seeking behavior of patients and health system response “used by WHO (2006). Data collection procedures Consecutive patients were approached after leaving consultation room. They were asked for consent to be interviewed. Those who were unwilling to participate were excluded. After data collection, interview schedules were compiled. Field editing was done to check for errors, eliminate mistakes, making sure the responses were coded. Data was sorted, coded and entered into the computer using statistical software, Statistical Package for Social Sciences (SPSS) version 24. Analysis of contingency tables was done and Chi-square statistics were used to test for association between variables and level of significance. The cut-off point for level of significance

DOI: 10.21522/TIJPH.2013.06.04.Art002
ISSN: 2520-3134

was set at p-value < 0.05) and all tests were two sided. Logistic regression was used to calculate the odd ratio.

Operational definitions

The following are operational definitions:

Patient delay: Refers to the time interval between the onset of the first Tuberculosis (TB) symptoms and first contact with Public health services (health centres, hospitals or TB treatment centres) because of those symptoms.

Healthcare services delay: Refers to the time interval between the first medical consultation to Public Health facility and the time taken to diagnose TB patient.

Total delay: Refers to the time interval between the first TB symptoms and TB diagnosis (which is equal to the sum of patient and Healthcare services delay).

New TB patient: Refers to a patient who has never had treatment for tuberculosis or who has taken anti-tuberculosis drugs for less than one month.

Pulmonary Tuberculosis (PTB): Refers to a patient with tuberculosis disease involving the lung parenchyma.

Extra pulmonary TB (EPTB): Refers to patients with TB in any organ other than the lungs verified by histopathology.

Ethical clearance, informed consent & data confidentiality

The study was approved by the Ethics Committee of the National Tuberculosis and Leprosy Training Centre (NTBLCTC) located at *Saye* village, Zaria, Kaduna State and Ministry of Health and Human Services of Kaduna State. Written informed consent was obtained from all patients at enrollment. Participation in study was voluntary, no coercion was used and participants were assured that no repercussions will follow clients that are unwilling to participate. Willing participants signed an informed consent form expressing their willingness to participate in the study. Anonymity of participants was assured by coding all questionnaires uniquely using numbers and by not recording names of participants. Confidentiality of information given by clients was upheld.

Result

Table 1. Demographic, risk and clinical factors associated with patient delays in Tuberculosis diagnosis

Socio-economical	**Odd ratio**	**Confidence interval**	**P value**
Age			
18-38	1		
39-59	0.866	0.012-1.511	0.001*
60-80	0.975	0.199-1.384	
Marital status			
Married	1		
Single	1.00	0.14-4.67	0.001*
Separated	0.44	0.01-1.00	
Economic Status			
Low	1		
Medium	0.268	0.25-3.80	0.001*
High	0.178	0.01-29.33	
Sex			
Male	1		0.02*
Female	1.046	1.04-2.17	
CD4			
Less than fifty	1		
Less than hundred	0.88	0.01-1.01	0.98
Education			
Illiterate	1		

Literate	1.02	0.29-1.98	0.018*
Smoking			
Yes	1		0.997
No	0.706	0.12-7.43	
Alcohol			
Yes	1		
No	0.84	0.25-0.96	0.002*
**P<0.001-highly significant; *P<0.05-significant			

Table 1 showed demographic, risk and clinical factors associated with patient delays in Tuberculosis diagnosis. Age, marital status, economic status, sex, education, and alcohol consumption were significantly (P<0.05) associated with patient delays while smoking and CD4 count were statistically similar (P>0.05) with patient delays. There was a strong connection between single, female and literate and patient delay.

Table 2. Demographic, risk and clinical factors associated with patient health system delays in Tuberculosis diagnosis

Risk factors	Odd ratio	Confidence interval	p-value
Age			
18-38	1		
39-59	0.17	0.12-2.28	0.047*
60-80	0.11	0.82-14.3	
Economic Status			
Low	0.874	0.182-4.204	
Medium	1		0.001*
High	1.624	0.02-12.76	
Marital status			
Married	0.40	0.37-18.53	
Single	1		0.93
Separated	0.51	0.44-1.45	
Sex			
Male	1		
Female	1.418	0.221-9.101	0.46
CD4 counts			
Less than 50	1.88	0.196-18.18	0.75
50-100	1		
Education			
Illiterate	1		
Literate	0.611	0.049-7.566	0.075**
Smoking			
Yes	1		
No	0.877	0.02-4.09	0.001**
Alcohol			
Yes	1		
No	0.96	0.93-0.97	0.001**

**P<0.001-highly significant; *P<0.05-significant

Table 2 the results of logistic regression analysis on health system delays in Tuberculosis diagnosis as a binomial outcome variable. Age, economic status, education, smoking and alcohol consumption were significantly (P<0.05) associated with health system delays while sex, marital status and CD4 count were statistically similar (P>0.05) with health system delays. This implies that age, economic status, education, smoking and alcohol consumption might be possible predictor of health system delay for TB patient. CD4 counts, sex and economic status had the highest relative risk.

DOI: 10.21522/TIJPH.2013.06.04.Art002
ISSN: 2520-3134

Discussion

An understanding of the factors associated with waiting time may help to enhance systems and operational changes in facilities. More than half of the respondents were female and this was shown to be significant for patient delay. These findings are similar to other studies done in Nigeria (Oche & Adamu, 2013) and other developed countries (Whyte & Goodacre, 2016) but percentage for the female was higher than that found in another study in Nigeria (Umar et al., 2011). This study found that gender of the patient influenced waiting time which concurs with findings in similar studies (Oche & Adamu, 2013). In this study, it was evidenced that women has somatic awareness and are presented more often to medical practitioners than the men do. Female (OR=1.046; 1.04-2.17), literacy (OR=1.02; 0.29-1.98) and single (OR=1.00; 0.14-4.67) were the major determinants that influence extended patient delay. Females were 1.046 (95 % CI: 1.04–2.17) times more likely to have prolonged patient delay than males. However, this association was significant. It has been reported that patient delay is common among females than males (Ndagaya *et al.,* 2009). This study however, finds a significant probability difference between the sexes and increased patient delay, a pattern consistent with those reported in Tanzania (Ndagaya *et al.,* 2009) and Odusanya *et al.,* (2004) where sex was not found to be a significant predictor of prolong patient delay. In contrast to the Kumasi study (Lawn *et al.,* 1998) males in this study postponed care-seeking longer than females. In a study in India, males delay longer because of fear of cost of diagnosis and treatment (Atre *et al*., 2004). Also, men were more likely to neglect symptoms longer until they are serious before seeking care. Fazlul *et al*. (2007) attributed similar differences in case detection to women limited decision-making power and failure of health systems to provide accessible and acceptable health care.

Female (OR=1.418; 0.22-9.10), high income earner (OR=1.624; 0.02-12.76) and CD4 count less than 50 (OR=1.88; 0.19-18.18) were the major determinants that influence extended health system delay. Females were 1.418 times more likely to have prolonged health system delay than males. However, this association was significant. High income earner individuals 1.624 times extended health system delay than medium and low-income earners with a significant effect while patient with CD4 count less than 50 had likelihood to cause delay in health system facilities about 1.88 times, though the association is not statistically significant (P>0.05). The significant risk factors were similar to some of the risk factors (HIV infection, older age, low educational level, longer walking distance to the nearest public facility and female gender) associated with TB diagnostic and treatment delay (Okotie *et al.,* 2008). These were consistent with some of our findings. Our data showed that female sex served as an important determinant of both patient delays. Despite the cross-sectional nature and sufficient sample size to detect correlations with delay, female sex showed significant effect with delays in seeking diagnosis and treatment for TB. Similar findings were reported in studies from other countries (Storla *et al*., 2008). In addition, cultural factors are likely to be involved in gender differences. Because of the higher TB prevalence in females, TB is likely suspected and investigated more readily in female (Odusanya *et al.,* 2004). Therefore, female is likely to seek health care earlier when symptoms appeared; thus, TB propaganda regarding disease control and diagnosis is more necessary for female. Moreover, biological differences between males and females with respect to TB incidence and the sensitivity of smear examinations may play an essential role (Atre *et al*., 2004). In addition, gender-specific themes were particularly pervasive within financial, stigma, and health literacy barriers. Atre *et al*. (2004) reported that gender-related differences in barriers and delays in TB diagnosis and treatment services found that women experienced greater financial barriers and greater stigma than men; the identified barriers were gender-specific in the majority of studies. It is therefore challenging to overcome gender-specific barriers that require intervention. We propose that female patients with symptoms suggestive of TB should receive more attention before and after seeking care.

Previous reviews of the factors associated with patient and diagnostic delays (Oche & Adamu, 2013) reported that the majority of factors associated with delays in TB diagnosis and treatment were related to the economic status, age, education level, travel time, or distance from the health facility which are in tandem with variables in our study. Economic status was one of the major determinants which correlated with patient delay in this study. It is important to balance the TB severity and the costs associated with seeking care to continue with diagnosis and treatment. Almost all included studies were cross-sectional in design, which used a consecutive method of sampling. Cross-sectional studies have

a number of inherent limitations that potentially bias the results, such as its low comparability and that it is includes certain confounders. Thus, these studies do not obtain the causality of the observed associations. Although some of the studies were controlled by logistic regressions for these confounders, their residual effect might still have introduced bias.

Conclusions

Several indicators such as overgrowing population, weak and devastating health systems as well as political and security instability in the Zaria, Kaduna State might create opportunity for massive spreading of TB. Thus, there is a need for a comprehensive review of factors which may play a role in the spread of TB within this region. Factors associated with patient delay and patient health system in seeking health care for more than 30 days after development of symptoms were age, sex, marital status, economic status, education, smoking and alcohol intake while for patient delay includes age, sex, marital status, economic status, education and alcohol intake. It is anticipated that this study, using rigorous methods of the systematic review process, will present a foundation towards efforts in containing the disease while, learning from other region ‘s experience.

Acknowledgement

The author would like to acknowledge the management of NTBLTC, Saye, Kaduna State, Nigeria.

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DOI: 10.21522/TIJPH.2013.06.04.Art002
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Article 1 - Answers and Responses to Tau Journals Reviewers Comments

S/N	Review Comments	Answers	Changes Made (Line & Page No)	Remarks/Justification
1.	English needs to polish with coherence and cohesion along with some grammar mistakes.	The English has been improved upon and grammatical errors corrected.	The entire article was reviewed and necessary correction made.	The changes can be seen across the entire length of the corrected article.
2.	No comment from the reviewer	Not Applicable	Not Applicable	Not Applicable
3.	No comment from the reviewer	Not Applicable	Not Applicable	Not Applicable
4.	Literature review should include at least one or two studies and how the present study helped to fill out the gaps found. The Objectives need to be rewritten as General and Specific objectives - 1 General and 2 - 3 Specific objectives.	Literature review has been expanded with the inclusions of additional 3 Nigerian local cases cited (Pgs. 3 & 10) The following are the 3 sited references: 1 Federal Ministry of Health Nigeria (2010). 2 Oche, M. & Adamu, H. (2013). 3 Okotie *et al.*, (2008). **The Objectives:**	This is cited under background on page 3, paragraph 2 and lines 1-4 of the corrected article. This is cited on Page 3, paragraph 2, line 4-5 of the corrected article. This is cited under discussion on page 10, paragraph 3 and lines 1-9 of the corrected article. **The General objective** of this study was to assess	The newly introduced references are among the listed references on pages 12 & 13 of the corrected article. The references are listed below based on the order of arrangement in the references: 3 Federal Ministry of Health, Department of Public Health. National Tuberculosis and Leprosy Control Program: workers manual. 5. Abuja, Nigeria: Federal Ministry of Health; 2010.

		This has been re-adjusted as General & specific objectives in line with the reviewers directive.	the patient waiting time and identify associated factors that affect patient waiting time at NTBLTC Zaria. **The specific objectives** were to: (1) To assess the demographic, risk and clinical factors associated with patient health system delays in NTBLTC Zaria. (2) To assess the demographic, risk and clinical factors associated with patient delays in NTBLTC Zaria.	9 Oche, M. & Adamu, H. (2013). Determinants of patient waiting time in the general outpatient department of a tertiary health institution in north Western Nigeria. *Annals of medical and health sciences research*, 3(4), pp.588–592 11 Okotie, O.T., Patel, N. & Gonzalez, C. M., (2008). The effect of patient arrival time on overall wait time and utilization of physician and examination room resources in the outpatient urology clinic. *Advances in urology*, p.507436. The objectives are as stated on page 4 of the article.
5	Sample size calculation and formula needs to be added. Ethical issues like privacy, confidentiality of data need to be described.	Sample size calculation has been added as directed (Pg. 5) Issues around Ethical Clearance, privacy and confidentiality of data has been included & elaborately described (Pg. 7)	The sample size was calculated by using the Shuster (1990) formula for determining the sample size: $n = \frac{z^2 p (1-p)}{\varepsilon^2}$ **Ethical Clearance, Informed Consent & Data Confidentiality** The study was approved by the Ethics Committee of the National Tuberculosis and Leprosy Training Centre (NTBLCTC) located at *Saye* village, Zaria, Kaduna State and Ministry of Health and Human Services of Kaduna State. Written informed consent was obtained from all patients at	The detail (complete) sample size calculation is on page 5 of the corrected article. The ethical clearance and informed consent can be forward to the journal reviewer on request.

DOI: 10.21522/TIJPH.2013.06.04.Art002
ISSN: 2520-3134

			enrollment. Participation in study was voluntary, no coercion was used and participants were assured that no repercussions will follow clients that are unwilling to participate. Willing participants signed an informed consent form expressing their willingness to participate in the study. Anonymity of participants was assured by coding all questionnaires uniquely using numbers and by not recording names of participants. Confidentiality of information given by clients was upheld.	
6.	Discussion section is too short and actually reflects mainly the result findings.	Discussion section has been expanded and no longer around result only as instructed (Pg. 9-11).	The full content are as described on pages 9 – 11 of the article re-submitted.	Details as in pages 9-11 of the corrected article.
7.	Few more local study references of Nigeria, if available.	Some cited authors have been properly added to the reference list on pages 12-13 of the article. Again, three (3) additional local references has been added as well.	Find below the list of newly added references: 1 Federal Ministry of Health Nigeria, 2010 2 Oche, M. & Adamu, H. (2013) 3 Okotie *et al.*, 2008	The references are listed below based on the order of arrangement in the references: 3 Federal Ministry of Health, Department of Public Health. National tuberculosis and leprosy control programme: workers manual. 5. Abuja, Nigeria: Federal Ministry of Health; 2010. 11 Oche, M. & Adamu, H. (2013). Determinants of patient waiting time in the general outpatient department of a tertiary health institution in north Western Nigeria. *Annals of medical and*

				health sciences research, 3(4), pp.588–592 13 Okotie, O.T., Patel, N. & Gonzalez, C. M., (2008). The effect of patient arrival time on overall wait time and utilization of physician and examination room resources in the outpatient urology clinic. *Advances in urology*, p.507436.
8.	No comment from the reviewer	Not Applicable	Not Applicable	Not Applicable
9.	No comment from the reviewer	Not Applicable	Not Applicable	Not Applicable