FACTORS THAT ARE ASSOCIATED WITH OUTCOMES OF TREATMENT AMONG PULMONARY TUBERCULOSIS PATIENTS IN PLATEAU STATE, NIGERIA.

BY

IBRAHIM LUKA MANGVEEP

DEPARTMENT OF COMMUNITY MEDICINE, AHMADU BELLO UNIVERSITY, ZARIA NIGERIA.

SEPTEMBER 2012

FACTORS THAT ARE ASSOCIATED WITH OUTCOMES OF TREATMENT AMONG PULMONARY TUBERCULOSIS PATIENTS IN PLATEAU STATE, NIGERIA.

BY

IBRAHIM LUKA MANGVEEP MBBS (ABU 1995)
MPH-FE/MED/0005/2009-2011

A THESIS SUBMITTED TO THE
POSTGRADUATE SCHOOL,
AHMADU BELLO UNIVERSITY, ZARIA
NIGERIA

IN PARTIAL FULFILLMENT FOR THE AWARD OF
MASTER OF PUBLIC HEALTH (MPH) IN
FIELD EPIDEMIOLOGY
DEPARTMENT OF COMMUNITY MEDICINE
AHMADU BELLO UNIVERSITY, ZARIA
NIGERIA

MAY 2012

DECLARATION

I hereby attest that this is an original work that I performed to be on the record of my research carried out under the Supervision of Dr Idris S. H. of the Department of Community Medicine, Faculty of Medicine, Ahmadu Bello University. This work has not been presented in any previous application for the award of a higher degree.

---------- ----------

Dr Luka Mangveep Ibrahim

CERTIFICATION

This thesis titled ***'Factors that are associated with outcomes of treatment among pulmonary tuberculosis patients in Plateau state, Nigeria.***' Meets the regulation governing the award of the degree of ***'MPH-Field Epidemiology'*** of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

Supervisor	----------	----------
	DR S. H. IDRIS MBBS, FWACP Department of Community Medicine Ahmadu Bello University Zaria.	Date
Head of Department	----------	----------
	DR M. N. SAMBO MBBS, MIAD, FWACP HOD, Community Medicine Ahmadu Bello University Zaria	Date
Dean Postgraduate school	----------	----------
	Prof. J. ADEBAYO BA, MA, PhD Dean Postgraduate School Ahmadu Bello University Zaria	Date

DEDICATION

This work is dedicated to TB patients and all persons, groups and organizations that had committed themselves and or their resources in the fight against the disease.

ACKNOWLEDGEMENTS

I acknowledge the untiring efforts of my Academic Supervisors Drs Idris and Sambo and NFELTP Resident Advisors Drs Patrick Nguku and Lora Davis for supporting me through this thesis. I am also thankful to the TB and Leprosy Control Team in Plateau state for their active participation in the data collection and to the Plateau state Ministry of Health for granting me the leave for the study.

I sincerely appreciate my wife and children for their support to me during the study period and to the Almighty God for carrying me through the rigors of the FELTP course.

TABLE OF CONTENTS

DECLARATION ..... - 3 -
CERTIFICATION ..... - 4 -
DEDICATION ..... - 5 -
ACKNOWLEDGEMENTS ..... - 6 -
LIST OF TABLES ..... - 9 -
LIST OF FIGURES ..... - 10 -
LIST OF ACRONYMS ..... - 11 -
SUMMARY ..... - 12 -
CHAPTER ONE - INTRODUCTION 1
1.1. Background information 1
1.2. Problem Statement 7
1.3. Relevance to public health 9
1.4. Research questions 12
1.5. General and specific objectives 12
1.5.1. General objective 12
1.5.2. Specific objectives 12
CHAPTER TWO - LITERATURE REVIEW 13
2.1. Introduction 13
2.2 Anti-Tuberculosis drugs related factors 13
2.3 Patients' related factors 14
2.3 Service providers related factors 19
2.4 Organizational structure of the programme 21
CHAPTER THREE - METHODOLOGY 23
3.1 Study area 23
3.2 Study design 24
3.3 Study populations 24
3.3.1 Inclusion criteria 24
3.3.2 Exclusion criteria 25
3.4 Sample size determination 25
3.5 Sampling Technique 27

3.6 Study Instruments 27
3.7 Data Collection Methods 28
3.8. Data Management 29
3.9 Ethical Considerations 30
3.10 Limitations to the study 30
CHAPTER - RESULTS 31
4.1: Socio-demographic and clinical characteristics of the respondents 31
4.2: Knowledge of duration for TB treatment and behavioral characteristics of Respondents 36
4.3: Distance of respondents from TB treatment sites 38
4.5: Factors associated with interruption of treatment 39
4.6: Factors associated with outcome of treatment 40
4.7: Multivariate analysis; 41
4.8: Service providers' factors associated with outcome of treatment for TB. 43
4.9: Findings of Focus group discussions 46
4.9.1: Patients' factors associated with outcome of TB treatment 46
4.9.2: Service providers' factors associated with outcome of treatment. 51
CHAPTER FIVE - DISCUSSION 56
Conclusion and recommendations 64
References 66
Annexes 72
Annex 1: Questionnaire for TB patients 72
Annex 2: Questionnaire for health workers in TB treatment sites. 76
Annex 3: Guide for focus group discussions with TB patients 79
Annex 4: Guide for focus group discussions with Health Care Workers from TB treatment sites. 80
Annex 5: Work plan 81
Annex 6: Approval for the study 82

LIST OF TABLES

Table 1: Age and sex distribution of respondents

Table 2: Distribution of respondents by their social characteristics

Table 3: Distribution of the respondents by clinical classification

Table 4: Interruption of treatment among the respondents

Table 5: Treatment outcomes of the respondents

Table 6: Knowledge of respondents on curability of TB and duration of treatment

Table 7: Distribution of the respondents by alcohol use and cigarette smoking

Table 8: Distribution of the respondents by the distance from TB treatment sites

Table 9: Factors associated with interruption TB treatment among the respondents

Table 10: Factors associated with outcomes TB treatment among the respondents

Table 11: Factors associated with interruption of treatment

Table 12: Factors associated with unfavorable outcome (default and failure) of TB treatment

Table 13: Socio-demographic characteristics of Health care workers

Table 14: Health care workers' knowledge DOT and education messages

LIST OF FIGURES

Figure 1: Outcomes of TB patients in Plateau state registered between 2001 and 2008

Figure 2: Trend of outcomes of TB patients registered between 2001 and 2010 in Plateau state

Figure 3: Plateau state in the Map of Nigeria

Figure 4: Distribution of health workers by training received for TB services

LIST OF ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
AOR	-	Adjusted Odds Ratio
Cat 1	-	Category 1
Cat 2	-	Category 2
CU	-	Central Unit
DOTS	-	Directly Observed Treatment Short-Course
DOT	-	Direct Observation of Treatment
GHCW	-	General Health Care Workers
HBC	-	High Burden Country
HIV	-	Human Immune deficient Virus
ICCO	-	Inter-church Organization for Development Cooperation
KM	-	Kilometer
LGAs	-	Local Government Areas
LGTBLS	-	Local Government TB and Leprosy Supervisor
MDGs	-	Millennium Development Goals
MDR-TB	-	Multi-Drug Resistant TB
MO	-	Medical Officer
NTBLCP	-	National TB and Leprosy Control Programme
OR	-	Odds Ratio
QAO	-	Quality Assurance Officer
RAD	-	Return after Default
STBLCO	-	State TB and Leprosy Control Officer
STBLS	-	State TB and Leprosy Supervisor
TB	-	Tuberculosis
TBLS	-	TB and Leprosy Supervisor
TI	-	Transfer in
WHO	-	World Health Organization
XDR-TB	-	Extensively Drug Resistant TB

SUMMARY

Tuberculosis (TB) is a global public health problem in Nigeria, only 22 countries account for 80% of the TB burden in the world and Nigeria with estimated incidence of 311 cases per 100,000 populations occupies the fifth position among the twenty-two high TB burden countries. The country uses the World Health Organization recommended directly observed treatment short course (DOTS) strategy for its control. The DOTS strategy involves daily observation of the patient swallowing their drug at least in the intensive phase of therapy. The health care workers have strategic role to ensure accessibility of the services to patients, educate patients on treatment including duration, prompt detection of patient who miss their daily drugs collection and undertake tracing of the defaulter. The outcome of TB treatment is proxy indicators for the assessments of the performance of the programme; poor treatment outcome implies a failing control program. Adherence of the patients on the long duration of treatment is influenced by the patient, the programme and the service providers. In plateau state, TB control using the DOTS strategy started in 2001, the cured and default rates had remained below and above the expected targets set by the National control programme respectively. There is lack of understanding of the factors that determine the outcome of treatment in the state; furthermore, no study had been done in the state on the factors that determine outcome of the TB treatment.

This study explored the factors that affect the outcome of treatment to help the control program to plan and target intervention to specific problematic areas to improve the cure rates in the state and to contribute to meeting the national targets for TB control in Nigeria.

We conducted cross sectional studies, using checklist and structured questionnaires to extract information on patients' clinical, socio-demographic characteristics and knowledge on TB and their association with the outcome of treatment. Self administered questionnaire was used to extract information from the health workers on their demographic characteristic, trainings and knowledge of TB control services including patients' education and prevention of defaulting from treatment. We conducted focus group discussion with TB patients and health workers. We performed, univariate, bivariate and multivariate analysis using epiInfo software.

Of the 378 patients interviewed, 229 (60.6%) were male; their mean age was 37.6 ±13.5 years. Seventy-one (18.8%) had interrupted their treatment. Unfavorable treatment outcome was associated with Interruption of treatment (OR 81.96; CI 95%: 10.61 – 633.03), lack of knowledge of duration of treatment (AOR 18.48; CI 95%: 1.82 – 187.18), cigarette smoking (AOR 23.89; CI 95%: 2.40 – 237.28) and distance > 5 km from TB treatment site (AOR 18.27; CI 95%: 1.82 – 187.18). The patients identified long distance and transport cost to TB treatment sites, daily clinic visit and unfriendly attitude of the health workers as the major barriers to adherence to TB treatment, additionally, the health care workers identified lack of training on TB control services leading to poor education of the TB patients and their unfriendly attitudes towards the patients as the barriers to adherence to treatment by the patients.

This study revealed that lack of knowledge of the patients on the disease and duration of treatment due to poor education, living far from the TB treatment site, history of smoking of cigarette and unfriendly attitude of the health workers towards the patient as the factors associated with unfavorable outcome of TB treatment in Plateau state. These findings suggest

that improving the knowledge of the patients on the duration of treatment, reducing their distances to health facilities and smoking cessation among TB patients will improve the outcomes of TB treatments in the state.

Key words: Treatment interruption, treatment outcome, Tuberculosis, Nigeria

CHAPTER ONE - INTRODUCTION

1.1. Background information

Tuberculosis (TB), a bacterial infection for which cure had been discovered more than half a century ago, is still among the major causes of death in the world. The World Health Organization (WHO) estimates that *Mycobacterium tuberculosi*s complex; the agent that cause the disease infects over 2 billion people in the world and accounts for over 2 million deaths annually. Developing countries with limited resources for health care services account for 95% of the TB cases and 98% of the deaths from the disease. Eighty percent of the global TB cases come from only 22 countries called High Burden Countries (HBC) and Nigeria occupies the fourth position among these countries. According to the WHO report of 2009, Nigeria had an estimated incidence and prevalence of 460,000 and 772,000 TB patients respectively and 195,000 might have lost their lives from the disease.[1]

Nigeria adopted the WHO Directly Observed Treatment Short Course (DOTS) strategy to control the disease in 1996[2]. The strategy prescribes a uniform diagnostic and treatment protocol for TB patients in the country. The country uses the eight months treatment regimen and each patient's outcome of treatment is evaluated at end of the treatment duration. The expected outcome is a cured rate of at least 85% among the patients whose sputum tested positive for *mycobacterium tuberculosis*. Failure to complete the eight month treatment and to achieve cure leads to continuous harboring and transmission of the infectious agent. These groups of patients are potential source of multi-drug resistant TB (MDR-TB). They constitute a major threat against the success of the TB control.[3]

In Plateau state, TB control services using the WHO recommended DOTS strategy started in 2001 following the signing of a tripartite agreement between the State Government, Netherlands Leprosy Relief and Inter-Church Organization for Development Cooperation (ICCO). The services started at 5 centers in three local government areas (LGAs). Over the years, with the support from WHO and Global Fund the state control programme embarked on expansion of the services such that by the end of 2010, there were 38 TB diagnostic (microscopy) centers in 15 of the 17 LGAs and 198 TB treatment centers (DOTS) spread over the seventeen LGAs.[4]

The control team is structured according to the national guideline for TB and leprosy control programme (NTBLCP) in Nigeria.[2] At the state level is the state TB and Leprosy control officer (STBLCO) supported by State TB and Leprosy Supervisors (STBLS). They are responsible for planning, supervision, monitoring and evaluation of the TB activities at the LGA levels. They are also responsible for training of personnel in TB control services and offering of technical and logistic supports including advocacy for TB control.

The LGA is the operational unit; the team at this level includes the LGA TB and Leprosy Supervisor (LGTBLS), the General health care workers (GHCW), the Medical Officer (MO) and the laboratory staff.

The LGTBLS are responsible for;

- Supervising the TB control services at the health facility to ensure adherence to the national guideline
- Order supplies and ensure their availability in the facility
- Keep up to date records of all patients in the LGA central register

- Offer supports in referrals and transfer of patients including tracing of those who interrupt their treatment.

The GHCW comprises of nurses, community health care workers and environmental health officers. They are in contact with the patient from diagnosis to the end of treatment. Their responsibilities include identification of TB suspects, completing sputum request forms, registering of patients for treatment, counseling of patients and direct observation of treatment and ensuring that all patients carry out follow up sputum examination. They are also responsible for detecting patients who interrupt in the different phases of treatment and initiate the process to trace and bring them back on treatment.

Other responsibilities of the GHCW include education of TB patients and their family members on the disease and treatment. The Control programme provides guidelines for the education of the patients at diagnosis and during treatment. The key issues for the education include the following;

- The sputum result and the type of disease diagnosed.
- The cause of tuberculosis and how it is transmitted.
- The curability of the disease with the current drugs
- The number and type of drugs to be taken by the patient, the duration of the treatment and need to continue on treatment for the period prescribed including the danger of interrupting or dropping out from treatment.
- Assurance of patients that they are no longer infectious if they adhere to their treatment.
- Creation of awareness to the patient that symptoms might disappear but they must continue to take the drug for the duration.
- How and when to collect drug on work free days

- Why medication must be observed especially in the first two or three months of treatment
- Reasons and when to conduct follow up sputum tests at the end of intensive phase of treatment, at end of fifth and seventh month for the smear positive patients.
- Symptoms and signs of possible side effects of the drugs
- Determine where to register or refer patient in health facility as close to their place of resident as possible
- Identify and remove barriers to patients' adherence to treatment
- Counseling of the relations of the patients to ensure support to the patient.[2]

Supervision is an essential component of the TB control programme, in Nigeria, it structured along the three tiers of government in the country. The Central Unit (CU) at the federal level supervises the state. The state supervises the local government TB and leprosy supervisor (LGATBLS) who in turn supervises the TB service providers at the health facilities. The laboratory staffs are supervised by a state Quality Assurance Officer (QAO). [2] The aim of the supervision is to ensure competence of the staff at the various levels of programme implementation.

Definitions of terms:

TB patients are registered for treatment using standard WHO classification; [5] which classifies the patients into two broad categories; category 1 (Cat 1) and category 2 (Cat 2).

Cat 1 patients include;

- New case (N); these are patients (smear positive or negative) who have never had treatment for TB or who has taken anti-TB drugs for less than four weeks
- Patients with extra-pulmonary TB

Cat 2 patients include;

- Relapse (R); These are TB patient who had previously received anti-TB drugs and was declared cured or completed the full course of the treatment and has once again develop sputum smear positive TB
- Treatment failure (F); is a smear positive TB patient who while on treatment on Cat1 treatment remains or become smear positive again five months or later after commencement of treatment.
- Returned after default (RAD); is a patient who had received at least four weeks of anti-TB treatment and returned smear positive after interrupting the treatment for at least eight weeks
- Others (O); these are patient who do not fit into any of the above classification.

Patient who have been registered for treatment in one LGA or state and is transferred to another LGA or state to continue treatment are registered as 'Transferred in (T.I)'.[5]

Patients are also evaluated at the end of treatment and classified according to WHO definitions[6, 7] as follows;

i. Cured; defined as a patient who was initially smear positive at start of treatment, has completed the full course of treatment and has remain smear negative at the end of the seventh month and one at least one other occasion.

ii. Treatment completed; defined as patient who completes the full course of anti-TB treatment but does not meet the condition of cured. This definition applies to smear positive, smear negative and extra-pulmonary TB patient.

iii. Failure; is a patient who still remain sputum smear positive at end of fifth or seventh month of treatment.

iv. Defaulted; applies to a patient whose treatment was interrupted for at least 2 months

v. Died; these are patient who died for any reason during the course of TB treatment

vi. Transferred out; refers to a patient who has been transferred to another treatment center in another state and whose treatment result is not known.

The outcome of treatment can be grouped into two; favorable and unfavorable outcomes.[8]

i. The favorable outcomes include patients whose outcomes of treatment are cured or treatment completed.

ii. The unfavorable outcomes include patient who default, failed or died during treatment or transferred out.

These standard classifications are useful for the evaluation of the performance of the TB control programme at the local, sub national and national levels.

1.2. Problem Statement

The targets for TB control in Nigeria which are in line with the STOP TB Partnerships targets is to achieve a cure rate of at least 85% of the smear positive (infectious cases) detected and less than 15% of the other outcomes (defaulted, failure, deaths and transferred out cases).[5] Review of the performance Plateau state control programme for 2001 -2008 (figure 1) revealed that of the 7,270 sputum smear positive patients registered for treatment 5,282 (72.7%) were successfully treated, 580 (8%) died while 1,010 (14.1%) did not complete or failed their treatment. Furthermore, review of the trend of treatment outcome in state between 2001 -2010 (figure 2) also revealed that the highest cured rate of 63.5% achieved in 2006 and the lowest default rate of 6.5% in 2007 is lower and higher than the national target of at least 85% and less than 3% respectively. Additionally, over one percent of the patients fail their treatment each year.

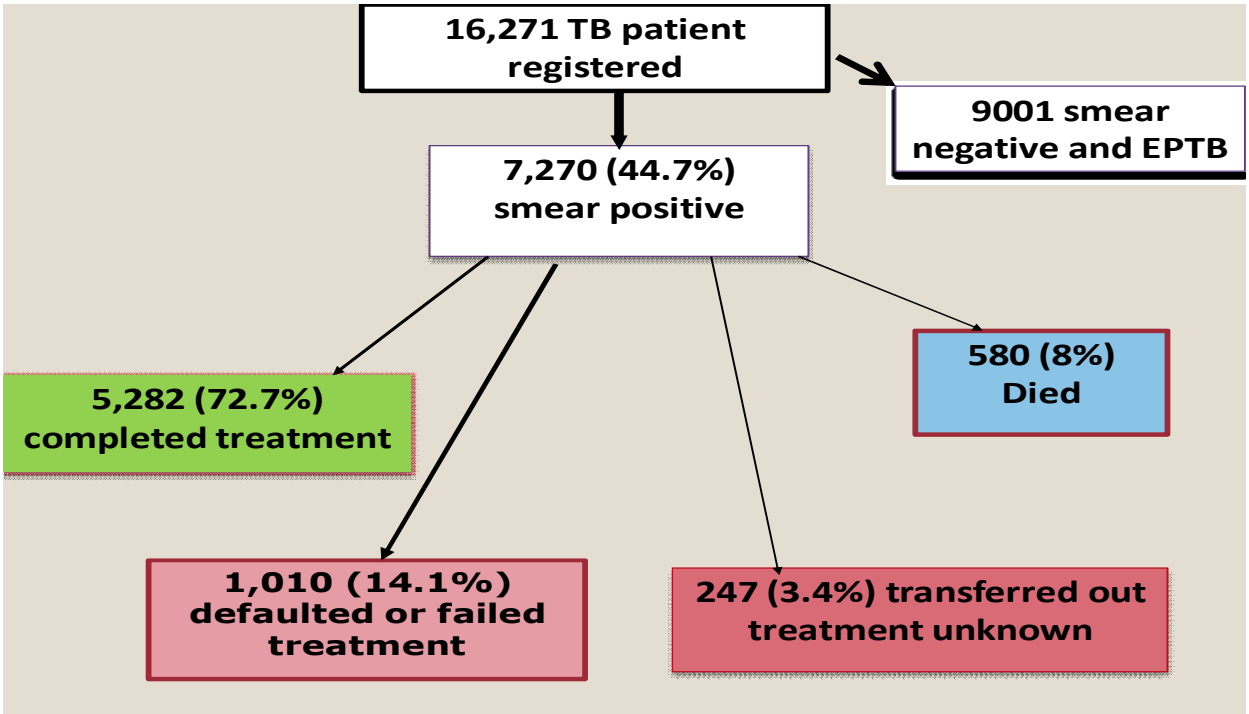


Figure 1 shows the outcome of treatment of the 16,271patients registered for treatment in Plateau state between 2001and 2008.

Source – Plateau state TB and Leprosy Control programme.[9]

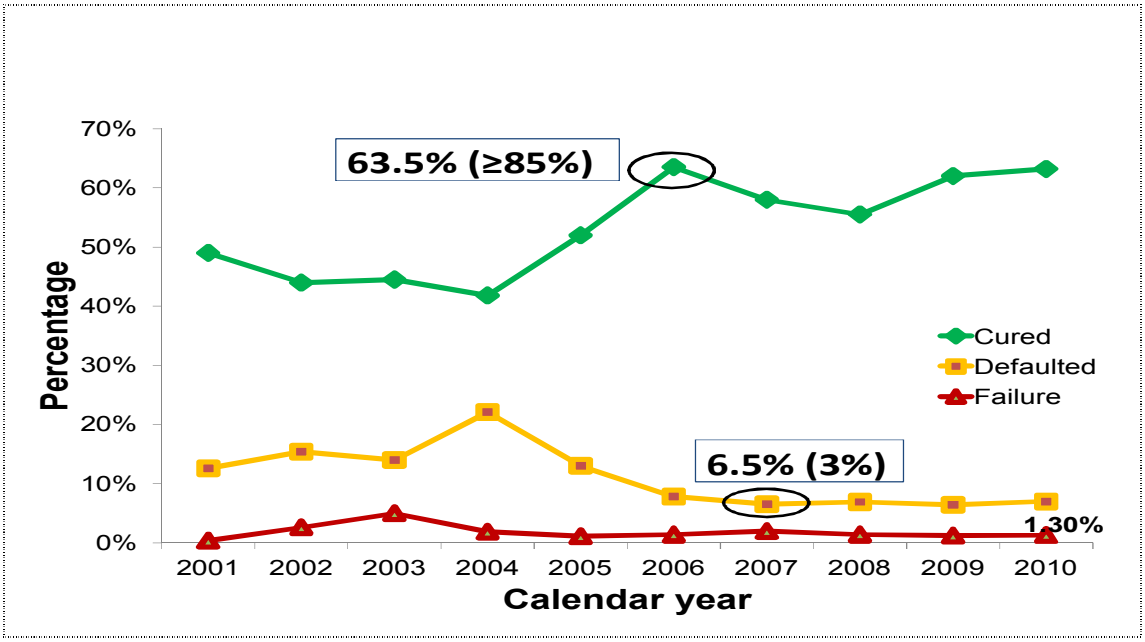


Figure 2 is a chart that shows the trend of the treatment outcomes of smear positive TB patients registered in Plateau state from 2001 to 2010.

Source – Plateau state TB and Leprosy Control programme.[9]

Sputum smear positive patients who remain uncured constitute a major threat to the success of the control programme and to the community they belong for the following reasons;

- They are potential source of MDR-TB which is difficult to treat in Nigeria. Furthermore, studies have shown that human errors are the main causes of emergence of MDR-TB arising from incomplete treatment of TB patients which results mostly from incomplete or erratic treatments. Patient with MDR-TB will continue to excrete the resistant bacilli in the environment they belong putting everyone in contact with them in danger of being infected.[2]
- The uncured patient will continue to transmit the disease to members of the community they belong. It is estimated that an untreated person with the infectious form of TB is

capable of infecting 10 to 15 people each year. The patients in Plateau state might have infected more than 20,000 people in the state in the last ten years.[10]

- Patient who fail to get cured under the DOTS strategy are proxy indications of bacterial resistant to the drug. The resistance in TB when developed is permanent and cure becomes difficult, they also contribute to the burden of the disease and additional expenses for their treatment. Patients who fail Cat 1 treatment will have to be restarted on Cat 2 treatment regimen. This implies more drugs, laboratory consumables and recording materials for the patients.[2]

There is lack of understanding of the factors that determine the outcome of treatment in the state as such intervention cannot be targeted at the specific area to reduce the unfavorable outcomes in the state. The implication is inability of the state to attain the national targets and TB will continue to claim lives including increase in the burden of MDR-TB which has no effective cure. Exploring and understanding factors that determine the outcome of treatment will help the control programme to plan and target intervention to specific problematic areas to improve the cure rates in the state and contribute to meeting the national targets for TB control in Nigeria.

1.3. Relevance to public health

The goals of TB control set by the NTBLCP according to WHO guideline are to reduce mortality, morbidity and transmission of the disease until it no longer poses threat to public health. The target set by the millennium development goal 6 (MDG 6) is also to reduce the prevalence and deaths rates by 50% by 2015.[7] The MDG target is just by the corner and despite the fact that the Plateau control programme had been operational for a decade its highest cured

rates of 63.5% are still far below the expected targets of at least 85% while the lowest default rate of 6.5% is far above the expected target of at most 3%.

According to expert suggestion, achieving good treatment outcome is more important than finding new cases because patients who default treatment are potential source of MDR-TB. Good treatment outcome is the rate determining step for success of TB control programme. The DOTS strategy provide the platform for effective treatment to effect permanent cure, prevent relapses, decrease transmission of the disease and minimise the development of drug resistance.

According to a WHO report over 400 000 cases of multidrug-resistant tuberculosis (MDR-TB) are emerging every year.[3] The major causes of emergence of drug resistant TB are human errors in patient management. These errors include lack of adherence to the national treatment protocol by prescribing inadequate drug to patient, poor implementation of the direct observation of treatment by health workers, erratic drug supplies to patients and patients' non adherence to treatment.[11] The Plateau TB control programme has produced over 1,000 patients who either failed or defaulted from treatment between 2001 and 2008. Study on the factors associated with the outcome of treatment will help to identify the area to focus intervention.[12] It will also give insight to the barriers contributed by the patients and service providers (health care workers) to expected treatment outcomes.[13]

To offer TB control services the health care worker should have the knowledge of the disease and its management, have the right attitude towards the patient and motivated to do the work. It is therefore pertinent to explore the health care workers' knowledge on the disease including

their responsibilities to patient in the context of the TB control programme in the state, this will help the control programme in planning for training to improve the quality of the service.

The patient also have responsibility to provide information to the health provider about contacts with immediate family, friends and others who might be vulnerable to the disease and most importantly they have the responsibility to follow the prescribed and agreed treatment plan and to conscientiously comply with the instructions given to protect the patient's health, and that of others. Furthermore, they have the responsibility to inform the health provider of any difficulties or problems with following treatment or of any aspect of the treatment as contained in the patients charter for TB care.[14]

The state had embarked on expansion of the services to ensure access to patients through creation of more TB treatment and diagnostic centers. It also introduced community TB care, a concept which allows the direct observation of the treatment to be carried out by a community member to make service more convenient to the patient. These efforts did not improve the cured rates in the state implying that other factors might be militating against the success of the programme. Furthermore, there is lack of knowledge on factors that contribute to patients' adherence to the eight month treatment in Plateau state. Understanding those factors is therefore an important step towards improving the care for the patients, reducing the mortality and morbidity caused by the disease and preventing the emergence of the difficult to treat MDR-TB in the state and the country at large.

1.4. Research questions

This study is designed to answer the following questions:

a. What are the TB patients related factors associated with outcome of treatment?

b. What are the Health care workers factors associated with outcomes of TB treatment in the state?

1.5. General and specific objectives

1.5.1. General objective

To determine the factors associated with treatment outcome of pulmonary TB patients in Plateau state, Nigeria.

1.5.2. Specific objectives

i. To assess the clinical and socio-demographic factors associated with outcome of treatment.

ii. To determine patients knowledge and beliefs on TB disease and treatment and its association with outcome of treatment.

iii. To assess the service providers' factors associated with outcome of treatment for TB.

CHAPTER TWO - LITERATURE REVIEW

2.1. Introduction

The target of Tuberculosis (TB) control programme is anchored on two important public health activities: detecting 70% of the infectious cases and ensuring that 85% of them are treated successfully.[2] This target is endorsed by the Stop TB Partnership[5] and is linked to the Millennium Development Goals indicator 6.8.[7] Treatment success is a performance indicator of the TB control programme both at national and sub national levels. Furthermore, successful treatment of infectious cases of TB is essential to prevent spread of the disease with ultimate benefit of rapid reduction in the prevalence rate, gradual reduction in the incidence rate and prevention of acquired drug resistant TB. It also leads to reduction of suffering of the patient from the disease including social and economic burden on the patient and the community they belong. However, the road to treatment completion of the treatment necessary for achievement of the set target in Nigeria involves a complex interaction of many factors. For example the patient must take TB drug uninterrupted for eight months. The treatment must be under direct observation of the health workers for at least the initial two months for cat 1 and throughout the duration for cat 2, the drugs must be available and services must be accessible to the patient both culturally and economically.[15] These factors cut across the drugs, patients, services providers and organizational structure of the control programme.

2.2 Anti-Tuberculosis drugs related factors

A major threat of TB control programme in the world is the emergence of multi drug resistance (MDR) and extensively drug resistance (XDR) TB. The bacilli have high propensity to mutate giving rise to bacilli resistant to the conventional drug in use for its treatment. The WHO

estimates that about 3.2% of the newly diagnosed patients already have bacilli resistant (natural resistance) to one or more of the anti-TB drugs.[16] The prevalence increased to 18.5% among previously treated patients indicating possible association of the MDR-TB with exposure to the drug.[17]

Improper use of antibiotics in the chemotherapy of TB patients from improper regimen prescribed by health care workers and failure to complete the whole course of treatment by patient have been implicated in the development of drug resistant TB. Interruption of treatment and failure to take the drug for the required duration cause the bacilli to mutate to strains resistant to the conventional drugs adding to the pool that exist naturally. Resistant TB is known to be associated with higher deaths, failure of patient and relapses of the TB patients.

The quality of the drug also plays an important role in the success of treatment of TB. Poor quality drug will not eliminate the bacilli rather it will potentiate the development of mutant resistant bacilli. This important fact had been recognized by the proponent of the DOTS strategy making 'uninterrupted supply of quality assured drug' one of the five elements of the strategy. Evidences from the Republic of Korea and Hong Kong where high quality short course chemotherapy led to decline in the MDR-TB support this fact.[18]

2.3 Patients' related factors

Tuberculosis is both a debilitating and stigmatizing disease, a condition it shares with HIV/AIDS. Its treatment takes long duration and depends on strict compliance by patients. Adherence to the long duration of treatment and outcome of treatment is affected by the patients' knowledge and beliefs on the disease, their social, economic and demographic characteristics including the presence of HIV co-infection.

2.3.2 Knowledge and belief on the disease

Case finding of TB in Nigeria is passive[2] this means that patient takes the initiative based on their knowledge of the disease to visit the health facility for diagnosis and treatment. Their knowledge and belief of the cause of the disease, its spread, curability and availability of the services is important for both early reporting for diagnosis and adherence to treatment. Knowledge on how to take the drug, the possible side effects of the drugs and the reasons for the long duration of treatment is also important to motivate the patient to complete their treatment. The symptoms of TB can improve within a few weeks of commencing treatment and the tendency for patient is to stop taking the drugs is quite possible putting them at risks of developing drug resistant. To stay on treatment, Patients understanding of the reasons for the long duration of treatment are prerequisite for their motivation to adhere to treatment and good treatment outcomes.

Mushtaq et al in their study in Punjab noted that good knowledge of TB was a core determinant of intended health seeking behaviour for treatment.[19] Patient with low knowledge are more likely to report late leading to severer TB at diagnosis requiring hospital admission at enrolment and unfavourable prognosis.[20] Poor knowledge of the disease and duration of treatment had been implicated as a major barrier to success of treatment and predictive for adverse treatment outcome.[21, 22]

Patients' cultural or personal beliefs about TB and how it should be treated including where to seek treatment have influence on their compliant and adherence to treatment. It is a strong force that model patients' confidence on the treatment they receive thus patients with conflicting

beliefs on the causes and curability of TB may become anxious or fearful and may develop resentment to the treatment and service providers.

Gebremariam et al in their study on factors that influenced adherence to TB treatment noted that beliefs of the patients in the curability of TB, supports from their families and health professionals influenced their adherence to treatment positively.[23]

In a qualitative study reasons for default among TB patient in Madagascar, the defaulted patient claimed that they were not allowed to ask questions and lack of comprehensive explanation by the health workers on the disease.[24] These underscore the importance of the education of the patient by the health workers poor education of the patient will contribute to non-compliance to treatment and consequently poor treatment outcomes as noted by Jaramillo E[25] in a study on encompassing treatment with prevention: the path for lasting control of Tuberculosis.

2.3.1 Demographic and socio-economic factors

The social, economic and demographic characteristic of the patients have influence on the outcome of TB treatment. Gender is one of the important factors that influence patients' behavior on compliance and adherence to treatment. Women in the reproductive age are known to be more susceptible to develop TB than men of the same age; they are also at greater risk of becoming HIV infected which in turns impart negatively on the progress of the disease. A study in the Netherlands revealed that women were most likely to culture positive than men.[26] Additionally; Lienhardt et al in their study from three west African countries noted that TB treatment and its outcomes is influenced by the marital status of women.[27] Furthermore, studies from Africa[28], Bangladesh[29] and Syria[30] also revealed that despite the fact that most married women must seek permission from their husband to attend health care they tend to adhere to anti-TB treatment

leading to better treatment outcome than men. A nine year review of treatment outcome of TB in Ilorin, Nigeria by Salami and Oluboyo showed that compliance which is an important component in the success of TB treatment was more in female than male patients.[31]

Age has influence on the occurrence, severity and outcome of disease. In developed countries TB is known to be common among older people because of weakened immune system of the age group, however in developing countries it is a disease of young adults.[32] WU et al in their study noted that elderly patients needed additional support to access TB treatment. The additional support required by the patient affected their adherence to treatment.[33] It reflects both demographic and socio-economic status of individuals, widowed and divorced persons rely on family support while single persons are usually younger than married persons and have higher tendency of migrating to towns in search of a job.[27]

Tuberculosis has been characterized as a disease of poverty, according to the WHO report 2009, developing countries account for 95% of TB cases and 98% of TB deaths in the world.[1] Poverty affect patients adherence to treatment. The policy for TB control include the provision of free drugs and sputum tests to TB patient, however patient must visit the health facility daily for direct observation of treatment during the intensive phase of treatment, they are also required to pay for all tests other than sputum microscopy and hospital stay. These indirect costs to the patient have the potential of affecting patient adherence to treatment because of the economic and financial it causes on them. In Brazil in a cohort of TB patients on factors associated with treatment failure, drop out and death. The study found positive relationship between low socio-economic statuses of patient with the poor treatment outcome.[34] O'Boyle et al noted that that non-compliant patient had problem of travel costs and availability of the transports leading to

non attendants by TB patient. They also found that white collars workers and student were more likely to default treatment than other occupational groups.[35]

Educational levels influence individual understanding including attitude towards disease including TB and its treatment. The relationship between adherences to TB treatment including its outcomes had been reported by many Authors. Shargie and Lindtjørn in Ethiopia reported that literate patients were less likely to default from their treatment, [36] similar results was reported by Xu et al in China[37] and Bello and Iteola in Ilorin Nigeria.[38]

The social behavior including smoking of cigarette and alcohol consumption of patient also have impart on the outcome of the treatment. Cigarette smoking is known to cause histological changes in the lower respiratory tract leading to alteration in the normal functions of the alveoli increasing patient vulnerability to acquiring TB infection.[27] It is also known to suppress the individual adaptive immune responses affecting patients' response to TB treatment leading to poor outcome of treatment.[39] Studies in Morocco by Tachfouti et al[40] and South India by Santha et al[41] show that smokers were more likely to default and end up with poor outcomes of treatments. Similarly, the long time excessive use of alcohol leads to damage vital organs including the immune system in the body affecting the individuals' response to diseases including TB.[42] Selassie et al in their study noted that alcoholics had a four-fold risk of relapse of TB than non alcoholics.[43]

2.2.3 HIV co-infection

HIV infection is one of the major factors that lead to the reemergence and worsening burden of TB in many countries. According to WHO report, of the 9.4 million new cases of TB registered, 1.1 million had HIV infection and over 380,000 of TB-HIV co-infection died in 2009.[44] The

HIV infection damage their immune system that help the TB drugs to get to the mycobacterium and impede absorption of the TB drugs.[45] Additionally, the drug treatment for TB/HIV infected patient can be complicated by drug-drug interaction between the complex drugs regimen used for TB and HIV treatment especially rifampicin which is one of the important anti-TB drugs with negative impact on the outcome of treatment.[46]

The stigma associated with HIV is also shared with TB because of the shared symptoms such as weight loss and fever leading concealment of disease, delayed or non adherent to treatment. These factors affect the outcome of TB treatment outcome and had been implicated as a major cause of death of TB patient, treatment failure and defaulting from treatment.[11, 47]

2.3 Service providers related factors

The outcome of TB treatment depends on the patients' adherence to the eight months of treatment that involves a complex interaction between the patients' and the service providers. The success or failure of this interaction has bearing towards the service providers' knowledge of the disease and skills on the treatment protocol, their attitude towards the patient and the TB control services.

2.3.1 Knowledge and skills of the health care workers

According to the national guideline for TB control in Nigeria the health care workers (TB services providers) have the important task of counselling the patients to adhere to the 8 months duration of treatment. The main source of information to patients on TB is vested upon the health workers responsible for providing TB services to the patients. To educate the patient adequately they also need adequate knowledge of the disease to ensure proper interaction with the patient. Therefore Patients compliance and adherence to the treatment is a proxy indicator of the quality

of counselling and education given to them by the health care workers. To ensure counselling of the patient the health worker must also have good knowledge of the disease and adequate skills to counsel the patient. A study on health service providers' perception of barriers to TB care in Russia by Dimitrova et al, revealed that work overload, shortage of staff, competing priorities, low salaries and low motivation were the important barriers.[48] To win the confidence of the patient the health needs to understand the individual needs and behaviour of the patients including adequate knowledge of the disease. A good communication between the health workers and patient is an important ingredient to improve treatment adherence.[49] Tekel B et al noted that patient who defaulted did so because of poor communication skills of the health care workers.[50] Santha et al in their study in India demonstrated that most TB default occur after the intensive phase of treatment, a period during which the symptoms of the disease might had wane off.[41] This occurred due to lack of proper counselling by the health care workers.

Kandel et al in their study in South Africa reported ignorance of the duration of treatment by the patient as one of the reasons for interruption of treatment.[51] Impact of counselling on adherence of treatment had also been noted by Liefooghe et al where they demonstrated that proper counselling of patient by the health worker lead to 13% reduction in defaulter rate among TB patients on treatment.[52]

2.3.2 Attitude of the health workers

The behaviour and attitude of the health worker towards the patient also has an important bearing on the ability of the patients to continue or discontinue treatment. Worker proficiency and workload affect the attitude of workers towards their work with potential of effects on their performance and outcome of treatment of the TB patients, lack of the professional attitude and

work overload leading to delayed or inadequate counselling of the patient may have negative effects on the outcome of the treatment.[53] it is common place, patient who feel that they are being treated harshly or badly by the health care workers may be discouraged to continue with their treatment

Problems in the laboratory may arise with microscopic examination by the laboratory technician, for example unreliable results from the laboratory will lead to mismanagement of the patient.

2.4 Organizational structure of the programme

TB control programme under the DOTS strategy, hospital admission is reserved only for the very sick otherwise all patient are treated on ambulatory bases, however patient must be observed swallowing every tablet at least in the first two months of treatment for category 1 cases and for the whole duration of treatment for category 2 patient. The observation takes place in the health facility by a health worker and the patient are required to travel each day to the facility for their drugs.

2.4.1 Distribution of treatment sites

The distribution of the TB treatment can make the services inaccessible to the patient. The daily facility based direct observation of treatment requires daily visit by the patient for their drugs, this arrangement can be costly and inconvenient to the patient. Lack of access to the TB treatment sites because of distance affects the outcome of treatment. A study by Comolet et al revealed distance as a significant barrier for adherence of the treatment.[24]

The TB drugs are best absorbed in acidic medium implying that patients is expected to swallow the drugs at least an hour before breakfast.[4] These strict rules might have negative effect on

patient adherence to treatment especially when patient jobs and work schedule conflict with the clinic hours. The DOTS strategy does not consider peculiarities among patient and distribution of the health facilities providing TB services.

2.4.2 Supervision

Supervision is an important part of TB control programme its aim is ensure competence of the staff, three levels of supervision exist in Nigeria. The federal (central unit) supervising the state which in turn supervises the LGA. The LGATBLS at the LGA supervise the health workers at the facility levels. Defect at any of the levels will affect the outcome of treatment and the overall performance of the programme. A study in Korea by Jin et al revealed that organized supervision by the central level to support the TB service providers and to help solve their problems brought about significant increase in patient regularity to treatment.[54]

CHAPTER THREE - METHODOLOGY

3.1 Study area

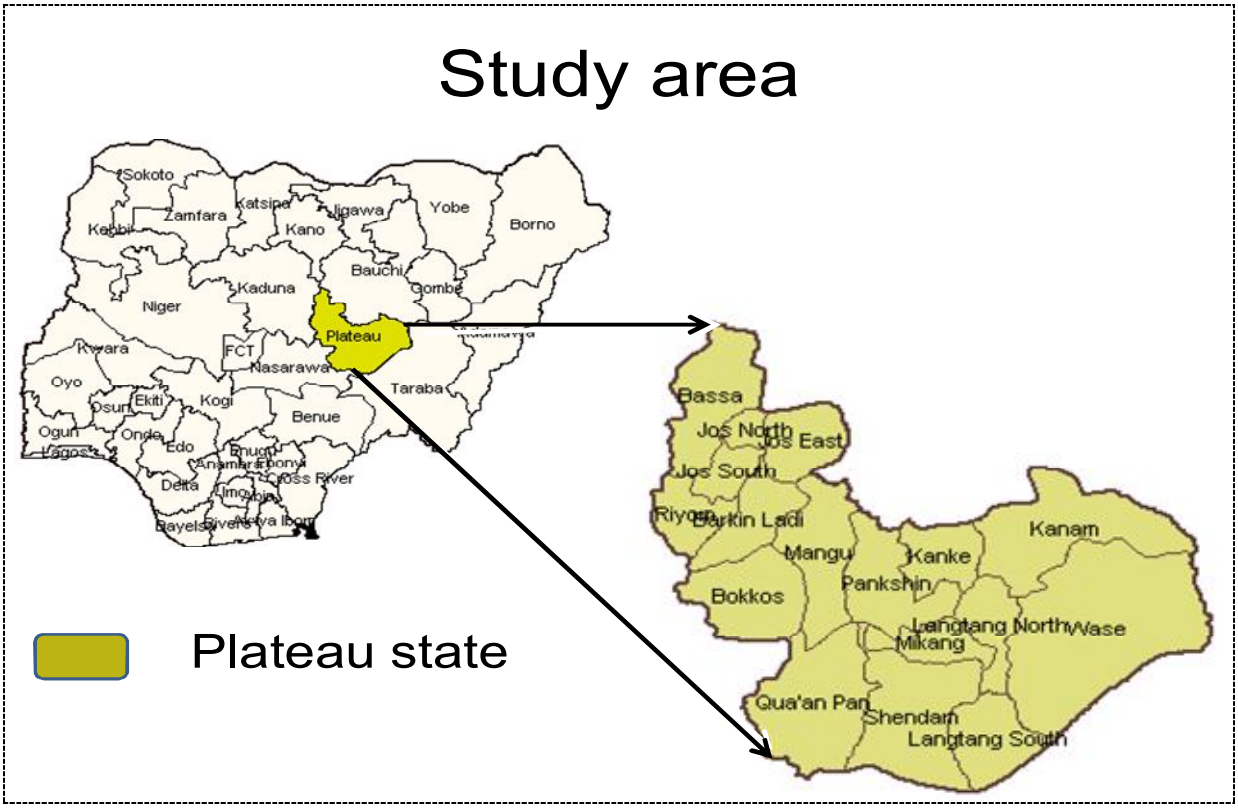


Figure 3, Plateau state in the map of Nigeria

Plateau state is one of the thirty-six states in Nigeria, located in the north central geopolitical zone of the country. It lies between latitude 8.30° and 10.30° North, Longitude 7.30° and 8.37° East with a land mass of 22,410 square kilometers and an estimated population in 2010 of 3.7 million people. The state shares common boundaries with Nasarawa, Kaduna, Bauchi and Taraba states. The state is divided into seventeen Local Government Areas (LGAs) for ease of administration with Jos as the state capital which houses the seat of the state Government and the TB/Leprosy control Office.[55]

The ministry of health reported that there were 964 registered health facilities in state in 2009, made up of 904 primary, 58 secondary and 2 tertiary health care facilities. Also of 904 primary health facilities 148 was owned by private individual or organization. [55] In 2010, there were 198 health facilities offering TB treatment sites made up of 172 public health facilities, 19 and 7 were faith based and private for profit facilities respectively.[56]

3.2 Study design

We conducted a cross sectional study.

3.3 Study populations

The study population were Pulmonary Tuberculosis patient and Health care workers

3.3.1 Inclusion criteria

i. Pulmonary TB patients

Pulmonary tuberculosis patients aged 15 years and above diagnosed by sputum AFB microscopy, chest X-Ray or by a clinician and registered for treatment at least seven months before the commencement of the study.

ii. Health care workers

This includes Health care workers serving as TB (DOTS) focal persons or participating in the TB control services in the health facility.

3.3.2 Exclusion criteria

i. TB patients

- TB patients less than 15 years; these age group of patient are categorized as children and might not respond to the research questions directly.
- Patients with pulmonary TB but known to have died or transferred out of the LGA; they could be traced and interviewed.

ii. Health workers

Health Care workers not participating in the TB control services; they might have no ideas on the control services.

3.4 Sample size determination

Sample size was calculated using the power of 80% and 95% confidence interval.

3.4.1 Sample size for Pulmonary TB Patient

The target for the national control programme in line with the global target set by WHO is treatment success rate of 85%. Review of the 10 years treatment outcomes in the state showed that the best cured was 63.5% in 2006[57] was used as the proportion (p) of interest. The non-cured patients (q) were 1-p (100% – 63.5%), q = 36.5%.

Using 95% (Z= 1.96) confidence interval and d (degree of precision) of 0.05 gave a minimum sample size of 392 derived from;

$$\frac{z^2 \times pq}{d^2}$$ [58]

n = Sample size

z =1.96

p = 63.5%

q = 36.5%

d = 0.05

$$n = \frac{1.96^2 \times 0.635 \times 0.365}{0.05^2}$$ = 356 + (10% of 356 for non responds) = **392**

3.4.2 Selection of health facilities

There were 198 DOTS facilities in the state comprising of 174 public, 19 faith-based (Private for non-profit) and 7 Private for profit facilities. One quarter (25%) of the health facilities were included in the study because of limited time and resources.

Total health facilities selected was derived from 198x25/100 = 50 + (10% of 50 for non response) = 55.

A proportionate to size allocation was used to determine the number of Health care workers from the various categories of health facilities as follows:

- Px55/198 where P was the type of health facilities
- Public health facilities = 172x55/198 = 48
- Faith Base facilities = 19x55/198 = 5
- Private for profit = 7x55/198 = 2

The facilities selected included 48 public facilities, 5 faith base facilities and 2 private for profit facilities

3.5 Sampling Technique

i. Pulmonary Tuberculosis patient

The national TB control programme provides central register for each LGA. The register contained names of all patients diagnosed and registered for treatment. It also contained information on the patients' demographic and clinical characteristics including outcome of treatment. The register was used to assign unique identification numbers to all patients. The TB central register was used to determine the sampling frame for the study. All the 728 patients that met the inclusion criteria were identified in the central register. They were assigned serial numbers; sampling interval was determined by dividing the total number of eligible participants (728) by the sample size (392) gave an interval of 2. The first number (patient) was selected randomly using the last digit on a 200 Naira note and subsequently every second patient was selected from the list of 728 patients were selected.

ii. Health workers

The lists of all the health facilities offering TB control (DOTS) services were obtained from the state TB control office. The facilities were listed by their types to make up the sample frame; each facility in each group was assigned serial numbers. Using the number from the predetermined weighted sample size calculation the facilities were selected using systematic sampling method. All health workers involved in the TB control services who were on duty on the day of visit to the selected facility were involved in the study

3.6 Study Instruments

The study instruments included:

a. Checklist

b. Structured questionnaire;

    1. Interviewer administered questionnaire for TB patients

    2. Self administered questionnaire for health care workers

c. Focus group discussions (FGDs) guides for TB patients and Health care workers.

3.7 Data Collection Methods

3.7.1 Quantitative data

The quantitative was collected by trained Research Assistants.

Checklist was used to extract information on patients' demographic characteristics, clinical category, HIV status, interruptions and outcome of treatment from the tuberculosis Local Government Central registers. Distance of the patients' place of abode to the health facilities was measured by the mileage of the vehicles (Motorbikes and car) used to trace the patients.

Interviewer administered structured questionnaire was used to extract information on patients' socio-economic and behavioral characteristics including their knowledge on treatment duration.

A self administered questionnaire was used to extract information from the health care workers on their demographic characteristic, trainings received for TB control services including their knowledge of TB control services, patients' education and preventions of default of patients from treatment.

3.7.2 Qualitative data

The qualitative data from focus group discussions were conducted by a team of 2 research assistants, a note taker and a moderator. We used a pre-designed FGD guide to ask questions on knowledge and factors responsible for unfavorable outcomes of TB treatment. The discussions were recorded.

3.8. Data Management

3.8.1. Management of Variables

All completed questionnaires were checked for completeness and consistencies of the variables We also checked to ensure all questionnaires were entered correctly such that all numeric variables had numeric values and all the data were valid.

3.8.2. Statistical Analysis

Quantitative data was entered, cleaned and analyzed using Epi info version 3.5.1 soft ware. Data was presented as proportions. The knowledge of the health workers on TB control were scored based on the number of points mentioned by the health workers into poor, fair and good knowledge of the subject matter. Bi-variate and multi-variate analysis was performed and odds ratios were used to compare categorical variables at 95% Confidence Intervals.

Qualitative data on knowledge of health care workers was analyzed using a five-point domain used to grade knowledge, for each domain; one point scored for correct response, zero for wrong response.

Knowledge grade

i. 0 to 1 points: poor knowledge

ii. 2 to 3 points: fair knowledge

iii. 4 and above good knowledge

Qualitative data from FGD was transcribed into written form, translated to English and reported as narrative.

3.9 Ethical Considerations

Ethical clearance was obtained from the Plateau state ethical committee. Informed consent was obtained from all respondents involved in the study.

3.10 Limitations to the study

1. We could not trace and interview all the respondents (patients) eligible for the study due to incorrect or untraceable addresses.
2. The study gathered information only from active smokers, passive smoking can cause the same effects on the patients
3. Data on smoking and alcohol consumption was based on self-information and not based on biomarkers such as nicotine concentration in body fluids and alcohol in breath; it is possible to miss some patient who might hide the information.
4. Times spend on drinking and quantity of alcohol consumed has effects on patients' adherence to treatment and outcome of treatment but was difficult to assess because of lack of standard measuring apparatus for the various types of alcohols consumed.

CHAPTER - RESULTS

4.1: Socio-demographic and clinical characteristics of the respondents

Table 1: Age and sex distribution of Pulmonary TB patients

Age group in years	Sex		Total Frequency (%
	Female Frequency (%)	Male Frequency (%)	
15-19	2 (1.3)	10 (4.4)	12 (3.2)
20-24	19 (12.8)	17 (7.4)	36 (9.5)
25-29	28 (18.8)	32 (14.0)	60 (15.9)
30-34	32 (21.5)	45 (19.7)	77 (20.4)
34-39	18 (12.1)	31 (13.5)	49 (13.0)
40-44	21 (14.1)	23 (10.0)	44 (11.6)
44-49	6 (4.0)	20 (8.7)	26 (6.9)
50-54	7 (4.7)	20 (8.7)	27 (7.1)
> 54	16 (10.7)	31 (13.5)	47 (12.4)
Total	149 (39.4)	229 (60.6)	378 (100)

There were males (60.6%) among the respondents than female (39.4%). Mean age 37.6 ± 13.5 years (female: 35.8, male: 38.7). The Median and modal age were 35 and 30 years respectively. About two third (60.8%) of the respondents were between 25 to 44 years.

Table 2: Distribution of respondents by their social characteristics

Social characteristics of patients		**Frequency**	**%**
Marital status	Single	81	21.4
	Married	271	71.7
	Separated	11	2.6
	Divorced	10	2.9
	Widow	5	1.3
Occupation	Farming	134	35.4
	Schooling	38	10.1
	Applicant	45	11.9
	Civil servants	64	16.9
	Bussiness	75	19.8
	Artesan	20	5.3
	Others	2	0.5
Educational levels	None	69	18.3
	Primary	93	24.6
	Secondary	121	32
	Post secondary	68	18
	Qur' anic	27	7.1
Patients role in the family	Main Bread winner	180	47.6
	Supports family	58	15.3
	Dependant	60	15.9
	House wife	80	21.2

Majority of the respondents (71.7%) of the patients were married one third (35.4%) were engaged in farming as for living. Half (50%) of them had achieved at least secondary education, 18.3% had never attended any school and 47.6% were the main bread winners in their family while 16% were dependants.

Table 3: Distribution of the respondents by their clinical characteristics

Clinical characteristics of patients	**Frequency**	**%**
Cat 1 *(New smear Positive and New smear Negative)* (N=378)	344	91.0
Screened for HIV (N=378)	246	65.1
HIV positive (N=246)	85	34.6

Most of the respondents (91%) were category 1 comprising of new smear positive and smear negative patients about two third (65.1%) were screened for HIV positive and 34.6% of patient screened were co-infected with HIV.

Table 4: Interruption of treatment among the respondents

Consistency of patient on treatment	**Frequency**	**%**
Interrupted treatment	71	18.8%
Consistent on treatment	307	81.2%
Total	378	100

Nineteen percent (19%) of the respondents had at least one incidence of interruption of their treatment.

Table 5: Treatment outcomes of the respondents

Outcome of treatment	**Frequency**	**%**
Unfavorable outcome (*Failure or defaulted*)	16	4%
Favorable outcome (*Cured or completed treatment*)	362	96%
Total	378	100

Four percent (4%) of the respondents either failed or defaulted from the treatment (unfavorable outcome of treatment).

4.2: Knowledge of duration for TB treatment and behavioral characteristics of Respondents

Table 6: Knowledge of respondents on curability of TB and duration of treatment

Patients' knowledge (n=378)	**Frequency**	**%**
Knew TB is curable	362	95.8
Knew duration for TB treatment	320	84.7

Majority (95.6%) of the respondents had knowledge on the curability of TB disease and 84.7% knew the correct duration (8 months) for TB treatment.

Table 7: Distribution of the respondents by alcohol use and cigarette smoking

Behavioral factors of patients		Frequency	%
Alcohol use (N=378)	Yes	166	44.2
Duration of taking alcohol (N=166)	< 5 years	27	16.3
	5-10 years	43	25.8
	> 10 years	96	57.9
History of cigarette smoking (n=378)	Yes	70	18.5
Duration of smoking cigarette (n=70)	< 5 years	9	12.9
	5-10 years	26	37.1
	> 10 years	35	50
Number sticks smoked per day (n=70)	< 5 sticks	23	32.9
	5-10 sticks	32	45.7
	> 10 sticks	15	21.4

More than a third (44.2%) and about a fifth (18.5%) of the respondents took alcohol and smoked cigarette respectively. Majority (57.9%) had taken the alcohol for more than ten years while 50% had been smoking cigarette for the same period.

4.3: Distance of respondents from TB treatment sites

Table 8: Distribution of the respondents by the distance from TB treatment sites

Distant of patient from TB treatment sites	**Frequency**	**%**
≤ 5 km	306	81
> 5km	72	19
Total	378	100

Nineteen percent (19%) of the respondents lived more than 5 kilometers from the TB treatment sites.

4.5: Factors associated with interruption of treatment

Table 9: Factors associated with interruption TB treatment among the respondents

Characteristics of patients (n=378)	Interrupted treatment		Total	Odds Ratios	95% Confidence interval
	Yes N (%)	No N (%)			
Sex of patient (male)	27 (38%)	122 (40%)	149	1.07	0.63 – 1.83
Age of patient (Age > 35yrs)	35 (49%)	141 (46%)	176	1.14	0.66 – 1.96
Marital status (Married)	23 (32%)	84 (27%)	107	1.21	0.70 – 2.30
Occupation (Unemployed)	22 (31%)	63 (21%)	85	1.72	0.98 – 3.09
Educational level (< secondary)	36 (51%)	153 (50%)	189	1.04	0.62 – 1.73
Role in family (Main bread winner)	32 (45%)	148 (48%)	180	0.88	0. 52 – 1.48
Distance of patient from health facility (> 5 km)	38 (54%)	34 (11%)	72	9.25	4.94 – 17.38
History of smoking cigarette	20 (28%)	50 (16%)	70	2.02	1.11 – 3.67
History of alcohol use	28 (39%)	139 (45%)	167	0.79	0.45 – 1.37
Know TB curable	65 (92)	297 (97)	362	0.36	0.13 –1.04
Don't know duration of treatment	23 (32)	35 (11)	58	3.72	2.03 – 6.85
Clinical classification (Cat 2)	8 (11%)	26 (8%)	34	1.37	0.54 – 3.37
HIV Positive (n=246)	8 (21%)	77 (37%)	85	0.45	0.18 – 1.10

Respondents living more 5 kilometers from TB treatment sites, those who were unaware of the duration for TB treatment and respondents who gave history of smoking cigarette were about 9, 4 and 2 times more likely to interrupt their treatment respectively. The sex of respondent, age > 35, alcohol use their social characteristics and clinical classifications including HIV co-infection were not associated with the likelihood of patient interrupting their treatment.

4.6: Factors associated with outcome of treatment

Table 10: Factors associated with outcomes TB treatment among the respondents

Characteristics of the respondents	Treatment outcome		Total	Odds Ratios	95% Confidence interval
	Unfavorable outcome	Favorable outcome			
Sex of patient (male)	7(44%)	142 (39%)	149	1.21	0.44 – 3.31
Age of patient (Age > 35yrs)	9 (56%)	167 (46%)	176	1.50	0.50 – 4.58
Marital status (Married)	12 (75%)	259 (72%)	271	1.19	0.35 – 4.50
Occupation (Unemployed)	4 (25%)	81 (22%)	85	1.16	0.36 – 3.68
Educational level (< secondary)	9 (54%)	180 (50%)	189	1.30	0.47 – 3.57
Role in family (Main bread winner)	7 (44%)	173 (48%)	180	0.85	0.31 – 2.33
Distance of patient from health facility (> 5 km)	9 (54%)	63 (17%)	72	6.10	2.11 – 14.18
History of smoking cigarette	7 (44%)	63 (17%)	70	3.69	1.35 – 10.28
History of alcohol use	10 (62%)	157 (43%)	167	2.18	0.77 – 6.12
Know TB curable	2 (13%)	14 (4%)	16	0.28	0.06 – 1.36
Don't know duration of treatment	7 (44%)	63 (17%)	72	6.24	2.24 – 17.38
Clinical classification (Cat 2)	13(81%)	331 (91%)	344	0.41	0.11 – 1.50
Interrupted treatment	15 (94%)	56 (15%)	71	81.96	10.61 – 633.03
HIV status (n=246)	1 (17%)	84 (35%)	85	0.37	0.04 – 3.23

The table shows that the likelihood of unfavorable (default and failure) treatment outcome was 6 times among respondents who lived more 5 kilometers from TB treatment sites, about 4 times among those who smoked cigarette, 6.2 times among the respondents who lacked knowledge of the duration for TB treatment and 82 times among patient who interrupted their treatment. There was no significant relationship between unfavorable treatment outcomes with the demographic, social and clinical characteristics of the respondents.

4.7: Multivariate analysis;

Unconditional Logistic Regression

Table 11: Factors associated with interruption of treatment

Term	Adjusted Odds Ratio	95% C.I.	Coefficient	P-Value
Sex (Male/Female)	1.88	0.68 - 5.15	0.63	0.221
Age (median age) (> 35 /≤ 35 yrs)	0.80	0.34 - 1.88	-0.22	0.610
Clinical classification (Cat 2/Cat 1)	1.94	0.53 - 7.13	0.66	0.318
HIV Positive (Yes/No)	0.22	0.07 - 0.64	-1.52	0.006
Distance (> 5 km/≤ 5 km)	14.08	5.53 - 35.83	2.64	0.000
History of alcohol use (Yes/No)	0.56	0.22 - 1.42	-0.57	0.222
Don't know duration of treatment (Yes/No)	5.28	1 1.96 - 14.21	1.66	0.001
History of smoking cigarette (Yes/No)	3.55	1.23 - 10.21	1.27	0.019

The table shows that living more than 5 km from TB treatment site, cigarette smoking and lack of knowledge of duration of treatment remained independent determinants factors for interruption TB treatment. It also shows that HIV co-infection seems to be protective against interruption of TB treatment (AOR: 0.22. 95% CI: 0.07 – 0.64). Age of patient greater than 35 years, previous exposure to TB treatment (cat 2), being male and alcohol use were not statistically significantly associated with interruption of the treatment.

Table 12: Factors associated with unfavorable outcome (default and failure) of TB treatment

Term	Adjusted Odds Ratio	95% C.I	Coefficient	P-Value
Age (median age) (> 35 /≤ 35 yrs)	0.55	0.10 - 2.90	-0.60	0.480
Sex (M/F)	0.88	0.14 - 5.49	-0.13	0.888
History of alcohol use (Yes/No)	2.31	0.40 - 13.25	0.84	0.348
Clinical classification (Cat 2/Cat 1)	2.28	0.11 - 45.26	0.82	0.590
Living > 5 km from treatment site	18.27	2.11 - 157.81	2.91	0.008
Don't know duration of treatment (Yes/No)	18.48	1.82 - 187.18	2.92	0.0154
HIV Positive (Yes/No)	0.35	0.06 - 1.99	-1.04	0.238
History of smoking cigarette (Yes/No)	23.89	2.40 - 237.38	3.17	0.006

The table shows living more than 5 km from TB treatment site, cigarette smoking and lack of knowledge of duration of treatment remained independent determinants factors for unfavorable outcome of TB treatment. The likelihood of unfavorable treatment outcomes was 18 times among respondents, who lived more than 5 kilometers from TB treatment site and those who did know the duration of treatment and about 24 times among cigarette smokers.

4.8: Service providers' factors associated with outcome of treatment for TB.

Table 13: Socio-demographic characteristics of Health care workers

Characteristics of Health workers (n=76)		Frequency	%
Sex distributions	Female	41	53.9
	Male	35	46.1
Highest education qualification	Medical Doctor	12	15.8
	Nurse/Midwife	20	26.3
	Community Health Officer	4	5.3
	Community Health Extension Workers	25	32.9
	Junior Community Health Extension Workers	7	9.2
	Environmental Health Officer	3	3.9
	Others	5	6.5
Duration working in present health facility	< 6 months	4	5.3
	6-12 months	9	11.8
	> 12 months	63	82.9

Majority of the health worker (53.9) were female. About one third (32.9%) were Community Health Extension Workers, Medical Doctor and Nurse/Midwife made up of 15.8% and 26% respectively. Most of the health workers had been working in their respective health facility for more than one year (82.9%).

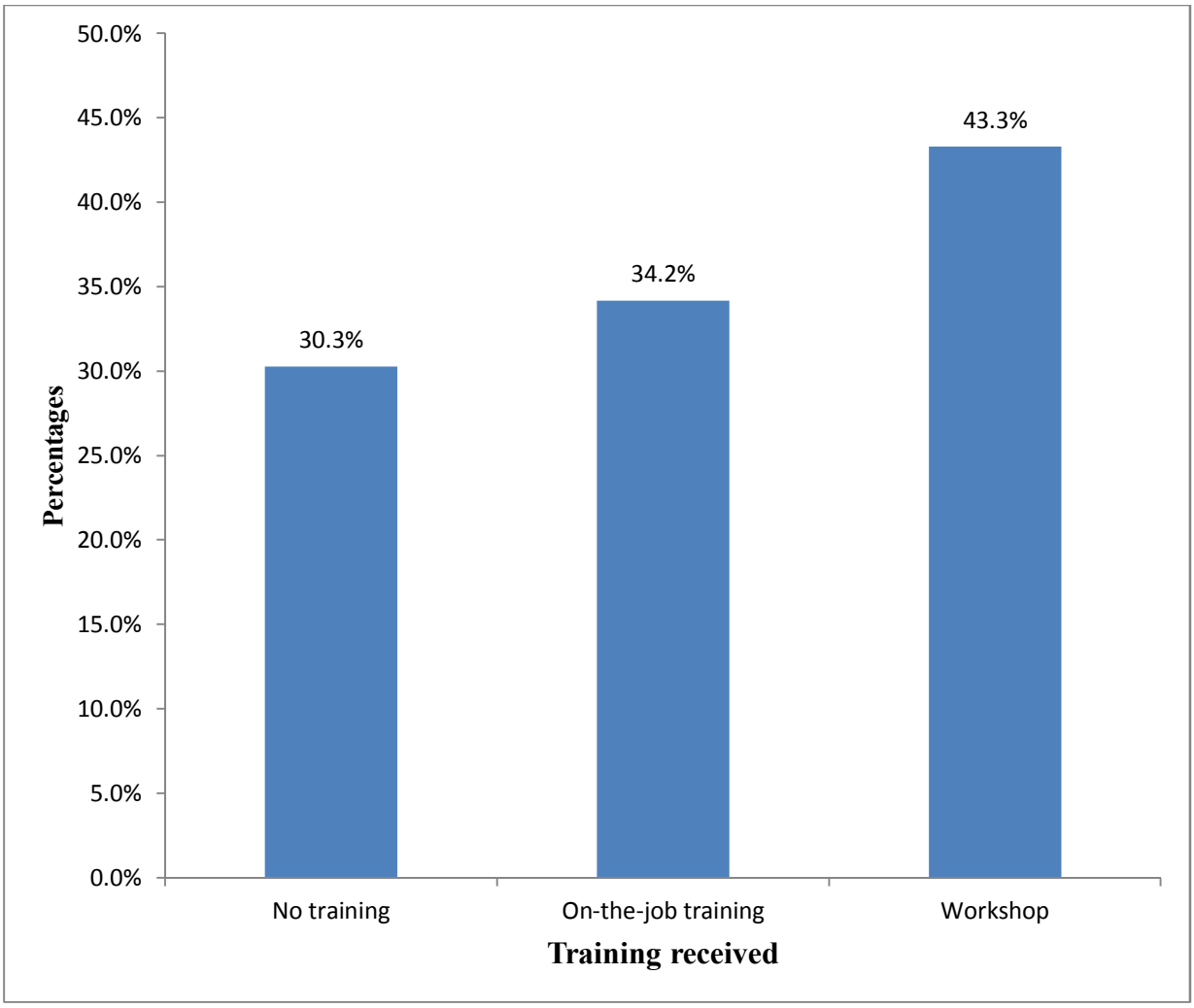


Figure 4: Distribution of health workers by training received for TB services (n=76).

Training for TB control services in form of workshops and on-the-job training was received by only 43.3% and 34.2% of the respondents respectively. About one third (30.3%) of them reported not to have received any form of trainings on the TB control services.

Table 14: Health care workers' knowledge DOT and education messages

Knowledge for TB control services	Poor N (%)	Fair N (%)	Good N (%)	Total
Knowledge of direct observation of TB treatment	18 (23.7)	26 (34.2)	32 (42.1)	76
Education messages at registration of patient	21 (27.6)	33 (43.4)	22 (28.9)	76
Education message to patient during treatment	28 (30.8)	30 (31.5)	18 (27.7)	76
Education massages to avoid default from treatment	31 (40.8)	23 (30.3)	22 (28.9)	76

The knowledge of the health care workers on TB control services was below average. Only 42% had good knowledge on DOT, 28.9% on education messages required for patient at registration, 27.7% on education during treatment and 28.9% to avoid default of patient from treatment. About a quarter had poor knowledge of the TB control services, it was worst on education of patient to avoid default from treatment (41%).

4.9: Findings of Focus group discussions

4.9.1: Patients' factors associated with outcome of TB treatment

Theme1: knowledge of tuberculosis and it causes

The participants were of the opinion that TB is an infectious disease with person-to-person transmission. The modes of transmission noted by the participants were as follows;

- Through the air
- Contact with an infected person
- Sharing of utensils

Majority of them knew tuberculosis as a serious disease that can lead to the death of its victim. However, there were divergent views on the cause of TB. Some of the participants said they did not know the cause of the disease while others mentioned the following causes

- Ingestion of cow milk that is poorly cooked
- Bad smoke or chemical was the opinion of a participant who works in a chemical factory
- Too much cold which exceeds a certain level that the body can bear.
- Living or sleeping in the same room with someone who has TB.

Quotations from some members

- *"*TB is a deadly disease that kills its victim if not properly managed" (female participant).
- "I am a victim of alcohol consumption and I do share cups with many people at the beer parlors, I belief I got it from one of the cups at the beer parlor" (male participants)

Theme 2: Common beliefs about TB

Majority of the participants noted that their beliefs had been changed about the disease due to the education they got from the health workers. However, most of their community members still belief that it is a disease from God and is closely related to HIV. According to a participant "in this era of HIV, people belief that when you have TB you automatically have AIDS because it causes the person to slim down" (female participant**)**

They were also of the opinion that TB can affect any person both young and old, male and females.

Theme 3: Problems TB disease caused to patient

Majority of the participants were of the views that the disease had greatly affected their normal activity and relationship with other people because of the body weakness it causes and the fear of the disease.

Quotations from some participants;

- "I loss almost all my customer" (a trader).

- "I was advised not enter and teach pupil until I am declared I am declared cured from the disease" (a male Primary school teacher).

- "I can no longer take care of house or do my houses work" (a house wife).

- "People run away from me" (a female participant).

Theme 4: Patients' opinion about anti TB drugs

There were different views from the participants' on the drugs. Majority of the participants noted that the drugs are good and effective in improving their health. They noted reasons for taking the drugs to include;

- To be cured from the disease
- To stay alive
- To get well and get back to work

Their major concerns were on the size and number of tablets they had to take in the intensive phase of treatment.

Quotations from some participant about the drugs and reasons for taking the drugs;

- "Me, I did not find it easy, I am a kind of person that does not like taking tablets in fact I prefer injections. To take four (4) tablets everyday was too much for me" (female participant).

- "The tablets are too big but they are smooth for easy swallowing" (female participant)

- "I did not find it easy with the drug, they are too big. I got tired of the drugs and wished to stop the treatment. There was a time I can perceive the unpleasant taste of the drug in my mouth" (male participant).

- "I take the drugs to be well so as to get back to my work" (female participant).

Theme 5: View about 'directly observed treatment' at the health facility

The general opinions of the respondents were that of inconveniences and cost of transport to the health facility for the direct observed treatment.

Quotations from some members:

- "We are asked to come to the hospital to take our drugs because when we are given the drugs to take at home, many of us will not take it as directed" (female participant).

- *"*When you go to the hospital, you are expected to swallow the drug in the hospital but health worker will not give you water to swallow the drugs. I can't imagine going about with water in bottle or sachet in my pocket every day because I am on TB treatment" (Male participant)

- "I had complaint a lot of the daily treatment in the hospital, sometimes I will like to travel for a week or two but I cannot because I do not want to miss my treatment" (female participant)

- "I had to take leave from my place of work because my employer could not be allowing me each day to for treatment" (male participant)

Theme 6: Patients views about the way they were treated by health workers

There were different views by the participants on the way and manner they were being treated by the health workers. Majority of the participants praised the health workers because they were seen as a great source of encouragement to them. However, others expressed their unhappiness with the attitude of the health workers towards them.

Quotation from a member

- "We know the good ones among the health workers, not all of them are good. We came to take our drugs and this lady (health worker on duty) ignored us. We even said that if it were the other Nurse she would have attended to us in no time. This lady always complains about the work and we the patients dare not attempt to complaint else there will be no drugs for us that day" (male participant)

Theme 7: Patients views on ways to help them adhere to their treatment for the required duration

The general views were centered on the direct observation of treatment and attitudes of the health workers. The daily clinic visit is cumbersome affecting their work; it is also costly because they have pay transport fare mostly on motorbikes to get to the clinic for their drugs. They expressed their dissatisfaction with the way and manner they were being treated by some of the health workers whom they felt were too harsh and unfriendly with them.

Quotations from some members

- "Give us the drugs for one or two to take at home to cut the cost of daily transport to the health facility, after all we are adults and our desire is to get well" (male participant).

- "The health workers should have good attitude towards us, they cause us more problem when they are harsh to us" (Male participant).

- "The daily treatment is burdensome to us; it is costly for us to transport ourselves to the hospital daily" (Female participant).

4.9.2: Service providers' factors associated with outcome of treatment.

Theme 1: Health Workers knowledge about the current treatment for TB

Majority of the participants knew that the current treatment for TB is the Directly Observed Treatment (DOT); the DOT means that the patient swallows the drug in the presence of the health worker. The treatment is free of charge to the patient but the patient will have to transport themselves to the health facility daily for the drugs.

Participants noted the followings as the importance of the DOT strategy;

- To monitor the patient closely for drug side effects in the intensive phase of treatment.
- To be sure patient take the drugs
- Monitor patients response to treatment
- Assess patients improvement

Quotation by a member;

- "Our experience with free drugs is that the patients do not value free things. We see it from the way the way they handle their TB hand cards. Some patients are quite careless with the hand cards because they are free; they squeeze or tear them within a few days of issues because they are free. This will translate to the free drugs. The direct observation of treatment gives us opportunity to educate the patients" (female participants).

Theme 2: Health workers perceived reasons for non adherence of patients to treatment

Majority of the participants were of the opinion that patient may interrupt or default from treatment for the following reasons;

- The patient feels better or well
- Patients who experience side effect of drugs.
- The daily clinic attendance to collect drugs are too cumbersome to the patient especially patient who have to travel long distance
- Poor patient education by the health workers on the treatment.
- Patient who indulge in alcohol consumption are more likely to forget to come for their drugs.
- Lack of family support for the patient

Quotations from members;

- "I think some patient after taking the drug for two or three months they feel strong and so do not want to continue with the drugs. They will feel that they are well so no need to continue taking the drugs" (female participant).

- *"*Some patient some coming for drugs due to lack of lack of transport fare to the hospital" (male participant).

- "Getting well and disappearance of symptoms is major cause of interruption or default from treatment also the inconvenience caused by the side effects of drugs" (female participant).

- *"*My experience is that some patients who take alcohol do heed to our advice to stop taking the alcohol but after two months of treatment, they feel better and think they are well. They resume their drinking habits and forget to come for drugs" (Male participant*)*

Theme 3: Health workers perceived ways to avoid patients defaulting from treatment

Majority of the participants were of the opinion that the health workers contribute significantly to patient adherence or non adherence to TB treatment. The major factors mentioned by the participants to ensure patients adhere to treatment were as follows;

- Patients counseling and education on the TB disease and treatment
- Proximity of the health facility to the patients place of abode
- Availability of the health workers at the facility to attend to the patients
- Attitude of health workers towards the patients

Theme 4: Health workers perceived ways to ensure patient adhere to their TB treatment.

The views of the health workers on ensuring patient adherence to treatment were centered on the patient-health workers relationships, patients' education and proximity of health facility to the patient.

Quotation from members;

- "The attitude of the health workers is very important; an unfriendly attitude will chase the patient away. The health worker should be friendly with the patients because if we are not friendly with them each time they come to take their drugs they will not be free" (female participants).

- "Honestly I have ever heard some patient say 'this Nurse is too harsh, I do not want her to touch me' they become selective. So if you are a TB service provider and you do not show them love and concern, patients will just leave the treatment even though they know that they treatment is for their good because they cannot tolerate the bad attitude of the health worker" (male participant).

- "If a patient interrupts treatment and we fail to trace the patient promptly, we should be blamed for the failure" (Male participant).

- "If we register patients to take treatment in a facility that is far from their homes they will not be consistent on their treatment" (male participant)

Theme 5: Health worker barriers perceived to proper education of patients

Majority of the participants mentioned the followings as their major challenge for effectively educate TB patient;

- Lack of knowledge of the health workers on TB and its treatment
- Lack of communication skills by the health workers
- Health workers with unfriendly attitude towards may not be able to educate a patient
- Language barrier between the health and the patients

Theme 6: Health workers knowledge of key education messages to patients at diagnosis and during treatment

The opinions of the participants on the educational message to the patients to ensure adherence to treatment included the followings;

- Adherence to treatment
- Dangers of stopping treatment before the required duration
- Free drugs and availability of the drugs
- curability of the disease
- what TB is
- how TB spread to others

- personal hygiene especially avoidance of indiscriminate spiting of sputum
- patient becomes non infectious with adherence to treatment

CHAPTER FIVE - DISCUSSION

This section highlights the patients' related factors associated with outcomes of TB treatment. The results of this study show that 19% of the TB patients interrupted their treatment and 4% failed or defaulted from the treatment. It revealed that several preventable factors were associated with the outcomes of the TB treatment in the state. The study explored the demographic characteristics of the patient that influence the outcome of treatment among TB patients. Our study revealed that there were more males (60.6%) than female among the respondents this is in consonants with the case finding reports from the state[9] where more males were generally reported among the cases than female. Our result on effects of gender on outcome of treatment was in contrast to the findings of Karim et al in Bangladesh who noted that women were more likely to adhere to treatment with better outcomes than males.[28] Similarly, in a nine year review of treatment outcome of TB in Ilorin by Salami and colleague, they found out that male were less likely to comply with treatment leading to poorer outcomes than female.[31]

Age is an important factor that influences the occurrence of diseases including TB. While TB is known to be more prevalent in the elderly in developed countries, it affects mostly the productive age group in developing countries.[32] The findings of this study supports the clustering of the respondent in the actively productive age brackets with mean of 37.6 ± 13.5 years. The age of the patients was not statically significantly associated with interruption and unfavorable outcomes of treatment. This finding was in contrast to the study of WU et al in Taiwan which revealed that age was an important determinant of outcome of TB treatment. They reported that elderly patients had poorer treatment outcomes because they needed additional support to access TB

treatment.[33] Additionally, in a case control study in China, Ai et al demonstrated that age above 60 years was significantly associated with non cure of TB patients.[59] This observed difference might be due to the fact the majority of the respondents in our study were younger age with a mean age of 37.6 ± 13.5 year and more than three quarters (77.1%) of them forty-years or less.

The clinical classification of the patients in this study especially patients who had previous exposure to anti-TB treatment was not statistically significantly associated with interruption and unfavorable outcome of treatments although it revealed that the Cat 2 patients were more likely to interrupt their treatment (OR 1.37) and also more likely to default of fail (OR; 2.4) their treatment compared to Cat 1 patients. Our results did not agree with the findings of Jha et al[60] on risk factors for treatment default among re-treatment Tuberculosis Patients in India and Amoran et al[61] on pattern of default among tuberculosis patients on directly observed therapy in rural primary health care centers in Nigeria, their results revealed that patients with previous history of TB treatment (Cat 2) had higher tendency to default from subsequent treatment leading to poor treatment outcomes.

HIV is a known factor with negative effect on TB including the outcome of treatment[62] for which reasons it was made an integral part of the TB control services. This study revealed that although more than a third (34.9%) of the respondents was not screened for HIV, 34.6% of those screened were HIV positive. The prevalence in our study is higher than the National prevalence of 25% reported in 2010.[63] This may be a reflection of the prevalence of HIV in the state, the sentinel survey showed that HIV prevalence in the state had risen from 2.2% in 2008 to 7.7% in 2010.[64] A WHO report showed that TB/HIV co-infection as a major factor associated with interruption

of treatment leading to high default[62] and Ai X et al in a cohort study on risk factors for poor treatment outcome in China also noted that co-morbid conditions including HIV was the important determinant of non-cure among the patients.[59] However, we did not find significant relationship between HIV co-infection and outcome of patients' treatment rather in contrast to the aforementioned, our study revealed that HIV co-infection was protective against failure and default from treatment (OR = 0.45). The contrasting finding in our study suggests presence of other factors that might not had been explored in our study.

The socio-demographic characteristics of the patients influence their behavior including adherence to TB treatment. We found that majority of the respondents were married (72%) and gainfully employed (77.5%). These groups especially the married women are very important in TB control. The DOTS strategy uses the ambulatory treatment of TB which requires patients to visit the clinic daily for their drugs, the daily clinic visit has the potential to interfere with their normal family life especially among women who might be required to take permission from their husbands.[65] Furthermore, the disease and its treatment is also capable of interfering with the normal work of the patients especially among the employed. The result of this study was not in congruent with finding in Bangalore city by Vijay et al who found statistical significant association of marital status of patients and their adherence to TB treatment. Defaulters were higher among married patients in contrast to those who were not married.[66] Similarly patients who engage in businesses particularly those that take them out of town and those who farm for living might tend to forget their treatment especially when symptoms of their disease reduce with treatment.

Other socio-demographic factors with potential effect on the patient interruption and outcome of treatment are patient educational level because it is expected that educated persons may tend to understand the importance for treatment than the uneducated. We did not find significant relationship between the patients' level of education and outcome of the treatment.

Patients' behavioral factors such as alcohol use and cigarette smoking affect their adherence to the treatment including outcomes of the treatments. Our study showed that as high as 44% and 18% of the respondents engage in alcohol consumption cigarette and smoking respectively. The effect of alcohol use on patients' adherence to treatment was reported from studies in Uzbekistan[65] and Bangalore city.[66] The researchers noted that alcoholics were more likely to default from their treatment. A study in India also implicated work related factors and alcohol consumption to non adherence to treatment.[67] This was also the views of the health workers in the focus group discussion who blamed alcohol consumption by patients as major reasons for non-adherence to treatment. The health care workers' were of the opinion that patients who indulge in alcohol consumption tend to forget to go to the clinic for their drugs or take their drugs as at when due. The non significant association between alcohol consumption with interruption and unfavorable outcome of treatment in our study may be caused by some unexplored factors. The data was extracted through self-reporting by the respondents and not based on testing of biomarkers for alcohol in the body. However, our study revealed that cigarette smoking was significantly associated with interruption of treatment (AOR: 3.55, 95% CI: 1.23 – 10.21) and defaulting or failing the treatment (AOR: 23.89, 95% CI: 2.40 – 237.36). Cigarette smoking is known to damage the lungs and suppresses the individual adaptive immune responses affecting patients' response to TB treatment.[39] Tachfouti et al in their study in

Morocco reported that treatment failures was higher among patients who smoke cigarette than non smokers.[40] Santa et al also reported smoking as a predictor for poor TB treatment outcomes in their study in India.[41]

Access to the TB treatment especially for the daily direct observation of the treatment (DOT) is influenced by the proximity of the health facility to the patients. Despite the fact that TB treatment is free, patients who live a long distance from the health facility will have to bear the cost of transportation to access the free services. Our study showed that 19% of the patient lived more than five (5) km from the TB treatment centers and the major reasons for interrupting treatment was blamed on lack of transport and long distance from the health facility by 40% of the respondents. The study also revealed that patients who lived more than five kilometers from the treatment centers were nine times more likely to interrupt their treatment (OR: 9.25, 95% CI : 4.94 – 17.34) and six times more likely default or fail the treatment (OR:6.10, 95% CI : 2.11 - 14.18). This finding is supported by the reasons for interruption of treatment by the patients. Our findings was consistent with those reported by O'Boyle et al in Malaysia, who revealed cost of transport and time of travelling to a treatment centre as the major factors influencing compliant with DOTS.[35] Kandel et al also found patients reasons to interrupt TB treatment among patients in a health facility in Eastern Cape Province, South Africa in a health to include lack of money for transports and long distant to TB treatment site.[52]

The disappearance of symptoms is a strong indicator of clinical improvement from diseases and a measure of the effectiveness of the therapy. It is common place for symptoms of TB to disappear even within the first phases of treatment when the patient is under direct observation of

treatment because of the quality of the drugs in use in Nigeria. Patient with inadequate knowledge of the duration of the treatment and the need to continue the treatment for the right duration even when symptoms disappear may feel that they are cured and thus stop the treatment. Kaona et al in their study on assessment of factors contributing to TB treatment adherence in Ndola, Zambia revealed that feeling well was the major reason for patient stopping treatment.[68] Our study revealed that although a high proportion (96%) of the respondents knew that TB is curable, however, 25% of the patient who interrupted their treatment did so because they felt well and were not aware of the expected duration for the treatment. Patients who were not knowledgeable about the duration of the treatment had about four fold (OR = 3.72) chance of interrupting their treatment and six fold (OR = 6.24) chance of defaulting or failing their treatment. It also remained an independent determinant for failure and default from treatment in multivariate analysis. Thus knowledge of the patients on the duration of the treatment may be considered a proxy indicator of the quality of counseling offered to them by the health care workers which is also dependent on the health care workers' knowledge on the TB control services and counseling skills.

Belief of patients on diseases including TB and their treatment is known to influence patients compliant and adherence to the treatment including the outcome. A study by Gebremariam et al in Ethiopia showed that TB patients who believed in the curability of the disease and confidence in the health workers adhered to their treatment leading to better outcome of the treatment.[23] Majority of the participants at the focus group discussion in our study were of the opinion that TB is caused by germ and spread from untreated persons to others through direct contact, the air and sharing of cups and utensils. In contrast to the participants' beliefs, they opined that their

community members still hold that TB is a disease from God and closely related to HIV. Associating TB and HIV may increase stigma on TB with potential negative effect on patients' adherence to the treatment. Despite their belief of associating TB with HIV, the general opinion was that the TB drugs were capable of curing their disease as stated by a participant.

This section highlights the health care workers related factors that determine the outcome of TB treatment in the state. Patients' decision to stay on treatment for the prescribed duration depends on how much help they get from the health care workers which also depend on the knowledge of the health care workers. Liefooghe et al in a randomised trial on impact of counselling on adherence of treatment of TB patients reported that proper counselling of patient by the health worker led to 13% reduction in defaulter rates.[52] The health care workers require adequate knowledge of the disease and the control strategies for effective counselling of the patients. We found out that though majority (82.9%) of them had been participating in TB control services for more than 12 months, 30.3% of them had not benefited from either on-the-job training or workshop on the TB control services. The below average of the knowledge score of the health care workers on TB control services might had been the reflection of the lack of trainings. The poor knowledge of the health care workers will affect effective communication to patients including education of the patients by the health workers. This was corroborated by the health care worker who participated in the focus group discussions. They identified a major barrier to patients' adherence to treatment to be improper education of the patients by the health care workers on the duration of treatment.

The relationship between the health care workers and the patients is also very important and has bearing on the attitude of the health care workers towards the patients. Patients who have confidence in the health care worker are more likely to follow their instructions and adhere to treatment duration. Conversely, patients who feel threatened, not loved or respected by the health care workers may choose not to continue their treatment leading to interruption and eventually failure or default from the treatment. Studies had noted the effect poor health care workers and patients relationships on TB treatments. O'Boyle et al reported that patient who feel that they are not treated with respect and empathy may not complete their treatment[35] and Comolote et al, in their study on reasons for default among TB patient in Madagascar also revealed that defaulted patients claimed that they were not allowed to ask questions when being counselled by the health workers.[24] Jaiswal et al also noted that reasons for patient who defaulting from treatment in a study in India was blamed on the health workers for their untoward behavior and attitude toward them whom they described as rude and unhelpful.[69] These findings are supported by the views of the participants at the focus group discussions in our study. They were of the opinion that negative attitude of the health care workers towards the patients is a key barrier to patients' adherence to treatment.

Conclusion and recommendations

Conclusion

This study revealed that lack of knowledge of the patients on the disease and duration of treatment, living far from TB treatment site, cigarette smoking and patients interrupting their treatment were the major patients' factors affecting TB treatment outcomes. Furthermore, poor knowledge on the TB control services due to lack of training and their unfriendly attitude towards the TB patients were the health care workers factors affecting TB treatment in the state.

Recommendations

Based on our findings we made the following recommendations;

1. The Plateau state TB and Leprosy control programme should strengthen supportive supervisions at the facility level with focus on increasing the knowledge and skills of the health workers through on the job training on patient management.

2. The Plateau state TB and Leprosy control programme in collaboration with partners who are supporting the TB control in the country such as TB CAP, Netherlands Leprosy Relief and TB Reach should train all the general health workers on TB control services including inter personal communications to ensure proper counseling of patients for treatment and prevention of interruption and defaulting from treatment.

3. The Plateau state TB and leprosy control programme in collaboration with the coordinators of the primary health care at the LGAs level should establish more TB

treatment centers including involvement of private health facilities to ensure wider spread of the services so as to reduce travel distance and cost to the patients.

4. The plateau state TB and Leprosy control programme should initiate and support community TB care and use of TB treatment supporters to make the treatment more convenient to the patients.

5. The National TB control programme should include smoking cessation among TB patients into the TB control programme.

6. The National TB control programme should conduct further studies to determine the effect of dose of cigarette smoked and smoking cessation on the outcomes of TB treatment.

References

1. WHO, Global tuberculosis control: epidemiology, strategy, financing: WHO report 2009. WHO/HTM/TB/2009.411.

2. Federal Ministry of Health Abuja Nigeria, National TB and leprosy control programme workers manual 5th edition, September 2008.

3. WHO, The global MDR-TB & XDR-TB Response Plan WHO/HTM/TB/2007.387.

4. Plateau state ministry of health, Fourth quarter report, Plateau state TB and leprosy control programme, January 2009.

5. WHO, Implementing the Stop TB Strategy: a handbook for national tuberculosis control programmes. Geneva, World Health Organization, 2008. (WHO/HTM/TB/2008.401).

6. WHO, Revised TB recording and reporting forms and registers – version 2006. Geneva, World Health Organization, 2006. (WHO/HTM/TB/2006.373).

7. WHO, The Stop TB Strategy: building on and enhancing DOTS to meet the TB-related Millennium Development Goals. Geneva, World Health Organization, 2006 (WHO/HTM/TB/2006.368).

8. Vasankeri T, Holmstrom P, Ollgren J, Liipoker et al. Risk factors for poor TB treatment outcome in Finland: a cohort study. BMC Public Health 2007; 7:291.

9. Plateau state ministry of health, annual report, Plateau state TB and leprosy Control Programme 2011.

10. World Health Organization, TB/HIV Clinical Manual 2nd Edition, 2004; WHO/HTM/TB/2004.329.

11. Crofton J. Failure in the treatment of pulmonary tuberculosis: potential causes and their avoidance. Bull. Intern. Un. Tuberc. 1980; 55 (3-4): 93-99.

12. World health organization, International Standards for Tuberculosis Care (ISTC). The Hague: Tuberculosis Coalition for Technical Assistance, 2006. http://www.who.int/tb/publications/2006/istc_report.pdf accessed on 06/02/2012

13. WHO, Adherence to long-term therapies: evidence for action. Geneva, World Health Organization, 2003.

14. WHO, Patients' Charter for Tuberculosis Care, http://www.who.int/tb/publications/2006/istc_charter.pdf Accessed on 02/02/2012.

15. Munro SA, Lewin SA, Smith H, Engel ME, Fretheim A, et al. Patient adherence to tuberculosis treatment: A systematic review of qualitative research. PLoS Med 4(7): 2007. e238. doi:10.1371/journal.pmed.004023.

16. Dye C, Williams B G, Espinal M A, Raviglione M C, Erasing the World's Slow Stain: Strategies to Beat Multidrug-Resistant Tuberculosis *Science* 15 March 2002; 295(5562). 2042-2046 *DOI:* 10.1126/science.1063814.

17. Zignol M, Hosseini MS, Wright A, Weezenbeek CL, Nunn P, Watt CJ, et al. Global incidence of multidrug-resistant tuberculosis. J Infect Dis. 2006; 194:479-85.

18. Donnelly John, A journey into the challenges and solution to stopping MDR-TB and XDR-TB, WHO/HTM/STB/2009.52.

19. Mushtaq M U, Majrooh M A, Ahmad W, Rizwan M et al. Knowledge, attitudes and practices regarding tuberculosis in two districts of Punjab, Pakistan. Int J Tuberc Lung Dis. 2010 Mar; 14(3):303-10.

20. Jittimanee SX, Nateniyom S, Kittikraisak W, Burapat C, et al. Social Stigma and Knowledge of Tuberculosis and HIV among Patients with Both Diseases in Thailand. PLoS ONE. 2009; 4(7): e6360. doi:10.1371/journal.pone.0006360.

21. Fatiregun A. A, Ojo A. S, Bamgboye A. E, Treatment outcomes among pulmonary tuberculosis patients at treatment centers in Ibadan, Nigeria Annals of African Medicine 2009; 8 (2):100-104.

22. Khan A, Walley J, Newell J, Imdad N. Tuberculosis in Pakistan: Socio-cultural constraints and opportunities in treatment. Soc Sci Med 2000; 50:247-54.

23. Gebremariam M K, Bjune G A, Frich J C, Barriers and facilitators of adherence to TB treatment in patients on concomitant TB and HIV treatment: a qualitative study. BMC Public Health. 2010; 10: 651.

24. Comolet, T. M, Rakotomalala R, Rajaonarioa H, Factors determining compliance with tuberculosis treatment in an urban environment, Tamatave, Madagascar Int J Tuberc Lung Dis 2(11):891–897.

25. Jaramillo E. Encompassing treatment with prevention: The path for a lasting control of tuberculosis. Soc Sci Med 1999; 49:393-404.

26. Borgdorff MW, Nagelkerke NJD, de Haas PEW, van Soolingen D. Transmission of Mycobacterium tuberculosis depending on the Age and Sex of Source Cases. American Journal of Epidemiology 2005. 154: 934-943.

27. Lienhardt C, Fielding K, Sillah J. S et al. Investigation of the risk factors for tuberculosis: a case–control study in three countries in West Africa. International Journal of Epidemiology, 2005. 34(4):914-923.

28. Karima F, Ahmed F, Begun I, Johnson E and Diwan VK, Female-male differences at various clinical step of TB treatment. Int. J Tuberc Lung Dis, 2008; 12 (11). 1336-9.

29. Begum V, de Colombani P, Das Gupta S et al, Tuberculosis and patient gender in Bangladesh: sex differences in diagnosis and treatment outcome Int J Tuberc Lung Dis 2001 July; 5(7), 604-610.

30. Bashour H and Mamaree F Gender differences and tuberculosis in the Syrian Arab Republic: patients' attitudes, compliance and outcomes. Eastern Mediterranean Health Journal, 2003; 9(4). 757.

31. Salami A. K and Oluboyo P. O, Management outcome of pulmonary tuberculosis: a nine year review in Ilorin. West Afr. J. Med, 2003 June; 22(2): 114-5.

32. Nardell, E A. Merck and the Merck Manuals Online Medical Library http://www.merck.com/mmhe/index.html accessed 27/07/2010.

33. Wu P, Chou P, Chang N, Sun W, Kuo H, Assessment of Changes in Knowledge and Stigmatization Following Tuberculosis Training Workshops in Taiwan. J Formos Med Assoc 2009; 108 (5): 349-435.

34. Alburquerque WFPM, Ximenes RAA, Silva NL et al. factors associated with treatment failure, drop out and death in a cohort of TB patients in Recife, Permanbuuco state, Brazil. Cad Saude Publica, 2007; (23); 105-14.

35. O'Boyle S. J. O, Power J. J, Ibrahim M. Y, Watson J. P. Factors affecting patient compliance with anti-tuberculosis chemotherapy using the directly observed treatment, short-course strategy (DOTS) Int J Tuberc Lung Dis 2002, 6(4):307–312.

36. Shargie EB, Lindtjørn B (2007) Determinants of treatment adherence among Smear-positive Pulmonary Tuberculosis patients in Southern Ethiopia. PLoS Med 4(2): e37. doi:10.1371/journal.pmed.004003.

37. Xu W, Lu w, Zhou Y, Shen H, Wang J. Adherence to anti-tuberculosis treatment among pulmonary tuberculosis patients: a qualitative and quantitative study. BMC Health Services Research 2009, 9:169 doi:10.1186/1472-6963-9-169.

38. Bello SI Itiola OA Drug adherence amongst tuberculosis patients in the University of Ilorin Teaching Hospital, Ilorin, Nigeria. African Journal of Pharmacy and Pharmacology 2010, 4(3),109-114.

39. Schneider NK and Novotny T E. Addressing smoking cessation in tuberculosis control. Bull World Health Organ 2007; 85(8):647-8.

40. Tachfouti N, Nejjari C, Benjelloun MC, Berraho M et al. Association between smoking status, other factors and tuberculosis treatment failure in Morocco. Int J Tuberc Lung Dis. 2011; (6):836-43.

41. Santha T, Garg R, Frieden TR et al, Risk factors associated with default, failure and death among TB patients, Int J Tuberc Dis. 2003 Feb;7(2):200-1.

42. Lönnroth K, Williams BG, Stadlin S, Aramillo EJ, Dye C. Alcohol use as a risk factor for tuberculosis – a systematic review. BMC Public Health 2008, 8:289 doi:10.1186/1471-2458-8-289.

43. Selassie AW, Pozsik C, Wilson D et al. why pulmonary tuberculosis recur: a population based epidemiological study, Amn Epidemiol 2005 (1)5; 519-25.

44. WHO, Tuberculosis global facts, World Health Organization 2010, http://www.who.int/tb/publications/2010/factsheet_tb_2010.pdf Accessed 12/02/2012.

45. Bevilacqua S, Rabaud C, May T. HIV-Tuberculosis coinfection. Ann Med Int, 2002, 153:113-118.

46. WHO, TB/HIV a Clinical Manual 2nd edition. World Health Organization, Geneva.

47. Harries A, Maher D, Graham S, TB/HIV a Clinical Manual 2nd edition 2004. WHO/HTM/TB/2004.329

48. Dimitrova B, Balabanova D, Atun R, Drobniewski F, Levicheva V Coker R, Health service providers' perceptions of barriers to tuberculosis care in Russia. Health Policy and Planning 2006; 21(4):265-274.

49. Mishra P, Hansen E. H, Sabroe S, Kafle K. K. Adherence is associated with the quality of professional-patient interaction in Directly Observed Treatment Short-course, DOTS. Patient Educ Couns. 2006 Oct; 63(1-2):29-37.

50. Tekel B, Mariam D. H, Ali A, Defaulting from DOTS and its determinants in three districts of Arsi Zone in Ethiopia, Int J Tuberc Lung Dis 6(7):573–579.

51. Kandel TR, Mfenyana K, Chandia J, Yogeswaran P. The prevalence of and reasons for interruption of anti-tuberculosis treatment by patients at Mbekweni Health Centre in the King Sabata Dalindyebo (KSD) District in the Eastern Cape Province. SA Fam Pract 2008;50(6):47.

52. Liefooghe R, Suetens C, Meulemans H, Moran MB, De Muynck A. A randomised trial of the impact of counselling on treatment adherence of tuberculosis patients in Sialkot, Pakistan Int J Tuberc Dis 1999, 3(12):1073–1080.

53. Dujardin B, Kegels G, Buve A, and Mercenier P. Tuberculosis control: did the program fail or did we frail the program? Tropical Medicine and International Health 1999; 2 (8):715-718.

54. Jin B.W, Kim S.C, Mori T, Shimo T, The impact of intensified supervisory activities on tuberculosis treatment, Tubercle and Lung Disease,1993; 74: 267-272.

55. State ministry of health, Plateau state health bulletin, 2008.

56. Plateau state ministry of health, Annual report of the Plateaus state TBL control report, 2011.

57. Plateau state ministry of health, Annual report of the Plateaus state TBL control report, 2006.

58. Daniel Wayne W. Biostatistics: a foundation for analysis in the health sciences. 7th edn. Georgia state university; John Wiley & Sons Inc, 1999.

59. Ai X, Men K, Guo L, Zhang T, Zhao Y et al Factors associated with low cure rate of tuberculosis in remote poor areas of Shaanxi Province, China: a case control study. BMC Public Health 2010; 10:112 doi:10.1186/1471-2458-10-112.

60. Jha UM, Satyanarayana S, Dewan PK, Chadha S, Wares F, et al. Risk Factors for Treatment Default among Re-Treatment Tuberculosis Patients in India, PLoS ONE 2006;5(1): e8873. doi:10.1371/journal.pone.0008873.

61. Amoran OE, Osiyale OO and Lawal KM. Pattern of default among tuberculosis patients on directly observed therapy in rural primary health care centers in Ogun State, Nigeria, Journal of Infectious Diseases and Immunity, 2011;3(5), 90-95.

62. WHO, Global tuberculosis control: epidemiology, planning, financing. WHO report 2009. WHO/HTM/TB/2009.411.

63. US embassy, Nigeria Tuberculosis Fact Sheet, Economic Section, United States Embassy in Nigeria. 2012. http://nigeria.usembassy.gov accessed 10/05/2012.

64. Department of Public Health. National AIDS/STI Control Programme, Technical report, 2010 National HIV Sero-prevalence Sentinel Survey. Federal Ministry of Health, Nigeria.

65. Hasker E, Khodjikhanov M, Usarova S, Asamidinov U et al Default from tuberculosis treatment in Tashkent, Uzbekistan; Who are these defaulters and why do they default? BMC Infectious Diseases 2008; 8:97doi:10.1186/1471-2334-8-97.

66. Vijay S, Balasangameswara VH, Jagannatha P S, Saroja VN and Kumar P. Defaults among tuberculosis patients treated under DOTS in Bangalore city: a search for solution. Ind. J Tub., 2003; 50:185.

67. Jaggarajamma K, Sudha G, Chandrasekaran V, Nirupa C et al. Reasons for non-compliance among patients treated under revised National Tuberculosis Control Programme (rntcp), Tiruvallur District, South India. Indian J Tuberc 2007; 54:130-135.

68. Kaona F. A. D, Tuba M, Siziya S, and Sikaona L. An assessment of factors contributing to treatment adherence and knowledge of TB transmission among patients on TB treatment. BMC Public Health. 2004; 4: 68. doi: 10.1186/1471-2458-4-68.

69. Jaiswal A, Singh V, Ogden J A, Porter JDH et al. Adherence to tuberculosis treatment: lesson from the urban setting of Delhi, India. Tropical Medicine and International Health, 2003; 8(7): 625-633.

Annexes

Annex 1: Questionnaire for TB patients

Factors associated with outcomes of treatment among pulmonary tuberculosis patients in Plateau state, Nigeria

Question number ----------

Section A: From Central Register and Treatment card

1. Patient name: ----------
2. Patient Registration number -------/------/-------/----------State/LGA/Year/Patient number
3. Sex of patient
   [ ] Female
   [ ] Male
4. Age of patient ----------(in years)
5. Clinical classification of patient (*Tick **one** that applies*)
   [ ] New smear positive
   [ ] New smear negative
   [ ] Relapse
   [ ] Failure
   [ ] RAD
   [ ] Others
6. HIV status of patient
   [ ] HIV Negative
   [ ] HIV Positive
   [ ] Unknown
7. Treatment outcome of patient
   [ ] Cured (***start on question 9***)
   [ ] Treatment completed (***start on question 9***)
   [ ] Failure (***start on question 9***)
   [ ] Defaulted (***start on question 8***)

Section B: Interview of Patients

Interview date (dd/mm/yy) ----/-----/----

Interviewer Name ---------- Sign ----------.

Consent from respondent:

My name is ----------. We are conducting a study on Tuberculosis disease and the services being offered for its control. The aim is to learn ways to organize the services better for TB patients in the state.

We shall ask you some questions and will take 20 to 30 minutes. Your participation is confidential and all information shall used for the study only.

Your response will help us assess the services and improve on it in Plateau state.

Thank you for giving us audience.

8. Did you ever interrupt your treatment?
   [ ] Yes
   [ ] No

9. Marital status of patient
   [ ] single
   [ ] married
   [ ] divorced
   [ ] Separated

10. Occupation of patient
    [ ] Farming
    [ ] Schooling
    [ ] Applicant / unemployed
    [ ] Civil servant
    [ ] Trading
    [ ] Artisan
    [ ] Others specify ----------

11. Highest education level attained:
    [ ] No formal education
    [ ] Primary school
    [ ] Secondary school
    [ ] Post secondary
    [ ] Qur'an education

12. How far is health facility from your home?
    [ ] ≤ 5 km
    [ ] > 5km

13. What do you think cause TB? (Tick **all** that apply)
    [ ] Witch craft/poisoning
    [ ] From God
    [ ] By germ
    [ ] Don't know
    [ ] Contact with TB patient
    [ ] Others causes please specify ----------

14. How does TB spread? (Tick **all** that apply)
    [ ] Don't Know
    [ ] Airborne
    [ ] Through food
    [ ] Through water
    [ ] Don't know
    [ ] Others please specify----------

15. Do you think you can be cured of TB?
    [ ] Yes
    [ ] No
    [ ] Don't know

16. Do you think this treatment can cure your TB disease?
    [ ] Yes
    [ ] No
    [ ] Don't know

17. How long are you supposed to take the treatment?
    [ ] < 8 months
    [ ] 8 months
    [ ] > 8 months
    [ ] Don't know

18. What are your reasons for taking treatment?
    [ ] To avoid spread of disease to others
    [ ] To be cured of the disease
    [ ] Forced by family member to take drug
    [ ] Don't have reason for taking the drugs
    [ ] others please specify ----------

19. Which of these roles applies to you in your family?
    [ ] Main bread winner
    [ ] Not main bread winner but supports family
    [ ] House wife
    [ ] Dependant

20. Have you ever smoked cigarette?
    [ ] Yes
    [ ] No ***(Go to question 25)***

21. If "Yes" when did you started smoking the cigarette? ---------- (in years)

22. How many sticks of cigarette do you smoke each day? ---------- (number of sticks)

23. Do you still smoke the cigarette?
    [ ] Yes
    [ ] No

24. If "No" when did you stop smoking cigarette? ---------- (in months)

25. Have you ever taken alcohol?
    [ ] Yes
    [ ] No ***(End of survey)***

26. If "Yes" when did you started drinking the alcohol? ----------(in years)

27. Do you still drink alcohol?
    [ ] Yes
    [ ] No

28. If "No" when did you stop drinking the alcohol?
    [ ] < 6 months ago
    [ ] 6 to 12 months ago
    [ ] > 12 months ago

Thank you for participating in the study

Annex 2: Questionnaire for health workers in TB treatment sites.

Question number ---------- Date of interview (dd/mm/yy) -----/----/------

Interviewers name ---------- Sign ----------

Consent form for respondents:

We are conducting a study on factors associated with outcome of treatment among pulmonary TB patients in Plateau state. We will like to gather information from the health personnel involved in the management of the TB control services at the facility levels. The information shall help us to organize and offer better services to the patients. We are requesting your kind permission to give us the information. All information was confidential and was used for the study only. Thank you for giving us audience

1. Name of respondent (Optional) ----------

2. Sex of respondent:
   [ ] Female
   [ ] Male

3. Qualification/Designation
   [ ] Medical Doctor
   [ ] Registered Nurse
   [ ] Nurse/Midwife
   [ ] CHEW
   [ ] JCHEW
   [ ] EHO
   [ ] Others specify----------

4. How long have you been working in this facility (***duration in months***)? ----------

5. What training have you ever received during your clinical practice for TB control services?
   [ ] None
   [ ] workshop
   [ ] on-the-job training

6. If you were trained when did you received the training?
   [ ] < 6 months ago
   [ ] 6 to 12 months ago
   [ ] >12 months ago

7. What does direct observation of treatment (DOT) mean in TB control services? ----------

---

---

8. Mention at least **six key** health education messages you give to TB patient at the time of registration for treatment?
   i. ----------
   ii. ----------
   iii. ----------
   iv. ----------
   v. ----------
   vi. ----------
   vii. ----------

9. List at least **six key** health education messages you give to a TB patient during their treatment to make them adhere to the long duration of treatment
   i. ----------
   ii. ----------
   iii. ----------
   iv. ----------
   v. ----------
   vi. ----------
   vii. ----------

10. When do we say a patient default treatment in the intensive phase of TB treatment?
    [ ] Patient misses drug for 2 days
    [ ] patient misses drugs for 3 days
    [ ] patient misses drug for 7 days
    [ ] don't know

11. When do we say a ***category 1*** TB patient default treatment in the continuation phase of TB treatment?
    [ ] Patient misses drug for 7 days
    [ ] patient misses drugs for 14 days
    [ ] patient misses drug for 28 days
    [ ] don't know

12. When do we say *a* ***category 2*** TB patient default treatment in the intensive phase of TB treatment?
    [ ] Patient misses drug for 2 days
    [ ] Patient misses drugs for 7 days
    [ ] Patient misses drug for 14 days
    [ ] Don't know

13. What do you think are important causes of patient failing to adhere to treatment? (***Tick all that apply***);
    [ ] Side effect of drugs
    [ ] Daily clinic attendance
    [ ] Lack of patients knowledge on duration of treatment
    [ ] Lack of drugs in health facility
    [ ] Workers attitude towards patient
    [ ] Patient attitude
    [ ] Lack of support for patient from family members
    [ ] Others specify ----------

14. How can patient be prevented from defaulting treatment?

    a. ----------

    b. ----------

    c. ----------

    d. ----------

    e. ----------

    f. ----------

Thank you for participating in the study

Annex 3: Guide for focus group discussions with TB patients

Introduce yourself

General introduction of all participants
Introduction to the topic for the discussion and general principles for the discussion (it is a discussion everyone is free to himself/herself there is no right or wrong answer).

- What do you know about TB?
- What are the common beliefs about TB in your community?
- Who are the people that can get TB?
- What causes TB disease?
- What problems has this disease caused you?
- What are your opinions about the drugs you are taking for the treatment of TB?
- Why do you take this anti-TB drug?
- What are your views about the current treatment protocol of 'directly observed treatment' at the health facility?
- What is your feeling about the way the health workers treat you?
- In your view what do you think could be done to make the treatment better for patient to help them continue on treatment?

Annex 4: Guide for focus group discussions with Health Care Workers from TB treatment sites.

Introduce yourself

General introduction of all participants
Introduction to the topic for the discussion and general principles for the discussion (it is a discussion everyone is free to himself/herself there is no right or wrong answer).

- What do you know about the current treatment for TB?
- What are you opinion about the treatment?
- What do you think could happen if a patient is properly treated?
- What do understand by the concept of direct observation of treatment?
- What problems are associated with the direct observed treatment?
- What in your experience are the problems faced by patient with the TB disease and its treatment?
- In your own view how can the problems discussed are solved?

Annex 5: Work plan

Tasks	Nov 2010	Dec 2010	Jan 2011	Feb 2011	March 2011	April 2011	May 2011	June 2011	July 2011	August 2011	Sept. – Dec. 2011
Finalization of proposal											
Application and securing clearance from state ethical committee for study											
Purchase /production of research items											
Identification and training of research assistants											
Pre-testing of data collection tools											
Collection of data											
Data collation and analysis											
Finalization of thesis (first draft)											
Final draft											

Annex 6: Approval for the study

PLATEAU STATE SPECIALIST HOSPITAL JOS

Ref. No. PSSH/ADM/ETH. CO/2011/72
Old Bukuru Road,
P.M.B. 2113,
Jos, Nigeria
Tel. 073-462180
Fax: 073-464031

Email: psshjos@yahoo.com

Date: May 10, 2011

Reg.No: NHREC/05/01/2010b

Notice of Full Approval after full Committee Review

Re: Factors that determine outcomes of treatment among pulmonary tuberculosis patients in plateau state, Nigeria

Name of Principal Investigator: Dr. Luka Mangveep Ibrahim

Address of Principal Investigator: NFELTP, Dept of comm. Medicine, ABU, Zaria

Date of receipt of valid application: 21 April, 2011

Date of meeting when final determination of research was made: 10 May, 2011

This is to inform you that the research described in the submitted protocol has been reviewed and given full approval by the Health Research Ethics Committee of the hospital.

This approval dates from **10/05/2011 to 09/05/2012**. If there is delay in starting the research, please inform the HREC so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the HREC. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Dr. Bitrus Matawal, MBBS, FWACS
Chairman, HREC PSSH