NONCOMPLIANCE TO ANTI-TUBERCULOSIS TREATMENT AMONG TUBERCULOSIS PATIENTS IN BAYELSA STATE

BY

AKE, ■FFIYEOSUO DENNIS

B.Sc. Microbiology (N.D.U)

Matric No: 161688

A Dissertation in the Department Of Epidemiology, Medical Statistics, and Environmental Health,

Submitted to the Faculty of Public Health,

In Partial Fulfillment of the Requirements for the Award for the Degree of

MASTER OF PUBLIC HEALTH [EPIDEMIOLOGY]

of the

UNIVERSITY OF IBADAN

August, 2012

CERTIFICATION

I certify that this project was carried out under my supervision by AKE, Iffiyeosuo Dennis in the Department of Epidemiology and Medical statistics (EMS), Faculty of Public Health, College of Medicine, University of Ibadan.

.....

Dr. A.A. Fatiregun

MBBS, (IL),MSc Epid & Medstat (Ib),FWACP

Senior Lecturer,

Department of Epidemiology and Medical statistics, faculty of public health

College of medicine, University of Ibadan, Nigeria.

DEDICATION

This project work is dedicated to my parents Mr. and Mrs. AKE who taught me the benefits of hard work.

ACKNOWLEDGEMENTS

My sincere appreciation goes to the Almighty JEHOVAH, Who in his infinite mercies granted me the grace throughout my research work. Big thanks to my parents for their love and support.

Thanks to my Supervisor; Dr. A.A. Fatiregun for his understanding and tutorship throughout this research work. Dr (Mrs) Ikeola. A Adeoye cannot be forgotten for her sacrifice in proofreading my work and making necessary corrections.

My colleagues are well appreciated too for their concern and readiness to assist me even in my absence. My appreciation will not be complete if Professor Ajuwon of the Faculty of Health Promotion and Education, University College Hospital, Ibadan is not mentioned, for his guidance and suggestions on ethical issues concerning this research work. I want to say big thanks to Mrs. Olukoya, M. Oluwatoyin for assisting me with her work as a guide to this research work

ABSTRACT

Tuberculosis (TB) is an important re-emerging disease with increasing global morbidity and mortality. Each year, more than nine million people are infected with tuberculosis worldwide and three million deaths are attributed to the disease. Presently Nigeria is ranked 4th among the 22 tuberculosis burden countries in the world with an estimated prevalence of 536/100,000 population. Tuberculosis control is hindered by patients' noncompliance to anti-tuberculosis drugs, and a single untreated case is capable of infecting 10 to 15 persons annually. Although factors responsible for non-compliance to treatment have been reported in studies, this has not been done in Bayelsa State. This study assessed factors responsible for non-compliance to anti-tuberculosis treatment, as well as to determine the prevalence of non-compliance to Tuberculosis treatment in Bayelsa state.

A total of 320 patients diagnosed with tuberculosis presently in the continuous phase of anti-TB treatment in Bayelsa State were selected from all directly observed therapy (DOT) centres in the State. The total sample size was distributed in proportion to the population in each DOT centre using the proportional probability sampling technique. Patients were interviewed using a pre-tested questionnaire to identify reasons for non-compliance.

Prevalence of noncompliance was 7.5%. Sex, age, religion, occupation, smoking habit alcohol consumption and transport fare were significantly associated with non-compliance. Males were about 12 times more likely not to comply with TB treatment compared to females (OR = 12.2, 95%CI=1.50-98.6). Respondents aged 35years and above were about 10 times more likely not to comply compared to their counterparts, who were below 35 years (OR=9.67, 95%CI=1.15-81.61). As regards knowledge, respondents with good knowledge about signs and symptoms of TB were 75% less likely not to comply to treatment than those with poor knowledge (OR= 0.25, 95%CI=0.10-0.63).

Prevalence of non-compliance to tuberculosis treatment is low in Bayelsa, however, collaborative efforts should be adopted by relevant agencies and bodies on proper health education to patients on the consequences of non-compliance to TB treatment at the time of diagnosis. This will help to further reduce the prevalence of non-compliance in Bayelsa State.

Key words: Tuberculosis, Non-compliance, DOT centres, Bayelsa State.

Word count: 338

TABLE OF CONTENTS

CHAPTER TWO (LITERATURE REVIEW)

CHAPTER THREE (METHODOLOGY)

List of tables **pages**

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND

Tuberculosis (TB) is a contagious disease caused by any of the several strains of mycobacterium, referred to as *Tubercle bacilli*. The principal bacterium responsible for the disease is *Mycobacterium tuberculosis*. Only people who are sick with tuberculosis in their lungs (Pulmonary tuberculosis) are infectious, and when they cough, sneeze, talk or spit, they propel the germs into the air. Person only needs to inhale small number of these to be infected (WHO, 1999). However, the bacteria sometimes move through the blood to other parts of the body such as kidney, joints, brains, etc (Extra pulmonary tuberculosis). Pulmonary tuberculosis or tuberculosis of the lungs is the most common, as well as the only form of tuberculosis that can be transmitted to others. If the disease is untreated, each person with active pulmonary tuberculosis will infect on the average between 10 to 15 people every year (WHO, 2005b).

Today, Tuberculosis is considered one of the three largest single infectious causes of mortality and morbidity worldwide, along with HIV/AIDS, and Malaria. Annually, more than three million deaths are attributed to TB. In 2009 alone, about one million women, 170,000 children, 1,830,000 men died of TB (WHO global report, 2009). Additionally, the estimated global incidence was 9.4 million cases, and the prevalence was 14million (WHO TB Epidemiology, 2009).

Increased morbidity and mortality because of tuberculosis has been blamed on neglect of the human dimension of tuberculosis control, this ranges from poverty, over population, failure to diagnose TB timely, poor treatment strategy, to noncompliance to anti TB regimen (WHO, 1995). This however, informed the initiative of the directly observed treatment, short course (DOTs) which has shown to be the most feasible and effective treatment strategy in the control of TB in the community. This means that TB drugs have to be taken in the presence of a care-giver. If this is properly followed, these medicines – Ethambutol, Isonaizid, Rifampicin, Pyrazinamide, and Thiacetazone – are capable of eliminating the disease within a period of 6 to 9 months. However, noncompliance a behavioural parameter has posed serious challenge to the DOTs strategy, and has led to

the emergence of multidrug resistance tuberculosis (MDR-TB, XDR-TB), and poor treatment outcome (Erhabor et al, 2000).

Tuberculosis has recently been referred to as a re-emerging infectious disease. For example, in the United States, with the discovery of anti-tuberculosis drugs in the 1940s, US cases began to decrease for most of the 20th century. However between 1985 and 1992, TB cases increased. This upsurge was largely attributed to the emergence of the scourging HIV/AIDS pandemic, compounded by poor compliance to treatment. Today, the trend still remains the same for most developing countries, bringing about an increasing diseased burden worldwide (Marcelo et al, 2002).

WHO (2010) reported that Nigeria is ranked 4th among the 22 high TB burden countries in the world. The 5 countries with the highest burden of TB in terms of number of incidence cases are India (1.6-2.4 million), China (1.1-1.5 million), Indonesia (0.35-0.52 million), Nigeria (0.37-0.55 million), and South Africa (0.40-0.59.

Studies (Onadeko and Sofowora, 1975) have been able to elicit the trend of TB in the country, itemizing it as a disease of public health importance in Nigeria. This has in turn brought about the need to set goals in line with the stop TB partnership targets. These targets are: To detect at least 70% of the estimated infection (smear positive cases). To achieve a cure rate of at least 85% of the detected smear positive cases. by 2015 reduce TB burden and death rate by 50%, by 2015. To eliminate TB as a public health problem (≤1/100,000 population).

1.1 Justification

In Nigeria, drug resistance (Multi-drug resistance, and Extensive drug-resistance tuberculosis) associated with noncompliance in different parts of the country has posed significant challenge to achieving the expected cure rate (85%) in line with the stop TB partnership targets (WHO, 2010). For example, in Bayelsa State (South-south, Nigeria), where this research work was carried out, Administrative report of 2009 and 2010 showed in absolute number, a total of 54 (11.7%) and 37(9.3%) noncompliant cases respectively. However, there has not been any instrument or study to measure or establish the reasons for noncompliance in Bayelsa State, hence, there is need to establish possible

risk factors responsible for noncompliance to Anti- TB regimen in the state, to enhance effective and efficient public health intervention in reducing the spread and burden of the disease in the state.

1.2 Problem statement

Increased TB burden and the emergence of drug resistance constitute a major public health problem for all age groups in both economically backward and technologically advanced countries in the world. Between 1989 and 1997, the estimated incidence of TB was 8, 000,000, with an estimated 3000,000 deaths annually. Nigeria was at that time rated 5th TB burden country in the world with an estimated incidence rate of 220/100,000 population (Kochi, 1997).Currently, the global incidence of the disease has increased to an estimated 9.4 million and 3.6 million deaths annually.(WHO, 2010).Nigeria is presently the 4th highest burden country in the world with an incident rate of 536/100,000 population.

This increase however shows that, the world health organization goal of tuberculosis control which aims at reducing the annual death by 40% from its present level of more than 3 million to 1.7 million seems elusive or difficult to achieve). The failure has been blamed on numerous factors among which is the poor emphasis on the human dimension of tuberculosis control- non-compliance (Erhabo et al, 2000).

1.3 Broad Objective

To assess factors associated with patient's non-compliance to Tuberculosis regimen in Bayelsa State.

1.3.1. Specific Objectives:

1. To determine the prevalence of non-compliance to Tuberculosis treatment in Bayelsa state.
2. To identify socio-demographic factors associated with patient's non-compliance to Tuberculosis treatment.
3. To identify socio-behavioural factors associated with patient's non-compliance to Tuberculosis treatment
4. To assess the level of knowledge of patients towards Tuberculosis.

1.4 Research Questions

1. What is the prevalence of non-compliance to Tuberculosis treatment in Bayelsa state?

2. What are the factors influencing treatment non-compliance among Tuberculosis patients in Bayelsa State?

3. How knowledgeable are Tuberculosis patients towards Tuberculosis?

CHAPTER TWO

LITERATURE REVIEW

2.0 BRIEF OVERVIEW OF TUBERCULOSIS WORLDWIDE

Tuberculosis (TB), is the single leading cause of death from any single infectious agent, and has continued to be a public health problem all over the world (Paul, 2009). Depending on the prevailing social factors, such as socio-economic status, malnutrition, crowded living conditions, incidence of HIV/AIDS, level of development of the health infrastructure, quality of the available control program, and degree of drug resistance to anti-tuberculosis agents, the prevalence, patterns of presentation and mortality from the disease vary from one country to the other, and from one region to the other. This has lead to various strategies harnessed to achieve the ultimate global target of the stop TB partnership program (WHO, 1995). Despite the various approaches adopted to stop the disease, including Directly Observed treatment Short Course strategy (DOTs), and the stop TB programme, TB continues to be a major public health problem, particularly in developing countries. Among the different reasons, the emergence of drug resistance had added a major dimension to the associated HIV/AIDS epidemic, which is increasing the incidence, prevalence and death rates associated with tuberculosis. Resistance to anti-TB drugs occur primarily due to poor management of TB cases, often due to incorrect drug prescription practices by providers, poor quality drugs or inadequate supply of drugs, and patient non-compliance among others. (Haynes, 1976)

Although this section of the research work will review gray areas and updated dimensions of the disease in literature, it will centre mostly on major consequences of non-compliance to anti-TB regime across the world, narrowing down to developing countries, especially Nigeria, and programmes developed to monitor and reduce the burden in the country.

2.1 Epidemiology of Tuberculosis

Mycobacterium tuberculosis is a facultative intracellular parasite, an agent that causes tuberculosis. The important one to man is the bovine and the human strains. The human strain is responsible for a vast majority of cases, while the bovine strain affect only cows and other animals, in recent years a number of atypical mycobacterium has been isolated

from man (Gangadharam. 1980). These have been classified into four groups namely; Photochromogens e.g. *Mycobacterium kanscisii*, Schofochromogens e.g. *Mycobacterium scrofuldceum*, Non photochromagens e.g. *Mycobacterium rusmen*, Rapid growers e.g. *Mycobacterium fortuitum*. All these are mainly saprophytic; diseases caused by these have common symptoms of pulmonary tuberculosis and cervical lymphadenitis (Crofton and Miller, 1992).

2.1.1 Source of Infection

There are two sources of infection: (1) human source; this is the most common infectious source to human. A person whose sputum is positive for tubercle bacilli and has not received any treatment or not treated fully can discharge the bacilli into the air, and susceptible individuals when inhaled can be infected by such strains. The tubercle bacilli in humans are usually of mixed group i.e. some multiply very rapidly and others so slowly. The more rapidly a bacillus strain multiplies, the more susceptible it is to bacterial action of chemotherapeutic drugs. Slow multipliers are the source persistent or dormant bacilli, remaining alive for years without causing noticeable harm to the host until a favourable condition set in; they start multiplying again and cause active disease. (2) Bovine source; the bovine source is usually infected milk by the bacilli. In this case person who consumes infected cow milk is likely to develop the disease. Patients remain infected for as long as they are untreated. According to the American Thoracic society, effective antimicrobial treatment reduces infection by 90% within 48 hours of commencement (Haynes, 1976).

2.1.2 The Tuberculosis Test

Von Pirquet discovered the tuberculosis test in 1907. A positive reaction to the test is generally accepted as of past or present infection by mycobacterium tuberculosis. The tuberculosis test is the only means of estimating the prevalence of infection in a population. For tuberculosis test, there are three main tests in use; the Mantoux test, the Heat test, the Tine multiple puncture test. The Heat test is the usually preferred test for large group of people, because it is quick and easy to perform. It is also reliable and inexpensive, the Mantoux test is a more precise measurement of tuberculin sensitivity is

required. The tine test is considered by some authorities as being unreliable and therefore not recommended (Parks and Parks, 1997).

2.1.3 Mode of transmission

Tuberculosis is transmitted by droplets infection and droplet nuclei generated by sputum-positive patients with pulmonary TB. Coughing generates the largest number of droplets of all sizes. Transmissions in general most likely occur indoors, where droplets nuclei can stay in the air few days (Haynes, 1976). The frequency and vigour of cough and the ventilation of the environment influence transmission of the infection. Once infected with mycobacterium tuberculosis, a person stays infected for many years, probably for life.

2.1.4 Control of Tuberculosis

Tuberculosis control is concerned with the reduction in the prevalence of disease in the community. WHO pointed out that TB control is achieved when the prevalence of natural infection in the age group of 0 and 14years is of the order of 1 percent (Parks and Parks, 1997). Since TB is an infectious disease, the basic principle of prevention and control are the same for any other infectious disease. The curative measures consist of case finding and treatment. Although this is the basic component of the national tuberculosis control programme, there is however a twin problem of delay in seeking treatment and abandonment of a prescribe regimen derived from complex factors (Rubel and Garro, 1992). Patient's non-compliance is one of the most challenges in the control of TB (Yach, 1988). Control measures are the same for technologically advanced countries and economically backward countries, however, the equality of these measures and the degree of their applications differ markedly (Miller and Scheiffelbein, 1998). However, case finding/early identification is the most important and universally applied strategy in identification and treatment of patients with infectious TB. This strategy cures the infected person and renders the patients non-infectious within a few weeks, thus interrupting transmission in the community.

2.2 Drug Resistance Tuberculosis

All drugs used in the treatment of TB (i.e. isonaizid, rifampicine, pyrazinamide, and ethambutol, or streptomycin), tend to produce resistant strains. This resistance may be of two types; (1) Primary or pre-treatment resistance- it is resistance shown by *Mycobacterium tuberculosis* in patients who have not received the drugs in question before. This is not always due to isonaizid, rifampicine, pyrazinamide, and ethambutol, or streptomycin. The acceptable fact remains that when the bacilli is fastly multiplying, resistance mutants appear irrespective of the administration of any drugs. According to an hypothesis, drug resistance is induced by transference through what is called "Episomes". Episomes are non chromosomal heritable genes which can pass from one bacterial cell to the other, if there is a direct contact between the cell containing episomes, the episomes leave the resistant cell and invade susceptible cell (Pamra et al, 1973). (2) Secondary or post treatment resistance: This occurs where *Mycobacterium tuberculosis* is sensitive to the drug at the start of treatment but becomes resistant to the particular drug during the course of treatment with it. Although drug resistant exist, Pamra et al 1973 opined that experts have considered that the issue of drug resistance is often grossly over-rated, this is because failure of treatment often attributed to drug resistance is really due to human factors such as noncompliance. It is also imperative to note that there is a relationship between poor compliance and drug resistance (WHO, 1995), thus drug resistance is a necessary indicator to increased spread of TB in a community. Drug resistance to tuberculosis can also be classified as either multi-drug resistance (MDR-TB) or extensive drug resistance (XDR-TB) depending on the line of drugs that are resisted.

The MDR- TB is defined as resistance to the most effective first line drugs (Isoniazid and rifampicin). Another type of resistance TB is called the Extensive drug resistance TB (XDR-TB), this is a type of multi-drug resistance TB that describes resistance to isoniazid, rifampicin and other second line- drugs used to treat MDR-TB. According to WHO, the prevalence of MDR-TB has been 1.1% in newly diagnosed patients. It is reported even higher in patients who previously received anti-TB treatment (7%).

The WHO stop TB department estimates a global incidence of drug of MDR-TB, as at 2004 to be about 480,000 cases (WHO, 2005b). The MDR-TB and XDR-TB are becoming increasingly significant. According to the United States national TB surveillance system (NTSS), between 1993 and 2006, a total of 49 cases (3% of evaluable MDR-TB cases) met the WHO reversed case definition (standard definition) for XDR-TB, and one in thirteen Mycobacterium isolates currently show a form of drug resistance (WHO, 1995). Multi-drug resistance has risen from poor compliance with TB therapy, resulting in difficulties in controlling the disease. Consequently, a threat to global pandemic occurred in the 1980s and early 1990s. Reacting to this signal, the World Health Organization developed a plan to try to identify 70% of the world's cases of TB and to completely treat at least 85% of the cases by 2000. Out of these goals were borne major TB surveillance programmes, and the concept of Directly Observed Therapy (DOT), which require third party witness compliance to pharmacotherapy. This although has gained certain success, but compliance with this strategy especially in low and middle income countries still pose a challenge, leading to a worsening situation with regards to the diseases burden in these countries (WHO, 2005b).

2.3 Management of Multi-drug Resistance Tuberculosis.

The treatment of MDR-TB is a challenge, which should be undertaking by competent clinician with an adequately equipped laboratory for mycobacterium culture and *in vitro* sensitivity testing.

2.3.1 Principles of Management

When MDR-TB is suspected on the basis of history or epidemiologic information, the patient's sputum must be subjected to culture and tuberculosis drug sensitivity testing, these patients may be started on WHO category 2 treatment, or such as that suggested by the American thoracic society, the centre for disease control and prevention (CDC), and the infectious disease society of America. Further therapy must be guided by the culture and sensitivity report. These guideline clearly mention, that a single drug should not be added to a failing regimen, hence when initiating treatment, at least those previously unusual drugs must be employed, to which there is *in vitro* sensitivity (Sumartojo, 1992)

this guideline is best suited for treatment of MDR-TB, given its good profile with long term use.

2.4 Drug Resistance Tuberculosis in Nigeria

The emergence of resistance to drugs in tuberculosis treatment (MDR-TB) associated with poor compliance is a significant problem and poses an obstacle to effective control of TB both at national and global levels.

Although, there has been no systematic population based national drug resistance surveillance in Nigeria especially related to non-compliance. However, from isolated and limited studies, it appears that MDR-TB is an emerging public health problem in Nigeria. For instance WHO estimated MDR-TB among new cases at 1.7% (0.3%-9%) and among previously treated TB cases at 7.9% (1-38%) in 2004 (WHO, 2005a). Drug resistance associated with noncompliance is a major challenge in the overall management of TB. There is no doubt that inadequate public health education and enlightenment concerning the disease as well as poor numbering system of residence in Nigeria, for tracing defaulters is more likely responsible factors for this challenge. However, there is an existing structure in Nigeria like other countries, aimed at reducing the burden of the disease in general (including MDR-TB) associated with non-compliance.

Following the adoption of DOT and the establishment of the national tuberculosis and leprosy control program me (NTBLC) by the Federal Government, through the Federal Ministry of Health, collaborations have been made especially by the NTBLC with other international agencies to meet with the stop TB partnership targets. In line with this, Nigeria has received support from the Global fund to fight AIDS, Tuberculosis and Malaria (GFATM) Round 5 for the establishment of 2 National, 6 Zonal reference laboratories. Such partners have also provided support for the establishment of reference laboratories in some states. It is also expected that with support from partners, in the nearest future the program me will establish treatment centres for the management of patients with XDR-TB easily (FMOH, 1991).

2.5 The National Tuberculosis and Leprosy Control (NTBLC) Programme Framework.

The federal government of Nigeria established the National Tuberculosis and Leprosy control program in 1988 within the department of public health in the federal ministry of health. The National co-coordinator, supported by a team of other medical staff, laboratory scientist and other support staff, at the national level heads the unit. Similarly, the state TB and leprosy control officer (STBLC) is located within the department of public health at the state level. Each STBLC team comprises of a medical officer and 2-3 TBL supervisors (TBLS) in some states, laboratory focal person and physiotherapist may be part of the team. Each of the 774 local LGA has a local government TBL supervisor (LGTBLS) who provides technical guidelines to the implementation of health programs in the LGA. This structure however has been integrated into the directly observed therapy short course strategy (DOTS) to ensure high-level cure rate and treatment compliance in Nigeria. Furthermore, towards achieving this aim, the National Tuberculosis and Leprosy Training Centre in Zaria, Kaduna State was established by the Federal Ministry of Health in 1991 with the aim of developing man-power for the NTBLCP. This centre also provides care for tuberculosis patients. Although the Federal Ministry of Health made TB control an issue of high priority, and having full adopted the DOTS strategy in 1993, the treatment of TB in the country is almost solely financed by foreign organizations. These organizations are the World Health Organization, the German Leprosy Relief Association, Damien Foundation, and the Netherlands Leprosy Relief Association. The DOTs is currently being implemented in 19 of the 36 states of the Federation. Since the implementation of DOTS in the country, about 100 microscopy centres and over 250 treatment centres have been established (FMOH,1991).

2.5.1 Programme Objectives

1. Early case finding and proper case management.
2. Comprehensive management of long-term physical and economic effect.
3. Integration of TBL services into the general health service
4. Promoting public-private partnership (PPP)
5. Behavioural change communication
6. Collaboration with bilateral and multi lateral partners

7. Ensure functional community management system
8. Human resource development

The fact remains that there is an existing well organized health system that embraces all efforts like other WHO member countries to fight the challenges of drug resistance TB especially associated with non-compliance, In other to meet the stop TB partnership program targets, as well as the MDGs, but I will strongly agree with other studies, that extraneous factors such as poverty and uncontrolled migration as peculiar with middle income or developing countries as may be called are still responsible for the current trend of TB in Nigeria.

2.6 Framework for Effective Tuberculosis Control

In 1996, the WHO declared TB as a global emergency because TB was out of control in many parts of the world. The following were reasons for the expressed reasons of TB being out of control; Government in many parts of the world has neglected the disease; inadequate TB control programs have led to an increased number of diseases i.e. inadequately treated TB patients tend to live longer with chronic disease and infect other people, thus resulting in Drug resistance TB; High rate of population growth have contributed to increased number of TB cases; The HIV epidemic which has been on the rise has led to an enormous increase in the number of TB cases especially in places where HIV and TB are both common. This has led to the development of a framework for a national TB program in different countries. The framework in Nigeria is made up of some very beautiful components, namely; (a) An overall objective of reducing mortality and morbidity and disease transmission while avoiding the development of drug resistance. (b) Systematic control of providing a short course chemotherapy under direct observation to at least all identified smear positive cases (which is a good source of infection) (c) Setting up a target of 85% of case detection consistent determination of prevalence and rate of transmission promptly. (d) Setting up a control policy package such as - Government commitment to a national TB programs, case detection through active case findmg, and compulsory short course chemotherapy for all new smear positive cases.

The development of effective treatment for tuberculosis has been a mile stone and one of the most significant advances during the 20th century. According to Parks and Parks

(1997) with the evolution of controlled trials, the chemotherapy of tuberculosis is now more rationally based than in the treatment of other infectious diseases.

Chemotherapy is required in every active case of TB. The objective of treatment is cure-that is elimination of both the fast and slowly multiplying bacilli from the patient's body. The effect of chemotherapy is not judged by the atomic healing of lesion, but mainly by the eliminating of bacilli from the patients sputum. Chemotherapy should be easily available, free of charge for every patient infected. It should be adequate, appropriate and applied to the entire pool of infected person in the society at large. Patient's compliance is a critically important aspect in TB control. The patient must take the correct drugs and the correct dosage for the appropriate length of time. Incomplete treatment puts the patient at risk of relapse and the development of drug resistance (WHO, 1994).

2.7 Anti-Tuberculosis Drugs

There are about twelve active drugs for tuberculosis treatment often in categories, and must satisfy the following; highly effective, free from serious adverse side effect, easy to administer, reasonably cheap, readily available. The currently used drugs may be classified into two categories, namely bactericidal and bacteriostatic, although currently given as fixed dosage, the following paragraphs will exray this drugs as loosed doses to enable us appreciate the efficacy of the individual drugs used in the treatment of tuberculosis. These drugs are capable of inhibiting the multiplication of the bacilli and lead to their destruction by immune mechanism of the host (WHO, 1994).

The drugs used are as followings;

RIFAMPICIN (RMP); this is a powerful bactericidal drug. It permeates all tissue membranes including blood-brain and placenta barriers. It is equally effective against intracellular as well as extracellular bacilli. It is the only bactericidal drug active against the dormant bacilli, which are found in the solid lesions. Rifampicin is of special value when the bacilli resist other drugs in combination of isonaizid, it can cure some cases of drug resistance. Rifampicin is used only as oral drugs. The vital daily dose (10-12mg/kg body weight) should be taken at least one hour before or two hours after meal because absorption is reduced by food. It is never used alone for the treatment of TB, but always used in combination with isonaizid or other drugs. The conventional daily dose is 450-600mg, for intermittent treatment the dose is usually 900mg. Many patients develop

nausea at the start of treatment, but this passes off with time. the toxic effect include hepatotoxicity, gastritis, influenza-like illness, purpura, thrombocytopenia and nephrotoxicity.Patients should also be told that the drug will turn the urine red, thus, can be used as test for compliance.PAS delays its absoirption,hence concurrent administration with PAS should be avoided. If Rifampicin is stopped for any reason, it should not be restarted within three weeks to avoid hypersensitivity (WHO, 1994).

ISONIAZID (INH) ranks among the most powerful drugs in the treatment of tuberculosis. It can easily penetrate the cell membrane, and is thus active against intracellular and extracellular bacilli. Its action is most effective on rapidly multiplying bacilli. It is less active against slow multipliers.INH gets widely distributed in the body including cerebrospinal fluid. Its ease of administration, freedom from toxicity and low cost makes it an ideal component for any regimen. INH should be given a single daily dose(4.5mg/kg of body weight subject in a maximum dose of 300mg) for intermittent therapy, the dose is 14-15mg/kg body weight i.e. 700mg twice a week.INH reach its peak level one or two hours after the dose. It has been found that its peak level in serum is more important than sustained inhibitory level. It is for this reason that INH should be given in a divided dose (Styblo and Chun, 1976).However; patients may experience gastro-intestinal irritation, peripheral neuropathy, blood dydcrasias, hyperglycemia and liver damage. Those patients who are slower activators experience a higher incidence of toxicity (WHO, 1994).

STREPTOMYCIN is also bactericidal; it acts entirely on rapidly multiplying bacilli. It has been shown that when bacilli multiply rapidly it comes out of the phagocytes and is mostly extracellular and is therefore susceptible to streptomycin. Streptomycin is less active against slow multipliers. It has also been shown that it has no action on persisters (drug resistance strains) It does not permeate cell wall as normal biological membrane such as meningitis or pleura. It does however cross the placenta, as it excretes almost entirely through the kidney. The dosage has to be lowered in poor renal function and in older age groups. The daily dose of streptomycin is 0.75mg to 1gram in a single injection This is of disadvantage because of the organizational problem involved in the long term treatment. It can cause side effects which includes vestibular damage and nystragmus rather than deafness. Renal damage may also occur. Streptomycin should be avoided if

possible in pregnant women, because it may cause deafness to the unborn child (WHO, 1994).

PYRAZINAMIDE Is a bactericidal and particularly active against slow multiplier intracellular bacilli which are unaffected by other drugs. It has been found to increase the sterilizing ability of rifampicin; therefore, pyrazinamide has been incorporated in the short course chemotherapy regimen. The drug is given orally and the usual dose is 30mg/kg of body weight (average of 1.5-2g).Complications includes hepatotoxicity; hyperuricaemia. Pyrazinamide achieves high level in cerebrospinal fluid and is therefore recommended in tuberculosis meningitis (WHO, 1994).

ETHAMBUTOL is bacteriostatic in nature and is used in combination with other drugs to prevent the emergence of drug resistance to other drugs. It is given orally and basically act with other bactericidal drugs (INH, RMP, and Streptomycin).Its major side effects is retro-bulber neuritis. This however, does not occur at the usual dose of 15mg/kg given in two to three doses. Ethambutol has replaced para-aminosalicylic acid (PAS) almost entirely among adults (WHO,1994).

2.8 The Directly Observed Treatment Short Course (DOTs)

DOTs is a strategy that provides the most effective treatment to TB patients, it ensures that they regularly take the medicines until they are cured and monitors their progress towards cure. DOTs use a specific combination of Anti-TB medicines, featuring the drugs (isonaizid, rifampicine, pyrazinamide and ethambutol (or streptomycin) This standardized regimen is known as short course chemotherapy. This has been known to be 100% effective in obliterating TB bacteria from the body when properly taken (WHO, 1995). Supervision is the key to successful TB treatment using DOTS approach. If the patients does not complete treatment, or occasionally forgets to take the medicines, he or she may never be cured. With the DOTS strategy, the patients swallow the medicines under the watchful eyes of the health worker, community volunteer or even a trusted family member.

The DOTS strategy also includes a rigorous evaluation and monitoring system which makes it possible to track the patient's progress. Each patients coughs out phlegm (sputum) which is then examined under the microscope and checked for TB bacteria. A system of record keeping and reporting helps health workers and TB programmers to

monitor the progress of patient's Bacteriological examination is important after two months of treatment with four drugs. If the patients is still contagious, intensive treatment is been continued for a third month. At the end of two or three months when the patients is no longer contagious, treatment with only two drugs can be continued for the rest of the cure. Checking the sputum at the end of treatment provides essential proof to a doctor and patient that cure has been achieved.

Kochi (1997) describes DOTS as having achieved an overall cure rate of nearly 80%, with a range from 70% to 95% in a wide variety of infected populations. In Kochi's study. Most of these cases were found and treated within two years as the mobilization of DOTS strategy began in earnest. Furthermore measures in adult lives already saved as well as the potential to save millions more in years immediately ahead.Kochi (1997) opined that no other new health intervention of this decade has achieved such significant results or has been of such thoroughly proven effectiveness in the field. Short-course chemotherapy has the following advantages; Rapid bacteriological conversion, lower failure rates, reduction in the frequency of the emergence of drug resistant bacilli nd patients compliance is improved and they become non infectious earlier.

The DOTS strategy joins forces with primary health care (PHC) to improve TB cure rate from 40% to 80% (WHO, 1994).By curing TB patients PHC workers eliminates the source of infection in the community and thus prevent further the spread of TB. Effective TB control through DOTS achieves the kind of results that can increase the performance of existing PHC services. The DOTS strategy requires no specialized staff in the PHC institution, rather existing health personnel or workers can be used to promote the supervision of these patients. Its strategy is based on the efficient management of resources and on supervision by a central TB unit to ensure the health workers have the correct TB drugs on hand, and also on a TB supervisor to encourage problem solving in each local setting (WHO 1994).DOTS focuses on the accountability and results in PHC and provides the tools to respond to communities need.

DOTS is administered by health workers, volunteers, or family members usually through the PHC system (WHO,1995).Sometimes TB patients visit a local clinic regularly to receive their medicine, in other cases, the supervisor will visit the patients homes or work

places to watch them take their medicines. In some various situations, where the patients is very sick or leave in a remote area, the patient may be hospitalized for treatment.

In the DOTS strategy, the basic components for organizing a national TB programme and the guideline for treating TB are exact. However, this strategy is flexible and can applied in many ways. Supervision can be accomplished by having the patients visit the clinic, hospitalizing the patients or sending a health worker visit the patients home or workplace. Inadequate drug distribution system often prevents patients from receiving the right medicines for the correct length of time, causing dangerous disruption of TB treatment. In other to prevent such difficulties, PHC services must be supported by central TB unit leadership system. The central control provides support to the local health workers in the form of training as well as evaluation of outcomes of treatment services.

CHAPTER THREE

METHODOLOGY

3.0 Study Area:

This research work was carried out in Bayelsa State, south-south, Nigeria, a relatively small state, with an estimated 2million population (National Population Commission, 2006).It has eight local Government Areas. Administrative reports shows that there are 35 DOTs centres, only 13 DOTs centres were seen to be functional and accessible during the visit, 80% of the facilities were located in the creeks, with a unit of the National tuberculosis and leprosy control centre (NTBLC) domicile at the state capital (Yenagoa) Bayelsa State has a peculiar terrain as more than 70% of the state is riverine in nature, speed boats are the common but most expensive means of transportation. However, canoe and local boats are alternatives but are less utilized because of the inconvenience, as distances that are supposedly to be covered in two hours by speed boats are at best covered in 24hours by local boats.

Although no study has shown in kilometres the distance between the state capital and each of these local government areas of the state where the DOTs centres are located, but an average of two hours was spent on water (speed boats) visiting some of the functional DOTs centres in the riverine area of the state.

The following are the eight local government areas of Bayelsa State where the research was carried out: Ogbia, Sagbama, Nembe, Brass, Southern-Ijaw, Ekeremo, Kolokoma-Opokuma, and Yenagoa.

3.1 Study Design:

This study was a cross sectional study.

3.2 Study population:

The study was open to only adults (18years and above) confirmed to have pulmonary tuberculosis receiving treatment at clinics that encourage DOTs in the accessible local government areas of the state. It also includes those who stopped attending clinics prematurely but reported to the clinic because of severe re-emerging symptoms (return after default) during the six weeks period of investigation.

Inclusion criteria: To be included in this study, patients must have undergone laboratory test, and confirmed as having tuberculosis. Patients must have already initiated TB treatment for more than two months or in the continuous phase of treatment. Patients must also be adults (18years and above).

Exclusion criteria: Patients excluded from this study includes – children (less than 18years) with TB, patients in the intensive phase (less than 2months) of treatment. DOTs centres in inaccessible (crises prone) areas of the state were excluded from the study for security reasons

3.3 Data collection method

A pre-tested questionnaire was administered with the help of 9 research assistants, using a self reported method to elicit possible factors that predict noncompliance. The questionnaire is composed of the following sections: a) Socio-demographic characteristics. (b) Knowledge of cause, symptoms and perception of the disease c).Compliance, here patients were asked about drugs taken, how taken, side effects, as well as reasons for noncompliance.

The routine state supervisors meeting that congregates all the state supervisors from all the communities and local government areas that provides DOTs was used as a medium to train staff who were willing to participate as assistants in this research work. Few hours were used each day in their three days schedule state meeting to educate them on the essence of the research and the administration of the questionnaire. Those who willingly participated rehearsed briefly on how to administer the questionnaire and on the spot corrections were made.

The questionnaire, which was the main tool used in this research work was pre-tested among TB patients in the Niger delta University teaching hospital, Okolobiri, Bayelsa State. The field test lasted for just a day and 16 patients were sampled. Each questionnaire took an average of 30 minutes to complete, although the patients in the pre-test were all educated. At the end of the exercise, questions that were not easily understood were either re-worded or removed.

3.4 Definition of Terms;

For the purpose of this research work, the following are operational definitions used in this study.

Non-compliance – missing of drugs/treatment appointment for 11days and above

Compliance – patients who did not miss any of their doses or treatment appointments, as well as patients who missed for few days (10days or less) for the purpose of this study is also referred as compliant

Heavy smokers – patients that smoke on the average more than a packet per day or cannot estimate the sticks smoked per day.

Heavy drinkers – respondents that cannot estimate the quantity of alcohol intake because of over indulgence in alcohol.

Dependent variable –Noncompliance

Independent variable – these includes sex, Age, transport fare, smoking, family size etc.

Large family size – for the purpose of this study, respondents with five children and more are categorized as having large family size

Low and high income – respondent without a job or whose monthly income is less than five thousand naira per month were categorize as low income class, while respondents with income that is more than five thousand naira per month were classified as moderate or high income class.

Intensive phase of treatment: First two months of Tuberculosis treatment.

Continuous phase of treatment: Patients accessing treatment beyond the second month of chemotherapy in a DOTs centre falls within the continuous phase of treatment.

3.5 Ethical considerations.

It is an established principle to obtain consent from all participants in health researches (Smith and Morrow, 1993). Although the nature of the research does not involve invasive procedure, however, confidentiality of all information and willingness to participate was assured to all patients and was indicated in clear terms on the questionnaire. Approval was also gained from the Bayelsa State Ethics review board of the ministry of health.

3.6 Sample size determination

Using the formula $N = Z\alpha^2 \times pq/d^2$. (Leslie Kish 1965)
Where n = sample size
α^2 = level of significance (1.96)
p= prevalence of TB (27%)
q= 1-p
d= precision (0.05)
P = 0.27 (27%). (Erhabor etal, May 2000)
Substituting;
$N = z\alpha^2 \times pq/d^2 = (1.96)^2 \times 0.27(1-0.27)/0.05^2 = 320$

3.7 Sampling techniques

Multi-stage sampling method was used to obtain the required study participants from all the functional DOTs centres across the local Government Areas (LGA) of the State. All functional DOTs centres were employed in the study except those that did not meet the inclusion criteria (crises prone). A proportional probability sampling (PPS) was utilized to determine the expected number of respondents needed in each health facilities. TB administrative records at the NTBLC unit were used to assess the actual proportion (n_1) of patients eligible for the study in each DOTs centre. The actual value was divided with the total sample size (N) as the denominator to obtain the expected proportion (n_2) required in each health facility,

Equation showing how sample in each facility was determined.

Expected proportion (n_2) = Actual proportion (n_1))/ N x 100.

Finally a cluster sampling technique was used to recruit participants from each centre. The cluster size varied based on the size of the underlying population.

Questionnaire was administered to patients eligible to participate in the research to elicit reasons of non compliance. Each patient voluntarily filled the questionnaire with the help of a research assistant.

The following were accessible communities with functional DOT centres visited during the six weeks of this study and the number of patients that participated appropriately in the research work, in the eight local government areas of Bayelsa State.

Table 3.1; Distribution of respondents and their communities in the 8 LGA of Bayelsa State that participated in the research

Names of L.G.A	Names of community	Total pop. of patients	Expected No. of participants
Ogbia	Kolo(creek) town	58	18
Sagbama	Sagbama town	54	17
Kolokoma-Opokuma	Sabagreia	51	16
Nembe	Nembe	86	27
Brass	Khongho-Akassa	51	16
Ekeremo	Ofoni(tarakiri)	61	19
Southern-Ijaw	Amassoma	51	16
Southern-Ijaw	Tamogbene	51	16
Ekeremo	Ekeremo	61	19
Ogbia	Ogbia- town	51	16
Yenagoa	Ovum (F.M.C)	160	50
Yenagoa	Igbogene (N.T.B.L.C)	288	90
	Total	1023	320

3.8 Data management/Analysis

All questionnaire for data processing was entered (Data entry) into the SPSS version 15 windows for editing, coding of open ended questions, error identification and correction (Data cleaning). Frequency tables were used to estimate the proportion of respondents in each category (e.g. sex, occupation, tribe etc) that participated in the study. Chi-square was used to establish association between independent and dependent variables at 5%. Multivariate logistic regression was performed to obtain the adjusted estimate of Socio-demographic, and behavioural factors affecting compliance. Knowledge was also assessed using 14 questions on signs/symptoms of TB, and TB treatment. Respondents that scored <10 were categorized as having poor knowledge, while those that scored ≥10 were classified as having good knowledge. A mark is attached to each correct answer (yes), and multiple choice answers also have 1mark attached to the correct answer. (Table. 3.2)

With respect to smoking, respondents who could not estimate the quantity of cigarettes or marijuana, those who take on the average of more than one packet of cigarettes were categorized as heavy smokers. Whereas those who on the average consume more than a glass of dry gin or probably could not estimate the quantity

because of the frequency of alcohol intake per day were categorize as heavy drinkers (table 4.2)

Fishing and farming is a prominent occupation in Bayelsa State, especially in the rural areas because of the peculiar riverine terrain of the state, more than a half of the respondents in this study stay in the rural area and are likely fishermen/farmers. Hence, interest in this variable (occupation) was centred on this category of respondents, as a result farming/fishing was not classified as self employed but was analyzed independently as a variable to establish if an association exist with Noncompliance. (Table 4.5)

Table 3.2; Total number of questions (14) used in assessing knowledge of respondents to TB

Question	Response(*)
Which of the followings are signs and symptoms of TB:	
Loss of weight	*
persistent cough	*
night sweating	*
coughing blood	*
painful cough	*
chest pain	*
shortness of breath	*
loss of appetite	*
Do you know that a person who does not complete his/her treatment can develop drug resistant TB?	*
Is TB curable?	*
Drug resistant TB is more difficult and takes longer time to treat	*
How do people get Tb? *Spread through droplet from suffer*	*
How can TB be cured? *Orthodox medicine*	*
What is the duration for TB treatment? *8 months*	*

*proportion of respondents with correct answers to each question

CHAPTER FOUR

RESULTS

4.0 Socio-demographic characteristics of the respondents.

Table 4.1 shows that the mean age of the respondents was 38.5 ± 12.2 years and 64.7% were males. The age group of above 35 years had the highest number of respondents (63.1%) and the dominant ethnic group was Ijaw (49.7%). About 4% of the respondents were separated/divorced and majority (75.6%) practiced Christian religion. Very few (6.6%) had tertiary education and less than half (42.2%) had primary education. Over half (55.6%) of the respondents were married and over a third (35.0%) were unemployed.

Table 4.1: Frequency distribution of Socio-demographic characteristics of respondents

Socio-demographic characteristic	Frequency (N =320)	Percentage (100%)
Sex		
Male	207	64.7
Female	113	35.3
Age (in years)		
≤34	118	36.9
≥35	202	63.1
Marital status		
Single	130	40.6
Married	78	55.6
Separate/Divorced	12	3.8
Religion		
Christianity	242	75.6
Traditional	78	24.4
Level of Education		
None	21	22.2
Primary	71	42.2
Secondary	135	29.0
Tertiary	93	6.6
Tribe		
Ijaw	159	49.7
Others	161	50.3
Occupation		
Employed	94	29.4
Unemployed	112	35.0
Self-employed	54	16.9
Farming and fishing	60	18.8
Family size (No. of children)		
<5	196	61.2
≥5	124	38.8
Income		
Earn income	107	33.4
No income	213	66.6

4.1 Socio-behavioural characteristics of respondents

Table 4.2 shows that the major means of transportation reported was Motorcycle - Okada (56.2%) and 19.7% of the respondent reported that transport fare was high. About a quarter of the respondents (22.8%) smoked cigarette, out of which 9% were classified as heavy smokers (respondents that smoked more than one packet or more per day). Only 5% reported they smoked Marijuana. On alcohol consumption, 31.2% reported drinking out of which 12.2% were heavy drinkers (drink more than a cup of dry Jin locally called ogogoro per day).

Table 4.2: Frequency distribution of Socio-behavioural characteristics of respondents

Characteristics	Frequency (320)	Percentage (100%)
Smoke cigarette		
Yes	73	22.8
No	247	77.2
Type of smoking Habit		
None smokers	247	77.2
Light smokers	44	13.8
Heavy smokers	29	9.0
Drink alcohol		
Yes	100	31.2
No	220	68.8
Smoke Marijuana		
Yes	16	5.0
No	304	95.0
Alcohol quantity consumed		
None drinkers	220	68.8
Light drinker	61	19.1
Heavy drinker	39	12.1
Use of root, herbs or other chemicals		
Yes	205	64.1
No	115	35.9
Sharing utensils at home		
Yes	164	51.2
No	156	48.8
Drink from the same cup with others		
Yes	128	40.0
No	192	60.0
Aware of treatment centre in my LGA		
Yes	211	65.9
No	109	34.1
Type of Residence		
Share facilities with neighbours	116	36.3
Don't share facilities with neighbours	191	59.7
No place of residence(parks, bus etc)	13	4.0
Means of Transportation		
Local boat	15	4.7
Speed boat	65	20.3
Bus/Car	60	18.8
Okada	180	56.2
Transport fare		
Moderate Transport fare (<2000)	257	80.3
High Transport fare (≥2000)	63	19.7
Received counselling before starting drugs		
Yes	286	89.4
No	34	10.6

4.2 Prevalence of non-compliance among respondents to TB treatment

The prevalence of non-compliance to TB drugs was 7.5% (Fig 4.1), however Over half (58.8%) of the respondents indicated that they forget at times to take their drugs (i·e· those who fail to take their drugs ≤10 were still seen as complied, except for respondents who failed to take their drugs ≥11 days were categorize as noncompliant cases)·

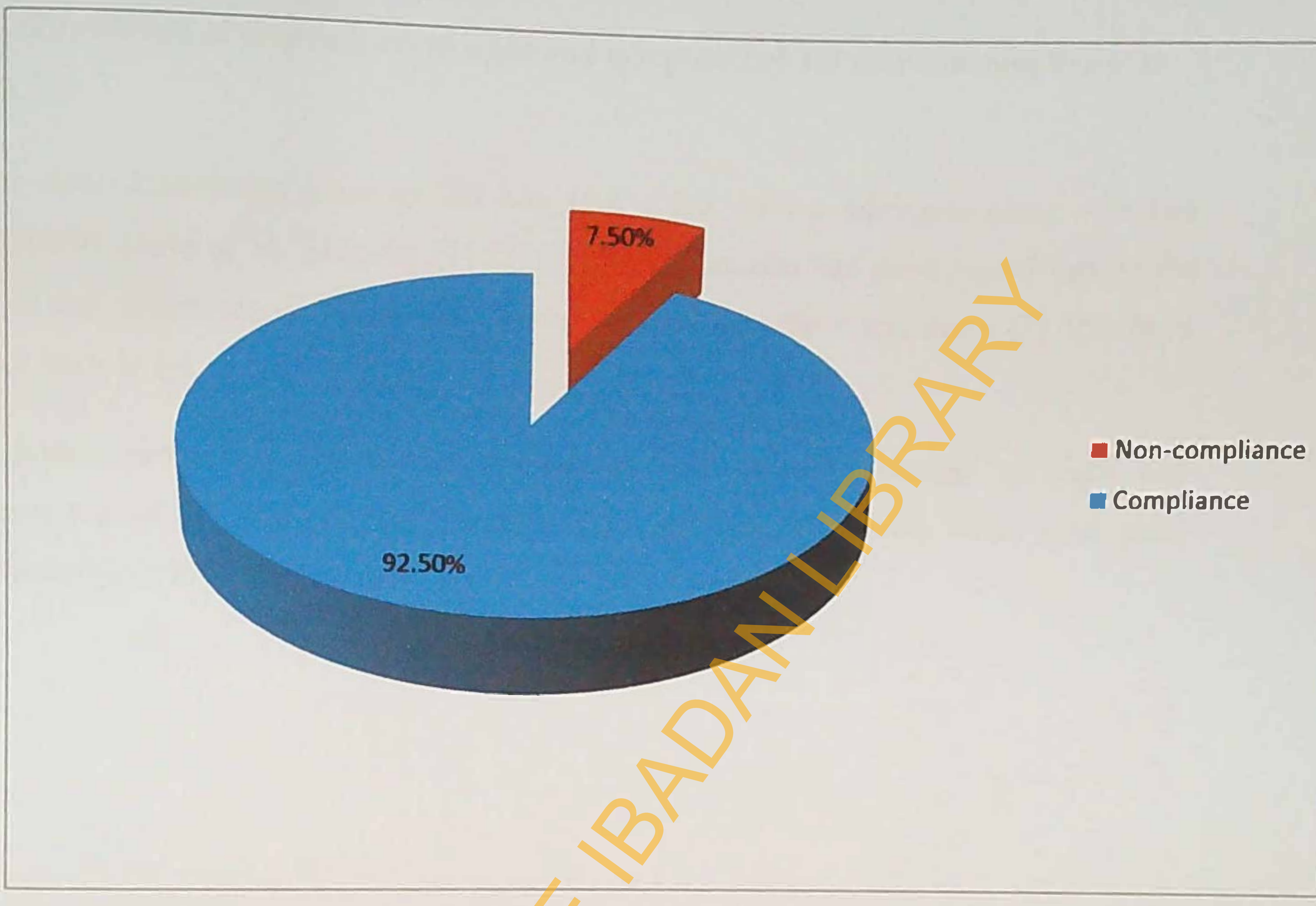

Fig 4.1: Prevalence of non-compliance to TB drugs

4.3 Knowledge of respondents to signs and symptoms of TB and noncompliance to TB.

The mean knowledge score on TB was 10.8 ± 2.9, with a minimum score of 4 and maximum score of 14. Majority (71.9%) of the respondents had good knowledge on the signs and symptoms of TB, while a lower proportion of the respondents (28.1%) have poor knowledge.

A higher proportion (13.3%) of respondents with poor Knowledge of signs and symptoms of TB did not comply with treatment compared with those with good knowledge (5.2%), ($p<0.05$).

Table 4.3 Cross tabulation of knowledge of signs and symptoms of TB and Non-compliance

knowledge of signs and symptoms of TB	Complied with TB drugs n (%)	Not complied with TB drugs n (%)	Total N (100%)	X^2	p-value
Good knowledge	218(94.8)	12(5.2)	230(100)	6.14	0.031
Poor knowledge	78(86.7)	12(13.3)	90(100)		

4.4 Percieved reasons for noncompliance by respondents

Reasons for non-compliance given by respondents included; Perceived severity of side effect of the drugs (52.7%), no money for transportation (69.1%), no reminder to take drugs (71.3%), had a traditional medicine that was better (37.5) and others (Table 4·4).

Table 4.4: Perceived reasons for non-compliance to TB drugs

Reasons for Non-Compliance	frequency*	percentage
No reminder to take drugs	228	71.3
No money for transport	221	69.1
Symptoms has reduced or stopped	206	64.4
Distance to the clinic is too far	204	62.8
Severity of side effect of drugs	168	52.7
Do not have a place to stay at Yenagoa	160	50.0
Everyone has neglected me	157	49.1
Lack of drugs in the facility	147	45.9
Do not like treatment from health workers	132	41.3
Got a traditional medicine that is better	120	37.5

*multiple response. N = 320

4.5 Association between Non-compliance and Socio-Demographic variables of respondents

A significantly (p=0.001) higher proportion (11.1%) of males did not comply to treatment compared with females (0.9%). More than half (63.1%) of the respondents were ≥35years, of which 11.4% did not comply to TB treatment compared with 8% of respondents that were aged ≤34years (p=0.001). Other variables associated with non-compliance included religion and occupation (Table 4.5).

Table 4.5: Cross Tabulation of Non-compliance and socio-demographic variables of respondents

Socio-demographic characteristic	Complied with TB drugs n (%)	Not Complied with TB drugs n (%)	Total (N =320) N (%)	X^2	p-value
Sex					
Male	184 (88.9)	23 (11.1)	207 (100)	11.0	0.001
Female	112 (99.1)	1 (0.9)	113 (100)		
Age (in years)					
≤34	117 (99.2)	1 (0.8)	118 (100)	11.9	0.001
≥35	179 (88.6)	23 (11.4)	202 (100)		
Marital status					
Single	136 (95.8)	6 (4.2)	142 (100)	4.28	0.117
Married	160 (89.9)	18 (10.1)	178 (100)		
Religion					
Christianity	229 (94.6)	13 (5.4)	242 (100)	6.48	0.011
Traditional	67 (85.9)	11 (14.1)	78 (100)		
Level of Education					
≤ Primary	88 (95.6)	4 (4.3)	92 (100)	5.7	0.057
Secondary	127 (94.1)	8 (5.9)	135 (100)		
Tertiary	81 (87.1)	12 (12.9)	93 (100)		
Tribe					
Ijaw	147(92.5)	12 (7.5)	159 (100)	0.001	0.975
Others	149(192.5)	12 (7.5)	161 (100)		
Occupation					
Govt employed	87 (92.6)	7 (7.4)	94 (100)	30.5	0.003
Not govt employed	209 (92.5)	17(7.5)	226 (100)		
Family size					
<5	179 (91.3)	17 (8.7)	196 (100)	1.00	0.32
≥5	117 (94.4)	7 (5.6)	124 (100)		
Income					
Earn Salaries	100 (93.5)	7 (6.5)	107 (100)	0.21	0.65
Do not earn Salaries	196 (92.0)	17 (8.0)	213 (100)		

4.6 Association between Non-compliance and Socio-Behavioural characteristics of respondents

Table 4.6 shows the variation of non-compliance to TB drugs across behavioural characteristic of the respondents. Variables found to be significantly associated with non-compliance were; type of smoking habit ($p=0.001$), alcohol consumption ($p<0.01$), drinking from the same cup with others in the community ($p=0.046$), means of transportation and transport fare ($p<0.01$). In relation to type of smoking habits, more of the respondents who were classified as heavy smokers (24.1%) did not comply with treatment compared to respondents classified as light smokers. About 16% of respondents that consume alcohol did not comply to treatment ($p<0.05$), while a greater proportion of those that spend higher transport (20.6%) did not comply to treatment regimen compared to those who spend moderate fare on transportation (4.3%).

Table 4.6: Cross Tabulation of Non-compliance and socio-behavioural characteristics of the respondents

Characteristics of the respondents	Complied with TB drugs n (%)	Not Complied with TB drugs n (%)	Total (N =320) n (%)	X^2	p-value
Smoke cigarette					
Yes	66 (90.4)	7 (9.6)	73 (100)	0.59	0.44
No	230 (93.1)	17 (6.9)	247 (100)		
Type of smoking Habit					
None smokers	230 (93.1)	17 (6.9)	247 (100)		
Light smokers	44 (66.7)	0 (0.0)	44 (100)	11.8	0.001
Heavy smokers	22 (75.9)	7 (24.1)	29 (100)		
Drink alcohol					
Yes	84 (84.0)	16 (16.0)	100 (100)	15.15	0.00
No	212 (96.4)	8 (3.6)	220 (100)		
Alcohol quantity consumed					
None drinkers	212 (96.4)	8 (19.7)	220 (100)		
Light drinkers	49 (80.3)	12 (19.7)	61 (100)	1.57	0.21
Heavy drinkers	35 (89.7)	4 (10.3)	39 (100)		
Use of root, herbs or other chemicals					
Yes	189 (92.2)	16 (7.8)	205 (100)	0.076	0.78
No	107 (93.0)	8 (7.0)	115 (100)		
Type of Residence					
Share common facilities with neighbours	117 (95.9)	5 (4.1)	122 (100)	0.61	0.74
Do not Share common facilities with neighbours	172 (90.1)	19 (9.9)	191 (100)		
No place of residence(sleep in parks, bus)	7 (100)	0 (0.0)	7 (100)		
Means of Transportation to DOT Facility					
Water	73 (91.3)	7 (8.8)	80 (100)	8.0	0.005
Land	223 (92.9)	17 (7.1)	60 (100)		
Transport fare					
<2000 (Moderate Transport fare)	245 (95.7)	11 (4.3)	256 (100)	19.4	<0.01
≥2000 (High Transport fare)	51 (79.4)	13 (20.6)	63 (100)		

4.7 Association between Noncompliance and reported reasons given by respondents

Table 4.7 shows the comparison of non-compliance to TB drugs with reasons for non-compliance mentioned by respondents. More of the respondents who complained of severe side effects of drugs (13.0%) did not comply with TB treatment compared with respondents who did not see side effect as a problem (1.3%) ($p<0.05$).

Table 4.7: Cross Tabulation of Noncompliance and perceived reasons by respondents

Reason for non-compliance	Complied with TB drugs n (%)	Not Complied with TB drugs n (%)	Total (N =320) n (%)	X^2	p-value
Severity of side effect of the drugs					
Yes	147 (87.0)	22 (13.0)	169 (100)	15.7	0.00
No	149 (98.7)	2 (1.3)	151 (100)		
Lack of drug at the facility					
Yes	137 (93.2)	10 (6.8)	147 (100)	0.19	0.66
No	159 (91.9)	14 (8.1)	173 (100)		
No money for transportation	199 (90.0)	22 (10.0)	221 (100)	6.21	0.013
Yes	97 (98.0)	2 (2.0)	99 (100)		
No					
No reminder to take drugs					
Yes	210 (92.1)	18 (7.9)	228 (100)	0.18	0.67
No	86 (93.5)	6 (6.5)	6 (100)		
Do not like treatment received from health workers	120 (90.9)	12 (9.1)	132 (100)	0.82	0.37
Yes	176 (93.6)	12 (6.4)	188 (100)		
No					
Got a traditional medicine that was better					
Yes	116 (96.7)	4 (3.3)	120 (100)	4.81	0.028
No	180 (90.0)	20 (10.0)	200 (100)		
Do not have a place to stay at Yenagoa					
Yes	151 (94.4)	9 (5.6)	160 (100)	1.62	0.20
No	145 (90.6)	15 (9.4)	160 (100)		
Symptoms is reduced or stopped					
Yes	188 (91.3)	18 (8.7)	206 (100)	1.28	0.26
No	108 (94.7)	6 (5.3)	114 (100)		
Distance from the house-too far to the clinic					
Yes	191 (95.0)	10.0 (5.0)	201 (100)	4.97	0.026
No	105 (88.20	14 (11.8)	119 (100)		
Everyone has neglected me					
Yes	146 (93.0)	11 (7.0)	157 (100)	0.11	0.74
No	150 (92.0)	13 (8.0)	163 (100)		

4.8 Logistic regression of Noncompliance to TB treatment and selected variables.

Table 4.8 shows the multiple logistic regression results of non-compliance to TB on selected variables. Males were about 12 times as likely not to comply with TB drug treatment compared to females (OR = 12.2, 95%CI=1.50-98.6). Respondents aged 35years and above were about 10 times as likely not to comply compared to their counterparts, who were below 35 years (OR=9.67, 95%CI=1.15-81.61). As regards knowledge, respondents with good knowledge about signs and symptoms of TB were 75% less likely not to comply to treatment than those with poor knowledge (OR= 0.25, 95%CI=0.10-0.63).

Table 4.8: Logistic regression on noncompliance with socio-demographic and behavioural variables

Variable	OR	CI	p-value
Sex			
Female (Reference)	1		
Male	12.16	1.50-98.6	0.019
Age group			
≤34 (R)	1		
≥35	9.67	1.15 – 81.61	0.037
Religion			
Christianity (R)	1		
Traditional	2.29	0.90 – 5.84	0.083
Occupation			
Govt employed (R)	1		
Not govtemployed	1.36	0.415 – 4.43	0.615
Drink alcohol			
No (R)	1		
Yes	2.02	0.64 – 6.34	0.23
Knowledge of signs/symptom Of TB			
Poor knowledge (R)	1		
Good knowledge	0.25	0.10-0.63	0.004

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATION

5.0 Discussion

The benefits of curing tuberculosis patient go beyond the individual, since it is a significant step towards breaking the chain of transmission and consequently controlling this epidemic disease. Hence, poor treatment outcome associated with non-compliance and outbreaks of multi-drugs resistance is a cause for concern (Marcelo et al, 2002)

Non-compliance is a behavioural problem, the determinants of which vary from one context to another, and has always been a major public health challenge in TB control (Paul, 2009).

In this study the prevalence of non-compliance with anti TB regimen under directly observed therapy was low (7.5%) compared with similar studies in Alexandria conducted by Ashry Gad (34.9%).

In this study, Sex, age and occupation, alcohol consumption, smoking habits, knowledge of signs and symptoms of TB, transport fare and means of transportation to health facilities for treatment were factors associated with noncompliance.

Specifically, males were 12times as likely not to comply with treatment than females (OR= 12.6, 95%CI= 1.50-98.6). This means that males are not so likely to follow the treatment regimen and hence face a higher risk of non-compliance to treatment. This is in line with studies carried out in eastern Ghana (Samuel et al, 2010), and could be as a result of the economic activities associated with the male gender (head of the family, thereby making sure of material provision for his family) that may have clouded his day to day schedule, thereby leading to limited time/forgetfulness with respect to treatment follow-up.

With regards to age, respondents in the age bracket of 35years and above were 9times likely not to comply with TB treatment than those less than 35years of age (OR= 9.67, 95%CI=1.15-81.61). This implies that the rate of noncompliance increases with age, as older people probably find it difficult to follow their treatment regimen. Related studies by Marcelo et al (2002) also confirm this result.

According to a study in Zambia, patient behavior to treatment follow-up is largely influenced by the knowledge of the patients about their disease and treatment (Bagoes et al, 2009), A comparable study done in Turkey also showed that patients who had poor knowledge of treatment had a higher noncompliance rate (Halim et al,1998), this seem to confirm results of the current study which shows that 75% of respondents with good knowledge of signs and symptoms were less likely not to comply to treatment than those with poor knowledge (OR=0.25 ,95% CI=0.10-0.63).

Findings from this study also revealed that respondents that were heavy smokers (24.1%) did not comply to treatment, and alcohol consumption was a predictor to non-compliance, as respondents that consume alcohol were 2times likely not to comply to treatment than non-alcohol consumers (OR= 2.02, 95%CI= 0.64-6.34). Although smoking has not been found to be significant in most studies, this could be as a result of other researcher's inability to categorize the habits as either heavy smokers or light smokers depending on the degree or quantity of cigarettes, marijuana or other substances that are of interest to the researcher. This became necessary to mention as the current study found alcohol consumers and smoking habit (heavy smokers) to be associated to non-compliant to anti-TB regimen. This is probably because excessive alcohol consumption and too much smoking may have affected their health seeking behaviour. This too is in line with studies conducted by Marcelo et al, 2002.

With regards to transport fare, the study found that those who spend more transportation to the health facilities for treatment, however, a higher proportion (20.6%) of those who paid higher transport fare to treatment facility were noncompliant compare to respondents that spend lower transport fare (4.3%, $p<0.01$). Hence, too much money on transportation and a longer distance to health facilities could be a barrier and possible predictors of noncompliance to TB treatment.

As for occupation, 29.4 % of the total respondents were Government employee, while 70.6% were non Government employee. A higher proportion of the non-Government employee (7.5%) did not comply with treatment. This could be as a result of the fact that occupation has direct bearing on the financial status of a patient and determines his/her ability to cover transport expenses and other logistics throughout the treatment period. (Marcelo, et al. 2002).

Reasons for noncompliance are multifactorial, (WHO, 2009.) this means that more than one factor can predict patients noncompliance to ant-TB treatment. Thesame was true in the present study as multiple reasons were given by patients interviewed, as likely reasons for noncompliance in Bayelsa State in addition to selected socio demographic/behavioural characteristics.

Other reported reasons given by respondents for non-compliance includes, severity of side effects, lack of drugs in the facility, no money for transportation, no reminder to take drugs, don't like treatment received from health workers, got a traditional medicine in addition to orthodox medicine, I don't have a place to stay when coming to the health facility at the state capital (probably because of lack of knowledge of DOT centre in their respective local Government Area or avoidance of stigma in their own communities), reduced symptoms ,long distance to access health care, complete neglect from every one Among these reasons given, severity of side effects, no money for transport, got a traditional medicine and long distance were found significantly associated with noncompliance.

Erhabor et al. reported that a long distance from the homes of patients to the chest clinic exposes a TB patient to a higher risk of noncompliance to treatment, and this study also attests to that as 5% of the total respondents that mentioned long distance as a barrier, did not comply to treatment ($p=0.026$). This most likely could be as a result of the fact that some of the TB patients were far away from the chest clinics, some stay in villages that can even hardly access a DOT center. Hence, availability of means of transportation may pose a challenge as in some villages in Bayelsa State, the only available boat leaves very early in the morning to avoid high tide at the sea and those that are left behind will have to wait to the next day.

A higher proportion (13.0%) of respondents gave severe side effect as the reason for their noncompliance to treatment ($p<0.01$). This is in line with studies carried out in eastern region of Ghana by Samuel et al. With respect to money for transportation, more of respondents who complained of lack of transport money to the health facility did not comply with treatment compare to those who saw it as not a problem. The reason is not farfetched as finance is a barrier to keeping treatment appointment, this however is consistent with study carried out by Bagoes et al, 2009.

5.1 Conclusions

Factors that facilitated non-compliance were Sex (males), Age (≥35 years), and Occupation (Non Government employee), Alcohol consumption, Smoking habits (heavy smokers), Poor knowledge of signs and symptoms of TB, Long distance to treatment centres and High transport fare. These factors should be borne in mind by policy makers, when making policies. This will help to curb the problem of non-compliance to TB treatment, which will help to stop the spread of TB as a public health disease.

5.2 Recommendations

To further reduce noncompliance rate among TB patients in Bayelsa State the following are hereby recommended

1. More information about TB signs and symptoms, as well as expected side effect of drugs during treatment period must be given to patients at the time diagnosis through health education programme.

2. Information, education and communication campaigns on TB should be carried to schools, churches, mosques and at public forum in order to reduce the myths, misconceptions about TB, this will help reduce stigmatization of TB patients in the communities, thereby making patients receive treatment in their villages if facilities are available rather than going to distant places where they are not known by people around for treatment because of fear of stigmatization.

3 .DOTs strategies can also be strengthened by giving patients especially males, the opportunity to choose their treatment supporter from the communities where they live, for constant reminder to take drugs and/or keep to treatment appointments.

4. Functional and adequately equipped laboratories should be built in all treatment centres of the state to avoid transporting samples to the state capital for laboratory confirmation and unnecessary delays of results.

5. Free transport fare should be made available by Government for TB patients in the state, especially for the elderly and patient in remote areas without treatment centres for easy access to treatment facilities

6. Patients should be referred back where necessary to health facility in their Local Government Areas, or catchment area that encourage DOT to avoid too much expenses on transport fare to access treatment

7. DOTS centres should be further decentralized in Bayelsa State to increase accessibility to health care.

APPENDIX 1

DEFINITIONS OF TERMS

DOTS: Direct observed therapy short course.

NEW CASE: A patient who has never had treatment for TB, or who has taken anti-TB drugs for less than 4 weeks.

NONCOMPLIANCE: Define as follows:1) missing ≥11 consecutive days of DOT; 2) prolonging of treatment ≥30 days due to sporadic missed doses. William J. Burman (1994).This definition remains the standard for this research work.

RELAPSE: A TB patient who previously received treatment and was declared cured or completed a full course of treatment, and has once again developed sputum smear positive TB.

RETURN AFTER DEFAULT: A TB patient who completed at least four weeks of treatment and returned smear positive after at least 8 weeks of treatment interruption.

CURE: Patients diagnosed as smear positive before treatment and became smear negative as shown by laboratory diagnosis at the end of 7 months after complete TB treatment.

TREATMENT FAILURE: A smear positive case that remained, or became smear positive again 5 months or later, after commencement of treatment.

MDR-TB (Multi drug resistance TB): This term is used to describe strains of TB that are resistance to at least two main first line TB drugs (Isonaizide and Refampicine).WHO.

XDR-TB (Extensive drug resistance TB): This is also a term used to describe a type of multi drug resistant TB, that are resistant to 3 or more of the six class of the second line of an- TB drugs.

RETREATMENT: Prescription of drugs for patients already treated for over 30 days. Who required different therapy due to relapse, return after default, or due to failure.(NTBLC manual)

CONCOMITANT CONDITIONS: include diabetes, immunosuppressive disease, mal-absorption syndrome, walking disabilities, HIV/AIDS, chronic obstructive pulmonary disease. The concomitant diseases/conditions that might influence treatment outcome were listed during the interview but diabetes mellitus and walking disability were the only conditions found by cross checking the medical records. Other medical conditions unrelated to TB, such as fracture and heart disease, were categorized as "unrelated conditions.

APPENDIX 2

QUESTIONNAIRE, TO IDENTIFY POSSIBLE FACTORS THAT PREDISPOSE PATIENTS TO NON-COMPLIANCE WITH ANTI-TUBERCULOSIS REGIMEN IN BAYELSA STATE.

Dear Respondent,

This questionnaire was designed to identify the various factors that are likely to make a patient not to complete his/her treatment as prescribed by the doctor. It is divided into three sections; A) Socio-demographic data, B) knowledge of signs/symptoms, cause and perception of TB, C) Compliance.

Please ensure that the instructions therein are followed, and the questions answered correctly as honest as possible. Caregivers must also be as objective as possible. Please be assured that the information you give will only be used for research purpose, and will not expose you to any harm whatsoever. To ensure confidentiality, your name will not be written on this questionnaire or on any of our records, and any other identifiers, except the name of the community you are resident to enable us assess more accurately the distance between your community of residence and the nearest health center that encourage TB treatment. Be rest assured that the information gained will be used to plan better interventions to tackle factors that can make TB patients not to complete their treatment appropriately.

Moreover, this study is entirely voluntary, you have no risk or any form of disadvantage if you do not want to participate.

Thank you for your anticipated cooperation.

Name of research assistant/interviewer: .....

Signature: .....

NB: Please indicate the correct option by writing the number you choo. sein the box provided. Except there is need to write out clearly your option(s)

SECTION A: Socio-demographic data

1). Age of respondent .....

2) Sex? (1). Male (2). Female

3) Religion? (1). Christianity (2). Islam (3). Traditionalist

(4). others (Specify).....

4). Tribe? (1). Ijaw (2). Nembe (3). Akassa (4). Epie (5). Ogbia

(6). Others (Specify).....

5). Marital status? (Please indicate the correct number in the box)

(1). Single

(2) Married

(3) Separated

(4) Divorced

6). Occupation?

(1). Civil service (2). Student (3). Businessman/woman (4). Unemployed

(5). Farming/fishing (6). Professional e.g Engineer, doctor

(6). others (specify) .....

7). Highest level of Education attained?

(1). Primary (2). Secondary (3). Tertiary (4). None

8). Residence?

(1). I live in a yard, and share common facilities like toilet, kitchen with my neighbours.

(2). I live in a rented apartment but do not share common facilities with my neighbours

(3). I do not have a steady place of residence, but sleep with friends and relatives

(4). I sleep on the street (e.g. under bridge, waiting shades, uncompleted buildings, market shops)

(5). I sleep in a bus/ motor parks

(6). Other.....

9). Number of household members (if applicable).....

10). How long does it take you to get to the health facility for your drugs?

(1). Less than 30mins (2). About one hour (3). More than one hour

11). How much do you spend on transportation fare to and fro, each time you go for treatment?

Specify .....

12). what means of transportation do you use? (1).local boat (2) speed boat (3) canoe (4) car/bus

(5)Okada ☐

13).What approximately is your financial income per month?

(1) Less than #500 (2) #1,000 (3) #2,000 (4)# 3,000 (5) # above #5,000 (6) I don't earn any income per month ☐

14) What is your community of residence? .....

15).Are you aware that there is a TB centre that can take care of you in your L G A? (1).yes (2). No ☐

SUB-SECTION A: BEHAVIOURAL/PERSONALITY TRAITS

16).Do you smoke cigarettes? (1). Yes (2). No ☐

17) if yes, how many sticks do you take per day?

(1) I stick (2) more than 1 stick, but less than a packet (3) 1 packet (4) more than 1 packet (5) can't estimate ☐

18).Do you take alcohol? (1). yes (2) No ☐

19). If yes, how would you quantify your intake?

(1) 1 shot (2).1 cup (3) 1 bottle (4) more than 1 bottle (5) can't estimate ☐

20) Do you take snuff? (1). yes (2) No ☐

21) Do you take marijuana (IGBO)? (1). yes (2) No ☐

22) Do you drink from the same cup with others in the village (community feasting/meetings)?

(1). yes (2) No ☐

23) Do you use the same cup/plates at home with others, or you have special cup/plates?

(1). yes (2) No ☐

24) Do you take roots, herbs or other chemicals for any reason?

(1). yes (2) No ☐

SECTION B Knowledge of signs/symptoms and perception of Tuberculosis (TB)

25).What signs and symptoms do you know about TB? (Please thick as many options as possible)

1. Lose of weight [ ] 2. Persistent cough [ ] 3. Night sweating [ ]

4. Coughing blood [ ] 5. Painful cough [ ] 6. Chest pain [ ]

7. Shortness of breath [ ] 8. Loss of appetite [ ]

9. Other.....

26).How do people get TB?

(1).Spread by witchcraft ☐

(2).Sexual intercourse

(3).Spread through droplets from sufferers

(4).I don't know

(5). Other means (specify).....

27). Is Tuberculosis curable?

(1). Yes (2). No ☐

28) If yes, how can TB be cured? (1) Traditional medicine (2) orthodox medicine (3) spiritual healing

(4) Others (specify)..... ☐

29) What is the duration for TB treatment? (1) 2 months (2) 5months (3) 6 months (4) 8 months ☐

30). what do you think about the duration of TB treatment?

(1).Too long (2).long (3) short ☐

31).Do you know that a person who does not complete his/her treatment can redevelop drug resistance TB?

(1). Yes (2). No ☐

32). do you know that drug resistance TB is more difficult, and takes longer time to treat?

(1). Yes (2). No ☐

SECTION C: Compliance

33). How many drugs were given to you during your last visit to the health facility?

.....

34). How were you instructed to take the drugs in a month?

.....

.....

35). How many have you taken? .....

36). How many do you have left? .....

37). Do you take the drugs each time in the presence of your caregiver? (Only for patients)

(1). Yes (2). No ☐

38). Do you forget at times/ or stop at any time to take your drugs?

(1). Yes (2). No ☐

39) if yes, for how long? (1) Less than 5 days (2) 6- 10 days (3) 11-15 days (4) 16-20 days

(5) More than 20 days (6) Never missed ☐

40). If yes, what were your reasons?/if no what likely reasons do you think can make you not to complete your treatment? (Please thick as many options as possible)

(1). Side effect of drugs too severe [ ]

(2). Lack of drugs at the facility [ ]

(3). No money for transportation [ ]

(4). No reminder to take drugs [ ]

(5). I don't like the treatment I receive from the health workers [ ]

(6). I got a traditional medicine that is better [ ]

(7). If I come from my LGA, I don't have a place to stay in Yenagoa [ ]

(8). the symptoms have reduced or stopped [ ]

(9). the distance from my house to the clinic is too far [ ]

(10). everyone has neglected me [ ]

41). Do you know the consequences of not completing your treatment?

(1). Yes (2).No ☐

42). did you receive any form of counseling before you started taking the drugs?

(1). Yes (2). No ☐

43) Do you have any other illness that can make you not to complete your treatment? (E.g diabetes, HIV/AIDS, walking disabilities etc)

(1). Yes (2). No ☐

REMARKS;

REFERENCES

Adekunle, A., Adeyeri, C. and Aderele, W.I. 1978. Socio-economic perspective of tuberculosis: implication for organizing services. *Nigeria Medical Journal* 8.2: 92-95

Amor, YB., Nemsa, B., Singh A., Sankin A. and Schluger, N. 2008. Under report threat of multidrugresistance tuberculosis In Africa. *International journal of epidemiology*. 38.4:1026-1032.

Anaja, K.S., Seetha, M.A., Singh, H. and Leela, V. 1980. Influence of initial motivation on treatment of tuberculosis patients. *Indian Journal of Tuberculosis*.27: 123 – 129.

Backer, M. and Maiman, L. A. 2005. Socio-behavioral determinants of compliance with health and medical care recommendations. *Journal of medical association Thailand*. 13:10 – 24.

Bagoes,W., Michelle,G., Maartye, D.and Marieke, J. 2009.Factors that influence treatment adherence of tuberculosis patients living in Java,Indonesia. *American journal of public health*. 116,3:231-238.

Bandura,A. 1977. Social Learning Theory. *British medical journal New Jersey*. 11983.287:101-105.

Barnhoom, F. and Adriaanse, H. 1992. Factors responsible for non-compliance among tuberculosis patients in Wardha District, *Indiaian social-science medical journal*. 34.3: 291 – 306.

Concato, J.and Rom, W.N. 1981. Endemic tuberculosis among homeless menial workers in New York. *British Medical Journal*. 282: 1305.

Crofton, J. and Miller, F. 1992. Clinical Tuberculosis and related symptoms in other diseases. *British journal of diseases of the chest*.288.82:285-289

Dick, J. 1996. Evaluation of a volunteer health worker programme to enhance adherence to anti-tuberculosis treatment. *Brazilian journal of infectious disease*. 6.2: 274 – 279.

Eke, C. (1973) The role of the Nurse in Tuberculosis control today. *Proceedings of the 1st Nigerian Anti-tuberculosis conference*. John N,and Elizbeth O.Eds.Franklin S,Victo M.and Benard U. 93 – 97.

Erhabor, G.E., Aghanw, H.S., Yusuph, H., Adebayo, R.A., Arogundade, F.and Omodura, A.2000. Factors influencing compliance tuberculosis with directly observed therapy at Ile-Ife,Nigeria. *Eastern mediterrenian journal*.77.5:235-239

Fateregun, A., Abimbola, S. and Bamgboye,A.E. 2009.Treatment outcome of Tuberculosis patients At treatment canters in Ibadan, *Nigeria. annals of African medicine* 8. 2: 100-104

Gangadharam, P.R. 1980. Laboratory outcomes of chest and lung disease in Delhi *Indian journal of tuberculosis*. 27.3:108

Gupta, P. R., Gupta, M. L., Purohit, S. D., Sharma, T.N. and Bhatnagar, M. 1992. Influence or prior information of drug toxicity on patient compliance.*Indian medical journal*. 40. 3: 181 –183.

Halim, H., Rasyid, A., Ahmad Z.1998. Evaluation of four years hospital implementation of DOTS strategy. *Annals of Medecine- Indonesia*. 38.3:130–134.

Hall, J., Roter, D. and Katz, N. 1988. Meta – analysis of correlates of provider behaviour in medical encounters.*British medical journal*.14. 26: 657 – 673.

Haynes, R. B. 1976 *A critical review of the determinants of patient compliance with therapeutic regimens.* Sackett,D.L. John,H.eds.New York.

Janis, I. 1983.The role of social support in adherence. *American review of respiratory disease*.4.146:26-39.

Jin, B. W.; Kim, S. C.; Mori T. and Shimao, T. 1993. The impact of intensified supervisory activities on Tuberculosis treatment. *Indian medical journal.* 10.74: 267 – 272.

Kochi, A. 1997. Tuberculosis control – is DOTS the Health breakthrough of the 1990s. *World Health Forum.*Eds. Bowman, K.and Bask,B.18. 3/4: 226.

Komaresan, J. A. and Maganu, E. T. 1992. Case holding in patients with tuberculosis in Botswana. *British Medical Journal* .97. 308: 340 – 341.

Kopanoff, D. E., Snider D.E Jnr. and Johnson, M. 1988. Recurrent tuberculosis: why do patients develop disease again? A united States Public Health Service Cooperative Survey. *American journal of Public Health.* 78. 8: 30-3.

Ley, P.1988. Communication with patient: improving communicaton, satisfaction and compliance. Goom Helm, London. *British Medical Journal.*54.119: 37 – 40.

Marcelo, F., Rabahr, A.B., Fernanda, Q.D., Joaqum, C.D.,Almenda, N.and Afranio, L.K. 2002. Noncompliance with tuberculosis treatment by patients at a tuberculosis and AIDS reference hospital in Midwestern Brazil. *Brazil journal of infectious disease*.6.2:18-20.

Magdorf, K., Arizzi-Rusche, A.F., Geiter, L., O'Brien, R.J. and Wahn, U.1994 compliance and tolerance of new anti-tuberculosis short term chemo-preventive regimen in childhood- a pilot project.*American journal of public health*. 48.10: 761 -764.

Miller, B. and Schieffelbein, C. 1998. Tuberculosis Bulletin of the World Health Organization Supplemen. 76. 2: 141 – 143.

Mindess, H. and Munford P. 1980. Psychology: The study of people. *American journal of public health.7.34: 48 – 49.*

Moodie, A. S. 1976. Mass ambulatory chemotherapy in the treatment of tuberculosis in a predominantly urban community. *American Review of Respiratory Diseases.*4. 95: 384-97.

Nation tuberculosis and Leprosy control programme workers manual: federal ministry of Health, Lagos (1991).

Oladepo, O., Adeniyi, J.D., Breiger, W. R.; Ayeni, O. and Kale, O.1988. Onchocerciasis: The potential of a patient education n the control of a tropical disease. Patient Education and counselling. *Elservier Scientific journal.* 12.89: 103-116.

Onadeko, B.O. and Sofowora, E.O. (1978) Daily short course (6 months) chemotherapy for treatment of pulmonary tuberculosis in Nigeria. A pelimnary report. *African journal of Tropical Medicineand hygiene.* 103. 625 – 639.

Onadeko, B.O. and Sofowora, E.O. 1975. Comparative trial of thiacetazone with isoniazid and paraaminosalicylic acid (PAS) with isoniazid in the treatment of pulmonary tuberculosis in Nigerians. Journal *of Tropical Medicine and Hygiene* 103:. 175 – 181

Oxford English dictionary.vol 13.1879. eds.*Sir James Augustus. and Henry Murray* 1993.

Pamra, S. P., Prasad, G. and Mathur, G.P. 1973. Causes of failure of domicialiary chemotherapy in pulmonary tuberculosis. *The International journal of tuberculosis and Lung disease.* 54: 185 – 194.

Parks, J.E. and Parks K. 1997. *Textbook of Preventive and Social Medicine. M/S Banarsidas Bhanot India*: 130 -140

Paul, J.C. 2009. Tuberculosis in Africa:Where do we go?.*International journal of health research.* 2. 1:1-2

Perronne, C. (1994) Association of tuberculosis and HIV infection (editorial) Press-Med. April 23; 23 (16): 731 – 3.

Ramachandran, P. and Prabhakar, R.1992. Defaults, defaulter action and retriveal of patients during studies on tuberculosis meningitis in children. *Journal on tuberculosis and lung disease*. 73 .3: 170–173.

Raven B. 1988. *social power and compliance in health care.* New York.

Rideout, R. and Menzies, R. 1994. Factors affecting compliance with preventive treatment for tuberculosis at Mistassini Lake, Quebec, Canada. *Clinical investigation medical journal.* 17. 1: 31– 36.

Rubel, A.J. and Garro, L. C, (1992) Social and Cultural factors in the successful control of tuberculosis. Public – health – rep. Nov – Dec; 107 (6): 626 – 36.

Samarasinghe, D., Hawken, M. and Harrison, A. C. 1992. Compliance and supervision of chemotherapy of tuberculosis. *International journal on health research.* 9. 2: 120 – 127.

Samuel, A.B., Tomoko, K., Tomokun,A. And Nobuyiki, H. 2010. Fcactors contributing to tuberculosis default rate in new Jabin municipality,in the earstern region of Ghana. *Journal of national institute of health.*59,3:291-292

Siafka, N. M. and Bouros, D. 1992. Consequences of poor compliance in chronic respiratory diseases, Europe. *British medical journal*. 5.1: 134 –136 6.

Smith, B.C.1979. Community Health: An Epidemiogycal Approach. Macmillan, New York. *Health journal*.21.133:15-18.

Smith, and Morow. 1993. Tooolbox: INTERVENTIOON strategies in tropical Diseases. World health Organization Publication.

Surmatojo.E. 1992. When tuberculosis treatment fails.A social behavioural account of patients adherence.*American review of respiratory disease.* 147.4:1311-1320

Styblo, K., and Chum, H.J. 1976. treatment results of smear positive tuberculosis in the Tanzaia National Tuberculusis and Leprosy programme; standard and short –course chemotherapy in tuberculosis and respiratory diseases. Proceedings of the 26th international union aginst tuberculosis (IUAT). *World Conference on tuberculosis and respiratory diseases. Tokyo.*

Umoh, A., Akpan, U., Afia, A. and Utsalo, S. 2005. Pulmonary tuberculosis: case finding and treatment outcome.*Journal of medical laboratory science* 14.2:40-41.

Ware, J. E., Davies, A., and Steward, A. L.1978. the measurement and meaning of patient satisfaction. *Health and medical services review journal.* 1. 1: 1 – 14.

Weintraub, M.1975. Promoting patient compliance. New York State journal of Med. 75; 2263 – 2266.

Westaways, M. S. and Wolmarans. L.1994. cognitive and affective reactions of black urban South African towards tuberculosis. *East mediterrenian journal.* 75. 6: 447 –453.

Wilkinson, D. 1994. high compliance tuberculosis treatment programme in a rural community. Lancet.*journal of public health research.* 12.343; 647 –648.

World. Health Organization. 1994..The global burden of disease in the 1990s in global comparative assessments in the health sector.

World Health Organization . 1995. Report on the tuberculosis epidemic. *Groups at risk.*

World Health Organization Lagos Newsletter, Quarterly Bulletin, Lagos, Nigeria. Vol 14. Mar, 1999.

World Health organization.2005a Public-Private Mix for DOTS implementation PPM DOTS in Indonesia: A Strategy for Action Mission Report. Geneva, Switzerland.. http//www.who.int/publication/2005/index html.

WHO global tuberculosis control report.2005b.*Elimination is a distant dream.* http//www.who int/tb/publication/globalreport

World health organization Report 2009 *Global Tuberculosis Control, Epidemiology, Strategy, Financing.* Geneva, Switzerland.

World Health Organization TB Epidemiology report. 2010. *Estimated Epidemiologic burden of TB/HIV in endemic countries.* WHO TB/HIV intervention programme. 2010.

Yach, D., Bell, J. 1988. Tuberculosis patient compliance in the Western Cape. *South-Afrrican Medical Journal.* 9. 73: 31-3

Youngleson, S. M. 1988. Measuring compliance in the treatment of tuberculosis in Cape Town – pitfalls in study design. *Soth Africa medical journal.* 9. 73: 28 – 30