UNIVERSITY FOR DEVELOPMENT STUDIES

FACTORS AFFECTING TUBERCULOSIS TREATMENT IN THE BOLE DISTRICT OF THE NORTHERN REGION OF GHANA

BY

YAKUBU ELIASU

(BSc. PUBLIC HEALTH)

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DECLARATION

I, the undersigned, declare that this thesis is the result of my own research work and that all the sources that I used have duly been acknowledged by means of references and that this work has not been submitted to any institution for the award of any other degree.

....

Yakubu Eliasu Date

(Student/Author)

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University for Development Studies

....

Dr. Gideon Kofi Helegbe Date

(Supervisor)

ABSTRACT

Tuberculosis (TB) is of great public health concern affecting one third of the world's population regardless of all the interventions put in place to control it. The objective of this study was to assess the factors that affect TB treatment in the Bole District. A cross sectional descriptive study was conducted with 95 TB patients made up of 25 defaulters and 70 completed treatment TB patients. Structured questionnaire was used to collect data from the study participants. The quantitative data was analysed using EPI info. For association of factors Chi-square test was used. If $p<0.05$ the test was considered statistically significant. This study found that the following factors were associated with TB treatment default; staying outside the Bole district whiles using the Bole district hospital as their treatment center ($p = 0.004$) and not having treatment supporters ($P = 0.001$). Other factors found to be associated with treatment default were travelling over 30km to the treatment center ($p = 0.002$) and patients' experiencing side effects of drugs ($p = 0.01$). Despite the challenges, the motivating factors for some patients to successfully complete their treatment were; the wish of wanting to get well, support from friends/family members in the form of words of encouragement and occasionally financial support. In conclusion, this study revealed that traveling over 30 km to the treatment center for TB drugs and patients' not having a treatment supporter were predictors of non-compliance with TB treatment. This study, therefore recommends that TB treatment be decentralized to all public health facilities in the district to reduce the travelling distance and cost incurred by patients in travelling to the district hospital for their medication.

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DEDICATION

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ACRONYMS AND ABBREVIATIONS

AIDS - Acquired Immunodeficiency Syndrome

BCG – Bacille Calmette Guerin

CDC – Center for Disease Control

CHPS - Community based Health Planning and Services

CSDA – Commission for Social Determinants of Health

DHMT – District Health Management Team

DOT – Directly Observed Treatment

DOTS –Directly Observed Treatment Short-course

ECDC – European Center for Disease Prevention and Control

GES – Ghana Education Service

GHS - Ghana Health Service

HBM – Health Belief Model

HIV– Human Immunodeficiency Virus

IGF – Internally Generated Funds

LTBI – Latent Tuberculosis Infection

MDGs – Millennium Development Goals

MDR-TB – Multi drug Resistant Tuberculosis

MOH – Ministry of Health

MTB – Mycobacterium Tuberculosis

MTN – Mobile Telecommunication Network

NACP – National AIDS Control Programme

NGO – Non Governmental Organisation

NHIS – National Health Insurance Scheme

NTP – National Tuberculosis Control Programme

PTB – Pulmonary Tuberculosis

SCC – Short Course Chemotherapy

TB – Tuberculosis

UNAIDS – United Nation Programme on HIV&AIDS

WHA- World Health Assembly

WHO - World Health Organisation

OPERATIONAL DEFINITIONS

Defaulter is a patient who interrupted treatment for at least two months upon initiation of treatment. In this study a defaulter was a TB patient who was registered at the treatment center and put on treatment but interrupted treatment for at least two months.

DOTS is a strategy adopted for the implementation of the national tuberculosis control programme. The strategy operates with five components, namely: case detection, directly observe treatment of patients with drugs, ensure continuous supply of drugs, case tracking and recording system and research.

Treatment supporter is a person nominated by the TB patients who supervise the patient take his or her medication on daily basis. The role of the treatment supporter is to ensure that the TB patient takes the drugs regularly as scheduled for the required period or duration.

Completed treatment: patients who are cured or declared treatment completed after the treatment period.

Multi drug resistance TB (MDR- TB): resistance to at least two first line TB drugs (rifampicin and Isoniazid).

Pulmonary TB refers to TB affecting the lungs.

Treatment failure: a patient who was smear positive at the start of treatment and remain positive or became smear positive at month five or later after starting treatment.

TB/HIV co-infection: a patient who is infected with both TB and HIV.

Smear positive TB: a patient with at least two sputum specimens which test positive for tubercle bacilli or a patient with only one sputum specimen showing positive for TB bacilli and chest radiographic abnormalities suggestive of active pulmonary TB.

CHAPTER ONE

1.0 Introduction

Tuberculosis (TB) is a contagious disease caused by the bacillus *Mycobacterium tuberculosis.* The disease is both preventable and curable. It typically affects the lungs (pulmonary TB) but can affect other sites as well (extra pulmonary TB). The disease is spread in the air when people who are sick with pulmonary TB expel bacteria, for example by coughing. The World Health Organisation (WHO) has stated that the disease ranks as the second leading cause of mortality the world over from an infectious disease after the Human Immunodeficiency virus (HIV) (WHO, 2012). WHO in 1993 declared TB a global emergency in recognition of the growing importance of TB as a public health problem (Bonsu et al, 2012). In Agust 2005, TB was declared an African emergency (WHO, 2013).

This study explores the factors that influence TB treatment. It examines the socio-demographic, patients and health system factors that affects TB treatment.

The purpose of this introductory chapter is to provide an overview of the study. The chapter introduces the problem of TB and its magnitude globally, in Africa and in Ghana. It states the aim, research objectives and conceptual model defining the study and presents a brief overview of how the chapters are presented in the thesis.

1.1 Background to Study

The past two decades have seen remarkable gains in the fight against TB. An estimated 41 million people have been successfully treated, and 6 million deaths have been averted (Who, 2011). However, there remain serious challenges to reach all people who need quality TB care. Every year as many as 4 million people with TB fail to receive

such care, and their illness is never documented, and over 400, 000 MDR-TB cases are not having access to proper diagnosis and treatment (WHO, 2011). Patients who are put on treatment are not complying with treatment leading to defaults and treatment failure, which serves as risk to drug resistance TB. It will be helpful in identifying patients who are likely to default if feasible when putting patients on treatment.

The consequences of TB for patients, families and communities through cost incurred in diagnosis, seeking for treatment, transport to and from health facilities/treatment centers and time lost from work cannot be underestimated. TB is influenced by factors such as socio-economic and nutritional status, people's perceptions and beliefs about the disease, health-seeking behaviour and access to health care. The negative consequences of TB can, however, be averted if the disease is detected early enough and treated.

Global efforts to control TB were revived in 1991; this was as a result of the World Health Assembly's (WHA) recognition that TB is a major global public health problem (WHO, 2006). Two targets for TB control were established as part of this resolution. These are to detect 70% of new smear positive cases, and to achieve a cure rate of 85% of such cases, by the year 2000 (WHO, 2006). The achievement of these targets will result in the reduction of the prevalence, incidence, transmission and drug resistance to TB.

Low TB case detection and undesirable treatment outcomes (default, treatment failures and death) threaten the success of the TB control programme in Ghana and the world over. This is because of the association of this situation to TB drug resistance and also

because patients continue to spread the infection (Namukwaya, Nakwagala, Mulekya, Mayanja-Kizza, & Mugerwa, 2011). Hence TB treatment success rate is classified as one of the indicators for the performance of national tuberculosis control programs. Several factors may affect the likelihood of treatment success. Such factors include; the severity of disease due to delay between onset of disease and the start of treatment, co-infection with HIV, multidrug resistance, malnutrition, which is mostly as a result of poverty, and also lack of social support to patients to ensure that they complete their treatment. However, if the disease is promptly detected and treated, patients with the disease become non-infectious and are cured.

The condition remains a major public health problem in the world. It causes ill-health among millions of people each year and ranks as the second to human immunodeficiency (HIV) as leading cause of death from an infectious disease (WHO, 2012). Statistics indicate that, there were about 9 million new cases in 2011 and 1.4 million TB deaths (990,000 among HIV negative people and 430,000 HIV associated TB deaths) (WHO, 2012). This is notwithstanding the availability of drugs that can cure patients.

Geographically, the burden of TB is highest in Asia and Africa. Africa contributes about 29% and 34% of all TB related morbidity and mortality to the global burden of the disease (Ahorlu & Bonsu, 2013). The WHO has also revealed that 3.7% of all new cases and 20% of previously treated cases were estimated to have multi drug resistant TB (MDR-TB) worldwide (WHO, 2012).

Nine (9) out of the twenty two (22) high TB burden countries in the world are in Africa (WHO, 2012). WHO estimates that, TB notifications from the African region

accounted for 24% of all notified cases in the world. The situation is worsening as a result of the high prevalence of HIV. Almost 80% of TB cases among people living with HIV reside in Africa (WHO, 2012).

Although Ghana is not ranked among the world's high-burden TB countries, the disease still remains a major cause of morbidity and mortality in the country. The disease has remained a terrified condition among the Ghanaian population as demonstrated by the local names given to it, such as "*Nsamanwa*" ("ghost cough") by the Akans, "*Kesibine"* ("black cough") by the Sissalas because traditionally the black colour is associated with evil (Ahorlu and Bonsu, 2013) and "*Kichewuse*" ("woman coughs") depicting that it is getting from sex by the Gonja people. It is estimated that Ghana has 86 smear positive pulmonary TB cases per 100,000 population and 101 of all types of TB cases per 100,000 population (WHO, 2012). About 46,000 – 50,000 new cases of TB are estimated annually by the WHO in Ghana (Ahorlu and Bonsu 2013,: Addo et al, 2010). WHO further estimate Ghana's TB mortality rate to be 75/100,000 (WHO, 2012). Ghana's TB Control Programme adopted the global targets of detecting 70% of the estimated TB cases, and curing 85% of the detected cases by the year 2005 using the directly observed treatment short-course (DOTS) strategy.

One of the major challenges facing the National TB Control Program (NTP) in Ghana is the reported low case detection due partly to under reporting from health facilities (Acquah et al, 2012) and the issue of unsuccessful treatment outcomes (treatment failures and defaults). Many people with TB do not also report to health facilities for treatment, even those who report to health facilities are not diagnosed as having TB and above all contact tracing and investigation not routinely conducted. According to the

Ghana Health Service (GHS), case notification/detection has improved meeting the global target of 70% in 2010 and that the NTP has since 2008 achieved the Global target of 85% treatment success (GHS, 2011).

1.2 Problem statement

The incidence of TB has been increasing globally due to diverse reasons resulting in TB as still a major public health problem. These factors include: poor TB case detection rate, non-compliance with patients' medication which is the biggest problem in TB control; many patients start TB treatment but never finish it posing a high risk of treatment failure, relapse and emergence of multidrug resistant TB (Boogaard, Boeree, Kibiki, & Aarnoutse, 2011) which is even expensive and difficult to treat. Inappropriate treatment prescribed by clinicians due to improper diagnosis may also contribute to treatment delay and increase the risk of drug resistance.

In many countries worldwide, the adoption of Directly Observed Treatment (DOT) has been associated with reduced rates of treatment failure, relapse and drug resistance (Shrivastava et al, 2014). However, its impact in reducing TB incidence has been limited by non-compliance to DOT, which occurs when patients do not turn up for treatment at the health facility or community DOT point (Tessema et al., 2009). In countries where DOT has had little impact on TB control, poor or non-compliance with self-administered TB treatment is common and has been identified as an important cause of failure of initial treatment, leading to relapse (Shargie & Lindtjørn, 2007).

In 2013 the case notification rate for the Bole District was 75/100,000 population and a default rate of about 11% (Bole DHD, 2013). The district is therefore faced with a problem of low TB case detection and a significant number of patients who are put on treatment usually default. Especially when it is known that defaulters and treatment failures are an indication of drug-resistant TB (DR-TB) (WHO 2013). While several studies on the factors associated with unsuccessful treatment outcomes have been carried out worldwide and in Sub-Saharan Africa, there are no satisfactory published studies on Bole. Therefore, without knowledge of factors that affect TB management in the district, it will be difficult to address the situation.

1.3 Objectives

1.3.1 General objective

The main objective of this study is to find out the factors that affect TB treatment in the Bole District of the Northern Region.

1.3.2 Specific objectives

- To determine demographic and social factors that affect TB treatment.
- To investigate patient related factors that affect TB treatment
- To assess health service related factors that affect TB treatment success
- To explore the factors that influence TB treatment from the perspective of care providers.

1.4 Justification

The results of this study will help health workers and programme managers to identify those patients who are at risk of defaulting their treatment. Once identified the appropriate measures can be taken and more attention given to the treatment needs of patients who fall within this category, thereby increasing their chances of successfully completing treatment. Also the identification of the risk factors for unsuccessful treatment can help programme managers in the district with valuable information needed in the development of effective interventions in the fight against TB.

1.5 Conceptual Model

This study adopted the Health Belief Model as its theoretical framework.

1.5.1 Health Belief Model

Over the years, the Health Belief Model has been one of the most frequently used psychosocial approaches to explaining health related behaviours. The model was developed to explain the frequent failure of people to participate in programmes to prevent or to detect diseases (Andrew et al, 1997). The HBM was later expanded to include people's response to symptoms and to their behaviours in response to diagnosed symptoms particularly compliance to medical regimen. It is a psychological model that attempts to explain and predict health behaviours.

The HBM is based on what is called the value expectancy concepts. The reformulation of the value expectancy concept in the context of health related behaviour translates as (i) The desire to avoid illness or get well (value) and (ii) the belief that a specific health action available to a person would prevent illness (expectation) (Karen et al., 2008). The expectancy was further delineated in terms of individual estimate of personal susceptibility to and severity of an illness and of the likelihood of being able to reduce

that threat through personal action. The model in recent years has been updated to predict behaviour that prevents or protects against disease or illness (Buchana, 2008). The model was developed in the 1950s as a result of limited success of public health service programmes. According to Gochman (1997) one such example was the failure of many adults to participate in a free TB screening exercise. Hence the programme operators became interested in identifying those factors that facilitate or inhibits participation (Gochman, 1997). In general, it is believed that individuals will take action to ward off, to screen for or to control ill health conditions if they regard themselves susceptible to the condition; if they believe it to have potentially serious consequences; if they belief that a course of action available to them would be beneficial in reducing either their susceptibility to, or severity of the condition and if they believe that the anticipated barriers (or cost of) taking the action outweighed by its benefits.

Early models of the HBM consisted of four variables that focused on aspects of an individual's perspective on his or her health and health related behaviour. The four variables were divided into two categories: threat perception and behavioural evaluation. Variables that combine to form threat perception are susceptibility and severity. An individual's belief concerning his or her susceptibility consist of assessing the probability of developing or acquiring a disease. The HBM proposes that feeling susceptible to a disease is a motivating factor to take preventive action. For the purpose of this study, participants were asked what disease, they perceived they were suffering from in order to determine participants' perceived susceptibility to TB.

In the case of a medically established disease, the component has been reformulated to include acceptance of the diagnosis, personal estimates of susceptibility to illness as a whole, that is, whether the patient accepts the medical condition he/she have been diagnosed with in this case the TB disease.

Perceived severity, feelings concerning the seriousness of contracting an illness or of leaving the disease untreated include evaluation of both medical and clinical consequences, for example death, pain and disability, and possible social consequences such as effects of condition on work, family life and social relations. This implies that a patient's perception about the severity of TB may act as a motivating factor for him or her to initiate action to fight the disease (Figure 1). However, variables likely to affect the initiation of treatment are considered under the behavioural evaluation. Most individuals will evaluate the benefits of engaging in the preventive behaviour as well as barriers of engaging in the behaviour. Assessing the benefits involves determining whether engaging in the behaviour will be beneficial and are effective in preventing or curing the disease. In otherwise, will engaging in the behaviour bring about positive outcome? In this study the benefits were determined by asking participants what factors motivated them to comply with the TB treatment.

At the same time barriers to engaging in the behaviour is great enough to outweigh the benefits. They may consist of internal barriers such as belief that taking action would cause embarrassment in the form of stigma from community members or external barriers such as lack of financial resources, transportation problems or unpleasant side effects of TB medication. This was also determined by asking participants what the factors that made them to default TB treatment were.

Much of the HBM's structure revolves around the central concept of evaluation and development of outcome expectancy with a resulting consequence of behaving in a particular way (Buchanan, 2008). The theory further proposes that behaviour is triggered by 'cues to action' which make the individual aware of the health threat. Such stimuli might be the individual's internal symptoms or prompts from external sources such as health care providers, family members or the media. Similarly, diverse demographic (age, sex and race.), Socio-psychological (social class, personality, peer and reference group) and structural factors (knowledge about the disorder and prior experience) are likely to play a part in shaping health behaviour, but these influence behaviour only indirectly by modifying the other components of the model (figure 1).

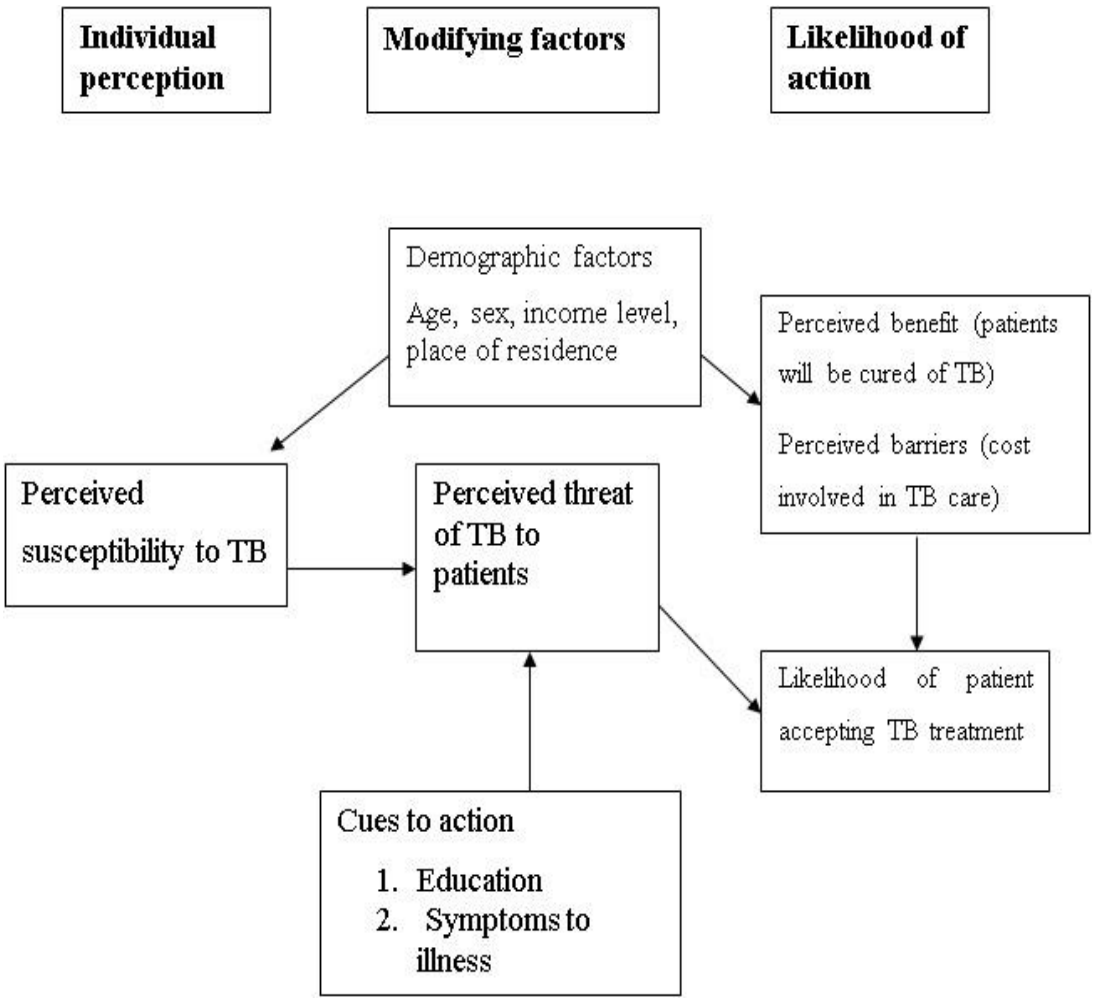


Figure 1: Health belief model (Adapted from Janz and Backer)

1.6 Organization of Chapters

This thesis is organised into six main chapters. The first chapter is the general introduction. It gives a brief overview of the study. The chapter also looks at the statement of the problem, study objectives, research questions, conceptual model underlining the study and justification.

The second chapter is made up of compiled information from peer reviewed journals, and other official documentation relating to the study topic. The chapter focuses on epidemiology and the historical perspective of TB. Factors affecting TB treatment have also been comprehensively reviewed and presented in this chapter.

The third chapter presents the methodology employed in conducting this study. The chapter gave a description of the background to the study area, study design, study variables, data collection tools, sampling technique and sample size determination. This chapter also looks at data analysis, quality control and ethical considerations.

Chapter four is a presentation of the findings/results from the field. In this direction the analysis will concentrate on the findings on the field.

The fifth chapter entails discussion of results and relating the analysis in chapter four with findings from other studies on the subject matter as expressed in published materials. In doing so, suggestions or recommendations are also made on the various issues that are being discussed as chapter six.

CHAPTER TWO

Literature Review

2.0 Introduction

In keeping with the aim of this study, namely to assess the factors that affect TB treatment in the Bole district of the Northern Region, this chapter reviews relevant literature from previous related studies on TB. The scope of this literature review, therefore, was to gather evidence from textbooks, published research, scientific reports and other credible sources (Jennifer and Frances, 2005) of scientific work done all over the world, mainly on TB treatment issues.

2.1 Historical perspective of TB and its control

In order to understand today's management of TB, it is imperative to see the disease in its historical context. TB has burdened societies since prehistoric times and despite the fact that it is an ancient disease and probably one of the illnesses most dealt with in the literature, there has been surprisingly little sound knowledge of the disease through the course of history (Luna, 2005), which has not helped contemporary efforts to combat the illness. From the time of Hippocrates (c. 460-377 BC) up until the nineteenth century, the infectious nature of the disease was not even acknowledged; rather, TB was considered a hereditary disorder (Luna, 2005). However, air, a common vehicle for the transmission of the live germs was included among the interpretations of the possible origin of the disease. For this reason, the dietary regimen proposed by Hippocrates and Galen (c. 130-200 AD) remained the basis of treatment up until the Renaissance. This practice changed very little in the seventeenth century, the sole difference being the recommendation of physical exercise and the use of new medicinal substances introduced in Europe at the time, such as quinine, coffee, tea, cocoa, and

even tobacco. Such lack of understanding partly explains why humankind has been unable to defend itself against this terrible illness for the most of history the only option being to fall ill and ultimately die (Luna, 2005).

It was only towards the latter half of the nineteenth century that the infectious nature of the disease became apparent, as a result of the studies by Villemin in the year 1865 (Barnes, 1995) and, particularly, Robert Koch (1843-1910). The German medical bacteriologist Robert Koch is commonly considered as one of the founding fathers of medical bacteriology. His investigations into the etiology of tuberculosis uncovered the pathogen of this condition, the tubercle bacillus today known as *Mycobacterium tuberculosis*, in 1882 (Gradmann, 2006). His work also showed that TB was a contagious disease. He has not only isolated the bacterium, which was later named after him (Koch's bacillus), from the sputum of infected patients, but also proposed that the principal measure for controlling the disease in the community would be to isolate affected patients. This suggestion paved the way for the "sanatorium" era of TB, during which prolonged confinement of patients in sanatoriums was believed to be the only effective way to cure TB and control its transmission.

Based on the above, and throughout the prolonged history of the disease, it can be seen that the human host defences were the only means to counter *M. tuberculosis* the causative agent of TB. In this confrontation between the microorganism and the immune defence system, the latter tended to prevail as a result of which only a very small proportion of infected individuals eventually developed the disease. However, when the disease became more established, the prognosis became very bleak in most cases with a mortality of more than 50% five years after the onset of the disease. In

turn, 25% of infected patients died within 18 months. Cure was only achieved in 25% to 30% of cases; the rest remaining chronically ill while continuing to spread the disease throughout the community (Luna, 2004). This extremely poor prognosis led to the development of various treatment attempts, most of which were empirical in nature and which proved to be ineffective. For this reason, when reviewing the history of TB therapy, two major divisions were established: treatment in the pre-pharmacotherapeutic era, and treatment in the period corresponding to the last 50 years during which effective cure became possible.

In the eighteenth century, treatment recommendations included moving to the countryside and partaking in moderate activities. There was still special attention to diet, with medication reserved for the initial or "inflammatory" stage of the disease. Thus, during the initial phase, treatment involved bleeding, antiemetic agents, and a light diet, whereas treatment in the "ulcerative" phase of the disease involved balsamic products, expectorants and opium.

In the early part of the nineteenth century, the practice of bleeding became more common, after the "irritative" doctrine developed by Broussais, who introduced the use of leeches as therapy for TB in the first third of that century (Luna, 2005). Some were opposed to this practice, including Laënnec, on the grounds that bleeding neither prevented the formation of tubercles nor eliminated them once they had developed. The debate over what constituted appropriate treatment continued over the subsequent years, during which the notion of the disease being associated with "impure air" regained popularity.

2.2 Epidemiology of Tuberculosis

2.2.1 Causes of TB

Tuberculosis (TB) is contagious and airborne. It is caused by three related organisms, *Mycobacterium tuberculosis*, *Mycobacterium africanum* and *Mycobacterium bovis* (Nunn et al, 1997). The most frequent organism involved in human disease is the *Mycobacterium tuberculosis* (MTB). The main source of infection is untreated smear-positive pulmonary tuberculosis (PTB) patient discharging the bacilli (WHO, 2012). The disease most commonly affects the lungs, but sometimes affects other parts of the body (CDC, 2005). A person needs only a small amount of bacilli to be infected. If stringent control measures are not implemented, approximately 1 billion people will become infected, 150 million will become symptomatic and 36 million will die from TB between 2002 and 2020 (Chung et al, 2007). Ultimately, a relatively small proportion of people infected with *Mycobacterium tuberculosis* will develop TB disease; however, the probability of developing TB is much higher among people infected with the human immunodeficiency virus (HIV) according to the WHO, 2012. WHO further states that the disease is also more common among men than women, and affects mostly adults in the economically productive age groups; around two-thirds of cases are estimated to occur among people aged 15–59 years.

2.2.2 Signs and Symptoms of tuberculosis

The onset of TB is gradual and develops signs and symptoms of infection such as low grade fever, mild to chronic coughs (with or without blood), and in severe form loss of weight, loss of appetite, fatigue and night sweats. Signs and Symptoms of TB disease may last for several weeks if not treated. It can progress to a severe disease and may cause death.

2.2.3 TB transmission

TB is transmitted from person to person by droplet infection through sneezing and coughing. The infection is transmitted when the other person breathes in these droplets containing bacilli (WHO, 2012). Once infected with *M. tuberculosis*, a person stays infected for life, but this does not necessarily mean that the person is ill. Most people have strong immune systems to overcome the infection. However, some people may develop symptoms of TB disease at any time. Among infected persons without HIV infection, only 1 in 10 (10%) will develop TB disease, most (90%) will remain healthy. The most important trigger for TB disease is weakening of the immune system. Patients with weakened immune systems, such as those with HIV infection, diabetes and malnutrition, are at greater risk of developing TB.

TB can spread by the respiratory tract, which is the most common way of infection. When a person is sick with TB and not properly treated that person will likely infect ten to fifteen people in a year (WHO, 1996).

2.2.4 TB prevention and treatment

The aim of treatment is to cure the patient and achieve non-infectiousness, hence interrupting transmission of the disease, while avoiding the emergence of drug resistance [European Centre for Disease Prevention and Control (ECDC), 2010]. Active, drug-sensitive TB disease is treated with a standard six-month course of four antimicrobial drugs that are provided with information, supervision and support to the patient by a health worker or trained volunteer. Without such supervision and support, treatment adherence can be difficult and the disease will persist (WHO, 2013). Findings from a study conducted by Gibson, Cave, & Doering, (2002) confirmed that for early TB diagnosis and prevention people who are at risk should learn about TB transmission

and prevention prior to contact with TB patients. This assertion makes information dissemination about TB control, particularly health education on the need for early reporting and prevention of TB very important for the control of the disease. This can be made possible by training lay people, particularly, those who have recovered from TB, community volunteers, patient relatives or family members and community members to act as peer educators in the community (Gibson, Cave, & Doering, 2002).

TB infection can also be prevented in infants and children by vaccinating them with the Bacille Calmette Guérin (BCG) vaccine. Chemoprophylaxis or preventive treatment is also available for TB risk group such as health workers who take care of TB patients and people with a compromised immune system. Other preventive measures include; environmental control and improvement of socio-economic conditions which is the most profound effect on reducing the disease load, as TB is intimately associated with poverty and deprivation.

2.3 Risk factors for contracting TB

Risk factors are those that predisposes patients to TB. Once an individual is infected with the TB bacilli, he/she has a higher chance of getting the disease if the person has medical conditions such as HIV& AIDS, diabetes, and other unhealthy lifestyles such as alcoholism and drug use (CDC, 2005). TB is the most frequent AIDS defining disease and in many African countries more than half of the TB patients are diagnosed with HIV when active TB is detected (Taarnhøj et al., 2011).

A complex interaction exists between TB and HIV infection. HIV increases the risk of patients to TB infection. HIV & AIDS break down the immune system of infected persons. This situation can facilitate the reactivation of latent TB infection (LTBI) and

increases the progression to active disease (Janet et al., 2002). TB can also affect HIV infection and is now the most common opportunistic infection in individuals being treated with antiretroviral therapy in the developing world. It may present as the first manifestation of HIV infection (Idemyor, 2007).

TB-HIV co-infection has fatal consequences as TB becomes the leading cause of death in HIV infected individuals and patients with acquired immunodeficiency syndrome (AIDS). People living with HIV who are also infected with TB are much more likely to develop TB disease than those who are HIV negative (WHO, 2012). The annual risk of developing active TB is 5-15%, considerably higher in HIV positive individuals than those who are not infected. Among persons who are dually infected, the risk of active TB increases as the immune deficiency progresses (Idemyor, 2007).

HIV also affects the performance of TB control programmes by increasing the number of TB cases and by compromising the treatment outcomes. It created a huge challenge to the already overstretched and understaffed health system in high burden countries. It increases the rate of treatment failure, defaulter and death, which in turn compromised the progress towards achieving the targets recommended for TB control under directly observed therapy short course (DOTS) strategy.

Globally 1.1 million TB cases (13.0%) of the 8 million cases that developed TB are co-infected with HIV (WHO, 2012). Seventy nine percent (79%) of these TB-HIV co-infections occurred in the Africa region WHO (2012). There were also an estimated 0.4 million HIV associated TB deaths in 2011, with approximately equal numbers among men and women. WHO, UNAIDS and the Stop TB Partnership have set a target of halving TB mortality rates among people who are HIV positive by 2015 compared with

2004 (the year in which TB mortality among HIV positive people was estimated to have peaked).

There is an epidemiological and clinical association between the two diseases. Therefore, TB-HIV collaboration is an appropriate intervention to improve TB case finding in HIV infected individuals and reduce the risk of HIV infection in TB patients. Children and elderly people also have a much higher chance of getting TB disease; this is because their body's defences are not strong (CDC, 2005).

2.4 Social determinants of TB

Social determinants are conditions that generate or reinforce social stratification in the society (CSDH, 2008). Social stratification in turn gives rise to unequal distribution of the social determinants of health, including material, living conditions and psychosocial circumstances as well as behavioral and biological risk factors (Hargreaves et al., 2011). To control TB it is very important to understand the complex risk factors and social determinants of the disease in the community.

In the face of keen global and national efforts to achieve case detection and treatment targets for TB control, delays to effective diagnosis and treatment hinders these efforts. They are often attributed to issues of accessibility to health services, socio-economic and socio-cultural factors, stigma and health system weaknesses (Gosoniu et al., 2008). In addition, individual factors such as knowledge, attitude, gender, ethnicity, income and education often contribute to the delayed or prevent a person from seeking health care which may worsen the disease among symptomatic individuals, increase the risk of death due to TB and raise transmission within the community. Stigma associated

with TB appears to be universal. The consequences of stigma can be seen affecting care seeking behaviours, as persons have been known to hesitate or choose not to disclose their TB status to family, friends, and community members out of fear of being socially detested, in addition to losing their employment and/or temporary housing. Research has demonstrated that in some cases, personal rejection occurs as a result of the stigma surrounding TB (Dhingra & Khan, 2010). Stigma has also been shown to hinder adherence to treatment. By identifying the consequences of stigma, social science research has illustrated the need for effective intervention strategies to mitigate it.

Key structural determinants of TB epidemiology include global socioeconomic inequalities, high levels of population morbidity, and rapid urbanization and population growth. These conditions give rise to unequal distribution of key social determinants of TB, including food insecurity and malnutrition, poor housing and environmental conditions, and financial, geographic and cultural barriers to health care access (Hargreaves et al., 2011). In effect, the distribution of TB in the population reflects the distribution of these social determinants, which influence the four (4) stages of TB pathogenesis; exposure to infection, progression to disease, late or inappropriate diagnosis and treatment as well as poor treatment adherence and success.

These social determinants are among the key risk factors for TB. For example, poor ventilation and overcrowding in homes, workplaces, and communities increase the likelihood of uninfected individuals being exposed to TB infection if a household member has the infection. Poverty, malnutrition, and hunger may increase susceptibility to infection, disease, and severity of clinical outcome. Individuals with TB signs such as a persistent cough often face significant social and economic barriers

that delay their contact with health systems in which an appropriate diagnosis might be made, including difficulties in transport to health facilities, fear of stigmatization if they seek a TB diagnosis, and lack of social support to seek care when they fall sick (Coker & Mckee, 2008).

Although DOTS has pioneered the use of a patient's social network to improve treatment adherence, a social determinant's framework also highlights how lack of hope for the future, driven by poverty, might also foster high rates of treatment default that undermine TB control.

Finally, because of the close relationship between HIV and TB in many settings, notably sub-Saharan Africa, the key structural and social determinants of HIV infection also act as indirect determinants of TB risk (Hargreaves et al., 2011). Foremost among these is widespread inequality in opportunities and expectations for men and women reinforced through cultural norms and socioeconomic systems. These opportunities and expectations create conditions that give rise to networks of concurrent sexual partnerships characterized by power inequalities between male and female partners (Hargreaves et al., 2011).

Growing consensus indicates that progress in tuberculosis control will require not only an investment in strengthening tuberculosis control programs, diagnostics, and treatment, but also an action on the social determinants of the disease. The rise in focus on addressing the social determinants of the disease stems from both within and beyond the TB sector. A major driver is the rising numbers of TB cases and the inequitable

distribution throughout the world. The incidence of TB continues to cluster among disadvantaged people such as the poor, and the hungry.

2.5 Directly Observed Treatment, Short-course and Global strategy

Directly observed treatment short-course (DOTS) is the foundation of the TB programme in Ghana. This is a comprehensive programme under the stop TB strategy aimed to detect, treat and cure patients with tuberculosis. It was designed by the WHO for monitoring and treating patients with tuberculosis. It is an internationally recommended control strategy for TB (WHO, 2012). The goal of DOTS is to reduce TB morbidity and mortality and the chance of *Mycobacterium tuberculosis* developing resistance to primary treatment drugs. Timely diagnosis and treatment of TB are two key fundamental elements for better treatment outcome under the TB control programme. TB treatment requires access to appropriate health care, but many patients may find it difficult to access treatment even when such services are available. Non-compliance to treatment has been widely acclaimed to as an important barrier for TB control. Incomplete treatment may result in prolong infectiousness, relapse, drug resistance and death (Soomro & Qadeer, 2013).

The stop TB strategy was launched by World Health Organization (WHO) in 2006 as an evidence based approach to reduce the burden of TB with provision of supervision and patient support based on effective two way communication between healthcare providers and those receiving treatment. This patient centered approach is also reflected in the International Standards for TB Care. The Stop TB Strategy aims to reduce dramatically the global burden of TB by 2015 in line with the millennium development

goal 6 (MDG) and the Stop TB Partnership targets and to achieve major progress in the research and development needed for TB elimination (WHO, 2012).

The millennium development goal (MDG) six (6), target eight (8) call for halting and begin to reverse the incidence of TB cases by 2015 (WHO, 2008), whiles the stop TB partnership goals call for halving prevalence and death rate by 2015 relative to 1990 rates. These goals are thought to be achievable if at least 70% of new sputum smear-positive TB cases are detected and at least 85% of these cases cured (WHO, 2006). This goal can be achieved through the five elements of DOTS strategy outlined as follows: sustainable government commitment to support the TB programme, quality assurance of sputum microscopy, standardized short-course treatment (including direct observation of therapy), regular supply of drugs and establishment of reporting and recording system (WHO, 2006).

Under the DOT strategy, the delivery of a standard short course of drugs, last's 6 months for new patients and 8 months for retreatment patients. Patients are directly observed under this system either by a health worker or by someone nominated by the health worker and the patient for this purpose (sometimes called a treatment supporter). The strategy has been widely promoted and implemented worldwide. Efforts to improve the results of treatment outcomes require a better understanding of the factors that affects TB treatment, and of patient experiences of taking the treatment. In most countries, low case detection and for that matter delays in seeking treatment and unsuccessful treatment outcomes (defaulting from treatment and treatment failure) are the two major challenges that TB programmes face (Shargie & Lindtjørn, 2007).

2.6 Case detection rate

One of the elements of DOTS is to detect TB cases as early as possible. In Ghana, where DOTS has been expanded to cover almost all public health facilities, the case detection rate has shown a marked increasing tendency from 53%, 62%, 68%, 70% and 78% in 2007, 2008, 2009, 2010 and 2011 respectively (WHO, 2012). The prevalence of TB estimated by WHO is 72 per 100,000 population in 2012. Though the country seems to have achieved the 70% case detection target, most regions and districts are challenged with low TB case detection rate. The DOTS strategy relies on passive case findings (self-presentation of patients at health facilities).

Actively identifying patients with chronic cough in the community has the potential to improve case detection rates. For instance, the findings from a study conducted by Odermatt et al., (2007) showed a positive correlation between the number of reported cough cases (notification) and confirmed TB cases. Finding new cases of TB is frequently stated to be among the greatest difficulties experienced by staff, who generally believed that most TB cases in the community went undetected. Several studies have revealed that active case finding is needed to increase case detection, although this is not performed due to shortage of staff and financial resources (Watkins, Rouse, & Plant, 2004). The shortfalls of the existing passive case finding methods were commonly attributed to poor awareness of TB in the community and the use of other treatment providers such as herbalists and chemical shops.

Most studies have cited inability to diagnose TB early to the lack of capacity of health workers to diagnose TB on time (Li et al., 2013). This is evident in the fact that most

patients make multiple attendances to health facilities before they are finally diagnosed of having TB. The long delay between onsets of TB related symptoms and attendance at health facilities is also one of the causes of low cases detection. Some patients have also reported to seek services from alternative sources such as traditional medicine practitioners, faith healers and chemical shop dealers before coming to the health facilities after those alternative sources have failed them (Watkins et al., 2004).

Delays in diagnosis and treatment of patients increase TB morbidity and mortality, including the risk of transmission to others. These delays are usually influenced by several factors, including the individual's perception of the disease (its causes and possible remedies), severity of the disease, access to health care and the expertise of health professionals (Lienhardt et al., 2001). The researchers observed in their study that most of the patients initially felt they were suffering from malaria because of the symptoms the condition presented. This perception of the disease leads them to access services directed at treating malaria. The researchers further added that, majority of the respondents reported visiting a number of health facilities including chemical shops at the onset of the disease. This also showed that probably health personnel did not have the expertise to diagnose the disease at first visits of clients, hence the multiple attendances of clients to the same facility or other facilities. Another factor that causes delays and low case detection is the fact that most people think access to TB services are paid for, hence are scared to go to the health facilities. The issue is even made worse in most rural setting because of lack of access to health facilities, majority of the community members rely on chemical shops and traditional medicines to cure themselves of their ailments. According to Watkins et al, (2004), these chemical and

drug peddlers as well as the traditional medicine practitioners do not have the capacity to diagnose TB, hence contributing to the low case detection rates.

There is therefore the need for the conventional health care system to collaborate with the complementary health care providers such as chemical shop and drug peddlers as well as traditional and faith healers to refer cases of cough to hospitals to screen for TB.

2.7 Outcome of Tuberculosis treatment

Monitoring of treatment outcome is a core part of surveillance necessary to succeed in TB elimination. TB treatment outcome surveillance is important for several reasons. It allows the measurement and comparison of the performance of TB services locally. It also allows local TB programmes to list cases where services failed and perform a review of such cases. Professionals involved in the TB control programme may learn from discussions of details of these cases. WHO published recommendations standardizing the evaluation of treatment outcomes of TB. These recommendations are based on applying standard short course treatment protocols to all new sputum smear pulmonary patients. WHO has also set targets for the detection and cure of at least 70% and 85% respectively. Studies have revealed that most countries including developed countries with good treatment facilities and secured supply of drugs for patients, treatment results have not reached the targets set by the WHO (WHO, 2014). The main reasons for this include high rates of death, TB Co morbidity with other diseases such as HIV and defaults. Defaults and incomplete treatment increase the risk of developing drug resistance and continues transmission of the disease in the population. Therefore, the goal of TB treatment is not only to cure the disease, but also prevent its transmission and the development of drug resistance. This can be achieved with short course chemotherapy (SCC) regimens. Three most important factors are believed to be

associated with positive treatment outcomes; they include: early diagnosis and treatment initiation, provision of appropriate regimen with sufficient number of effective drugs and the provision of extensive treatment support (Informa Healthcare, 2006).

Detection of TB cases as early as possible and to ensure that those diagnosed complete their treatment and get cured is the key elements in TB control. WHO target for treatment success is 85% of all detected smear-positive cases. Even where free medication is available, many patients are not successfully treated. Death (while on treatment or before the start of treatment), non-adherence to treatment and loss to follow-up are some of the reasons for non-success. Incomplete treatment may result in prolonged excretion of bacteria that may also develop into drug resistance, cause the transmission of disease to others and lead to increased morbidity and mortality within the population. Findings from a study conducted by (Kolappan, Subramani, Karunakaran, & Narayanan, 2006)) cited treatment default and treatment failure as some of the risk factors for TB mortality. About 18% and 30% of patients died as a result of treatment default and failure respectively. Also, finding from a study conducted by (Forson, Kudzawu, Kwara, & Flanigan, 2010) associates multidrug (MDR) resistance to high risk of treatment failure and death. They further stated that resistance to the antituberculosis drug is being recognized more as their effectiveness is subverted by poor adherence, inadequate dosing and prescription of incorrect treatment regimen. Ditah et al., (2007) also observed that MDR- TB patients were about 2 times more likely to have an unsuccessful outcome after treatment.

It is absolutely important to keep monitoring the outcome of treatment in order to evaluate the effectiveness of the intervention.

Under the TB control programme, TB cases are diagnosed and treated in health facilities. All centers offering TB treatment must adopt DOTS, the standardized regimens of short course chemotherapy adopted by the NTP. Free treatment is available to all patients with active TB through the TB control programme and its partners such as the global fund. In developing countries, the DOTS strategy recommends passive case finding or screening by examining TB suspects through sputum smear microscopy when they present to a health facility signs and symptoms suggestive of TB. In Ghana, with the DOTS strategy, sputum smear microscopy is the basis of case finding and diagnosis in TB control activities.

All sputum-positive patients are registered and put on treatment immediately. Those with negative sputum smears, but which clinicians still suspect of having TB undergo chest radiography at the hospital. A diagnosis of smear negative pulmonary TB is made by the physician on the basis of radiological abnormalities of the lungs and clinical features. All smear positive and smear negative patients are registered in the TB register, and have a tuberculosis treatment card, which is maintained at the TB treatment Center. New TB patients are treated with a combination of TB drugs, also known as the fixed dose combination therapy made up of rifampicin, isoniazid, ethambutol, and pyrazinamide daily for 2 months (intensive phase).

Those smear positive patients with a negative sputum smear at 2 months receive a further 4 months of treatment with isoniazid and ethambutol daily (continuation phase). If a patient is smear positive at 2 months, the intensive phase of treatment is continued for the third month, followed by a 5 month continuation Phase. All drugs are provided free of charge to the patient. Each new sputum smear positive patient undergoes a

sputum smear examination at the end of the intensive phase (at 2 months), during the continuation phase (at 5 months), and at the end of the continuation phase (at 6 or 8 months). Patients who are smear positive at 5 months are considered treatment failures and receive the retreatment regimen.

Final treatment outcomes after treatment period are defined according to recommendations issued by the WHO. A set of six possible and mutually exclusive categories of treatment outcome in high-incidence countries are being used. These categories are cured; completed treatment, treatment failure, death, defaulter and transfer out. Ideally, treatment outcomes in all patients should be routinely monitored by the epidemiological surveillance system. This would make it possible to recognize and amend system failures before the incidence and proportion of resistant isolates rise.

Definitions of categories of treatment outcomes according to WHO include the following:

- Cure: Patient who had completed full antituberculosis treatment and was culture negative at the end of the treatment.
- Treatment completed: Patient who had completed the assigned treatment, but final sputum cultures were not obtained and the supervising doctor decided that the patient required no further treatment.
- Default: Patient who had taken antituberculosis drugs for one or more months and interrupted treatment for two or more months.
- Treatment failure: Patient in whom sputum culture remained or became positive at 5 months of antituberculosis treatment.
- Death: Patient who died for any reason during antituberculosis treatment.

Understanding factors that underpin TB case management is fundamental to effective TB control. Several factors enhance or act as barriers to effective TB control. They largely include individual level factors, including socioeconomic status, demographics, the patient's attitude/behaviour toward the disease, patient's knowledge about the disease, belief systems, perceived barriers to access TB services, level of education and many others.

Health system factors include factors that operate within the health system that promotes or hinders access and treatment successes. These include health service delivery, support system for patients, including adequate health education to the patient, facility friendliness, availability of resource such as drugs and human resource.

Rene and Jane Dubos (1969) acknowledged that the problem of TB control is dominated by economic consideration. The resurgence of the disease is said to be the indictments of global political and economic institutions to improve the lives of ordinary people. The dramatic increase in the global prevalence of TB in the 1980s has brought about a glaring reversal in public health hopefulness of earlier decades. TB, according to many authorities was destined to be eradicated completely in the 1970s but has suddenly become the center of global public health concern. TB infection is derived from a combination of different factors, including collapsing health care services, poverty and social inequalities, the emergence and spread of HIV and other immune compromised diseases as well as the emergence of drug resistant strains of the disease (Mathew and Alimuddin, 2003).

2.8 Factors associated with unsuccessful TB treatment outcomes

Several factors contribute to unsuccessful TB treatment outcomes. These factors are mostly associated with non-compliance to treatment. Non-adherence to TB treatment constitutes a challenge to global TB control because it increases the risk of treatment failure, relapse and the emergence of drug-resistant TB (Boogaard et al., 2011). Although the problem is widely acknowledged, there is still no clarity about the exact impact of different levels and patterns of non-adherence on treatment outcome. This affects the provision of adequate advice to patients and clinicians. In the context of TB treatment, adherence to treatment is the extent to which clients/patients follows the treatment regimen prescribed. Non-adherence on the other hand is the situation whereby patients fail to take medication or discontinue treatment prematurely or deviates from the prescribed treatment regimen.

2.8.1 Socio-demographic, cultural and economic factors affecting TB treatment

An individual's disease is both a biological event with a microscopic agent and a social event with human determinants. TB is closely related to social and economic problems, people who are mostly affected live in densely populated areas, their income is poor, and they mostly lack or have little knowledge about TB (Hossain et al., 2012). There is a wide range of studies that emphasizes the close relationship between poverty and TB. These studies have suggested that poverty, poor nutritional status, homelessness and crowded living conditions are linked and increase the risk of TB (Lutge, Lewin, Volmink, Friedman, & Lombard, 2013). This is evident in the sort of names given to the disease years past. Indeed, Robert Koch himself described the disease as "the outcome of misery" (Lutge et al., 2013). Other writers such as Rene and Jean (1996) also called TB a "social disease".

The prevalence of TB is higher in poorer countries and among poorer communities in the developed countries; hence the adverse effects of TB are greatest for poor people, mainly because their income depends on physical labour. The association between poverty and TB exist over the entire course of the disease. Although effective treatment for the disease exist and can be accessed free of charge from all public health facilities across the country, several research findings show that the negative effect of poverty on TB treatment outcome is partly due to the cost of accessing TB treatment services in the form of transport fares to and from TB treatment centers (Xu et al., 2010). Additionally, the poor nutritional status that often accompanies poverty is not only a risk factor for development of the disease, but undermines the outcomes of TB treatment (Lutge et al., 2013). It is worth mentioning that financial difficulties also influence the health seeking behaviour of TB patients.

A study conducted by Xu et al., (2010) revealed that patient's socioeconomic status is a major determinant of TB treatment success, which is also related to drug resistance and the persistent spread of the disease. The study noted that high socio-economic status of patients, particularly high income levels was associated with successful TB treatment outcome. The study further revealed a situation of a vicious circle between treatment outcomes and patient's financial situation, indicating that patients with low income tend to have poor treatment outcomes and also spend much of their little income on medical care as a result of treatment failure. The research also revealed that financial burden was the main reason for failure of patients to seek care and complete treatment.

Another study conducted by Riris et al., (2011), reported a contrasting finding in their study, associating low socio-economic status of patients with shorter duration of

diagnostic delay or care seeking, as compared to widely published researches whereby low socio-economic status is usually cited as a risk factor for a longer duration of diagnostic delay or care seeking. They also reported that clinical presentation of patients may be more severe in poor patients, accounting for the early care seeking. The writers associated the severity or faster progression of the disease in poor patients with poor nutritional status associated with poor patients (Riris et al., 2011). A very interesting finding, reported in this paper was the fact that early contact with a facility implementing DOTS did not reduce diagnostic delays. This means that majority of the clinicians at those facilities were not conscious on TB case finding, such patients were just treated for cough and other symptoms and TB forgotten.

Hossain et al., (2012) also acknowledged the association between poverty and TB. According to them poverty influences all aspects of the TB disease process (exposure to infection, disease progression, delayed care seeking and above all poor treatment outcomes). They further stated that TB inflicts a lot of negative consequences on patients and makes the poor poorer, as a result of poverty related physical illness, malnutrition and decreased resistance due to a weakened immune system. As a result the poor are most likely to have severe forms of TB and run a high risk of poor treatment outcome. The researchers further assert that TB will push income insolvent patients into poverty and those deprived of food into a condition of further malnutrition (Hossain et al., 2012). In effect poverty and TB are said to be locked in a vicious cycle as one triggers the other. In fact, this is one of the reasons for making TB diagnosis and treatment free of cost. So that everybody with the disease, including the poor can access treatment. However, after several years the reality on the ground do not support this assumption as noted by Hossain et al., (2012).

Many TB patients go undetected in our health facilities and communities. However, those detected and put on treatment finds it difficult to come to DOTS centers for their medication because of lack of money. Being employed may be associated with better socio-economic status, which enables one to afford the cost of transportation for health care, purchasing of food increasing the chance of treatment compliance. Limited financial resources served as a barrier to treatment adherence. Patients in a study conducted by Rowe et al., (2005) cited the need to use public taxis to reach the clinic and the associated financial costs as a significant obstacle to accessing regular health care. Dodor (2012) also revealed in his study that some TB patients lost job opportunities because they became weak as a result of the disease, whiles others got their appointments terminated. Such patients may find it difficult to get money to transport themselves to health facilities for their drugs or even purchase food. For instance, a female patient during an interview session said she was sacked from her job as a food vendor by her aunt because of the fear that when others get to know of her situation, they would not buy her food again (Dodor, 2012).Similarly, findings from a study conducted by Berhe, Enquselassie, & Aseffa, (2012) have also shown a significant association between unemployment and unsuccessful treatment outcome. They found out that unemployed patients were about 3 times more likely to experience unsuccessful TB treatment.

A lot of cultural factors also influence TB care. Culture can be viewed as a system of learned or shared codes or standards for perceiving, interpreting and interacting with others. It can be said to be a normative framework for decision making and behavioural strategies in the society. It is therefore an integral component in defining and achieving health, maintaining health and treating illness. Spiritual components of health are also

central in many cultures. Hence, to a large extent, knowledge about diseases and where to seek remedies are defined by culture in a way. A study conducted in China cited the practice of seeing a traditional medical care provider as a cultural factor that underpins patient delays in seeking and receiving TB diagnosis and treatment (Li et al., 2013). The authors noticed that many TB patients visited traditional medicine practitioners for treatment before later seeking care at a conventional TB health facility. The major problem with seeing a traditional medicine provider prior to attending a health facility is that it results in diagnostic and treatment delays and may also lead to poor treatment outcome in situations where patients' conditions deteriorate badly.

Another cultural aspect of TB diagnosis and treatment delay is the stigma that is attached to the disease, which makes people to hide their condition. For example, in Ghana among the Gonja cultural setting TB is called "*Kiche wuse*" meaning woman disease. This is also common among the Dagaati culture, they also call TB "*pakori*" both phrases implies that the disease is gotten when a man cough during sex. The cultural belief in the cause of the disease defines the mode of treatment. Similarly, among the Sissalas the disease is called "*Kasubine*" meaning black cough and is mostly regarded as a dangerous disease. The recommended remedy for the disease in that setting is usually to prepare some traditional medicine for the patients.

2.8.2 Patient educational level

Several studies have shown a relationship between people's educational level and their health status. Education forms a unique dimension of social status, with qualities that makes it especially important to health (John and Catharine, 2003). Educational status

of the individual influence health seeking behaviour in many varied ways. It influences other social statuses including occupation, personal earnings, personal and household income and wealth, including freedom from economic hardship (John and Catharine, 2003). In effect educational background is amongst the most important determinant of socio-economic status. John and Catharine (2003) further state that education creates desirable outcomes because it trains individuals to acquire, evaluate and use information effectively. It enables self-direction toward any and all values sought including health.

According to Lertkanokkun and Okanurak, (2008) in their study carried out in Bangkok (Thailand) to assess the patient factors contributing to successful treatment. Out of a total number of 1,241 patients studied a significant percentage (81%) of the patients with higher educational levels and knowledge of tuberculosis were successfully treated. This supports the argument that these factors are associated with better compliance to TB treatment and subsequently treatment success (Lertkanokkun and Okanurak, 2008). Several other studies have demonstrated educational levels of TB patients as significant predictors of treatment outcome. According to (Belo, Luiz, Teixeira, Hanson, & Trajman, 2011), all patients deaths noted in their study occurred in the group with lower educational level.

2.8.3 Age of patients

Age of patients has also been associated with some kind of unsuccessful treatment outcome. Findings from a study conducted by Tessema et al., (2009) showed that the death rate of patients increased with increase in age of TB patients. The death rate

increased from 4.6% in the age group 0-14years to 10.1% in the age group 65 and above. Other studies have also associated poor TB treatment outcomes with increasing age of patients. A study conducted by Ananthakrishnan et al., (2013) reported that patients 70 years or older were more likely to experience unfavourable treatment outcomes. However, in Brazil, Garrido, et al., (2012), found out that older patients were less likely to default from TB treatment. The authors reported that each year of life, reduce noncompliance rate by 2%. In Egypt a study conducted by Nour El-Din et al., (2013) revealed that patients who were less than 30 years of age were more likely to default from treatment compared to patients who are about age 50 and above. They reported that patients who were less than 30 years were about 6.25 more likely to default from treatment compared to patients who are older than 50 years.

2.9 Patient related factors

2.9.1 Feeling better or lack of improvement with treatment

Interpretation of illness and wellness by patients is crucial to the adherence to treatment. Several studies have reported that patients stopped taking medication because they felt better and thought that they were cured. For instance a study conducted in South Africa reported that some patient become reluctant to take TB medication once they feel better (Rowe et al., 2005). A similar finding was found by Kaona et al., (2004) in their study where it was noted that the major determinant of non compliance to TB treatment was patient beginning to feel better.

On the other hand, some patients who felt no improvement in their condition whiles on TB treatment or felt condition has worsen were most likely to default from treatment (Nour El-Din et al., 2013). This is against the background that some patients even have the belief or perception that TB cannot be cured. Watkins and colleagues found out in

their study that patients took their drugs during the intensive phase and no one stops, but for the continuation phase the patients did not want to continue with treatment, they did not see it necessary because they were not getting better whiles on treatment. On the other hand, some patients who felt they no longer have the disease because symptoms had subsided also stopped taking the medicines (Watkins et al, 2004).

2.9.2 Knowledge about TB

Lack of knowledge about TB makes the condition a serious public health issue, which need greater attention. A patient knowledge about the signs and symptoms could prompt early care seeking. Similarly, a person's knowledge about the mode of transmission and methods of prevention of the disease will have helped people to take measures to protect themselves and others from contracting the disease. Kaona et al., (2004) found in their study that people's knowledge about the symptoms of TB did not vary according to levels of education. The study also cited lack of knowledge on the benefits of completing TB treatment as a risk factor for patients defaulting treatment. A study conducted by Muture et al., (2011) cited inadequate knowledge about TB as a reason associated with treatment default. Lack of awareness of the curability of TB and the duration of treatment was noted as a major risk factor for treatment default.

2.9.3 Stigma and discrimination

Many studies have reported the effects of stigma on TB treatment. Stigma leads to a situation where TB patients receive ill treatment from community members. It is common for people affected by TB to suffer from discrimination both in the developed and developing world as a result of the stigma and myths that surround the illness. In

some cultures, TB is associated with witchcraft (WHO, 2004). TB can be considered a 'curse' on a family, as the illness often affects multiple generations. It is now known that this is simply because TB is an airborne illness, which is more likely to be spread among people living in close proximity.

TB is often associated with factors that can themselves create stigma: HIV, poverty, drug and alcohol misuse, homelessness, a history of prison and refugee status. People who are discriminated against may be isolated socially, particularly in small communities, even entire families may be shunned. Women are often blamed as the source of TB, and those affected by the illness may be divorced or considered unworthy of marriage. Ahorlu and Bonsu (2013) in their study found that people accuse women as being the source of the infection with TB disease.

A stigma is an "attribute that is deeply discrediting" and that reduces the bearer "from a whole and usual person to a tainted, discounted one" (Goffman, 1963), stigma is said to be a social determinant of health. According to Turner (2010) stigma occurs because of community and institutional norms about undesirable or disvalued behaviours or characteristics. Goffman traced the historical use of the word stigma to the Greek in ancient times, which referred to a bodily sign designed to expose something unusual and bad about the moral status of the signifier. According to Goffman (1963), the signs were cut or burnt into the person's body as an indication of being a slave, a criminal or a traitor. The disgrace and shame of the stigma became more important than the bodily evidence of it.

Labelling, isolation, loss of status and discrimination can all occur at the same time and can be considered components of stigma. Further, Goffman (1963) distinquished three types of stigma. The first is stigma of physical deformity, which is the deficit between the expected norm of perfect physical condition and the actual physical condition of a deformity on a person. It can take the form of any physical impairment. Many chronic diseases create changes in physical appearance or functions. These changes often create difference in people. The second type of stigma is character blemish. This may take the form of dishonesty, unemployment and addiction. It may occur in individuals with sexually transmitted infections such as HIV/AIDS, alcoholism and TB. These individuals face stigma because many believe that the individuals who are infected could have controlled the behavior that resulted in the disease. The third type of stigma is tribal in origin. This type of stigma occurs when one group perceives features of a race, religion or nationality of another group as deficient compared with their own socially constructed norms.

The complexity of stigma stems from institutions, communities as well as inter and intra personal attitudes. Hence the community and individual norms that promote stigmatization of TB hinders the progress of the TB control programme. Mostly the fear of infection is one of the major reasons for stigmatizing TB patients. As a result stigma contribute to increasing delay in seeking TB care and treatment non compliance (Turner, 2010; Somma et al, 2008). For example, stigma was reported as a common experience among patients in a study conducted by Somma et al, (2008). Patients in the study reported being avoided by others. Such findings confirm peoples fear of the disease, lack of information about TB and its treatment and more importantly, support for TB clients (Somma et al, 2008).

Tuberculosis is seen as a discriminatory disease. This is due to the fact that TB is associated with HIV. Many TB patients had seen other HIV patients suffering from stigma and discrimination in their communities and feared that the same might happen to them. These raise an important point for delays in care seeking of TB patient or even adhering to treatment. Stigma results in many patients hiding their diagnosis of TB or seeking TB treatment in their locality difficult (Gebremariam et al., 2010; Somma et al, 2008). This is due to the fact that people associate TB with HIV Finding from a study conducted by (Gebremariam, Bjune, & Frich, 2010). For instance Gebremariam et al., (2010) noted in a focus group discussion where a patient said "*I don't want neighbors to see me here (referring to the TB clinic). One day, I saw this girl from my neighborhood here; I was sitting outside and waiting. I wished the earth would open and swallow me. I know she would spread the gossip. I tried to hide behind the man sitting next to me. I don't think she saw me"*. Because of the negative societal attitudes, most patients keep their diagnosis secret. Dodor, (2012) also reported in his study that the negative attitudes of others towards TB patients affected the way they interacted with both family and community members. Such patients usually ensured that they had limited interaction with family members. They live in isolation. This goes to explain how stigma affects care seeking among patients.

Issues of varied ways of caring for patients at home are many in our local settings where the literacy levels are low. The possibility of being exposed to tuberculosis by simply associating with patients may create some reluctance by those in the household to providing proper care for the patient and encourage non-compliance to treatment. As a result, people affected with the disease receive little support from family members, friends and even health workers.

The impact of stigma thus delays care seeking, making it much more likely that they will become seriously ill and infect others. This then perpetuates the myth that it is the TB treatment itself that causes deaths, as treatment is much less effective if left until the illness is in its advanced stages. Stigma around TB can also make people reluctant to stick to their course of treatment over the many months the treatment last for fear of being 'found out'. Additionally, by taking treatment irregularly, people risk developing drug resistance.

2.9.4 Duration of treatment of TB

The length of the treatment period and the quantity of drugs to be taken at a time all affects adherence to the treatment. A number of studies showed that non-adherence to TB treatment results in unsuccessful treatment outcomes. Reasons for non-adherence to TB treatment are many, ranging from the patients beginning to feel better, lack of knowledge on the benefits of completing a course, running out of drugs at home and TB drugs being too strong to continue (Kaona et al., 2004). Siemion-Szcześniak & Kuś, (2009) noted in their study that about 7% of patients interrupted treatment as a result of adverse reaction to drugs. Also, pill burden, coupled with overlapping side effects of drugs cause, treatment interruption among HIV infected TB patients as note by (Gebremariam et al., 2010). They also reported that patients felt they were over burden with drugs, where such patients used phrases like "*becoming a drug bad*" and "*becoming a pharmacy*" to describe the situation. Other patients were reported to have associated high number of pills with potential damage to the body and higher risk of not tolerating the drugs. As such, ensuring successful treatment of patients might require addressing these multiple factors beyond simple supervision of drug intake.

2.9.5 Side effects of TB drugs

Managing the side effects of medication is important in helping people to complete their TB treatment. This is crucial to minimize the impact of TB on a person's health and to stop them spreading the illness. The side effects of TB drugs depend on the regimen of treatment. These range from mild but irritating to severe and potentially life threatening, and can sometimes even warrant a change of medication. Dealing with side effects during at least six months of treatment can prove very challenging for people, and is another thing to contend with along with symptoms of the illness itself.

In general, the first line drugs used to treat drug-sensitive TB are better tolerated than the second line medications for drug-resistant TB (Mukherjee et al., 2004). Recognised side effects include: nausea and vomiting, vomiting can prevent medication from being absorbed, orange red urine and rashes among others.

2.9.6 Availability of treatment supporter

TB treatment lasts for 6 to 8 months and requires patients to take drugs on a daily basis for the treatment period. As a result, patients are required to self-nominate someone to support them throughout their treatment period. Treatment supporters are expected to play the role of a DOT supporter, supervising patients to take their medication on a daily basis. Treatment supporters are also required to collect patient's medication from the health facility whenever patients are unable to do that in person. In reality, this may not be so as some of the treatment supporters do not live with the patients and therefore not likely to observe the patient take his or her drugs. Treatment supporters are expected to provide social and probably financial support to patients. In China, a study conducted found out that patients who were visited at home by health workers to

supervise their treatment successfully completed treatment compared to defaulters who were not visited frequently (Xu et al., 2010)

2.9.7 Alcohol, tobacco smoking and other substance abuse

There is scientific evidence indicating the relationship between addictive drugs abuse and increase susceptibility to infections. Drugs such as heroin, cocaine, marijuana and other substances such as alcohol alter the abusers neuropsychological and pathophysiological responses and also are capable of altering the immune system. Immune suppression caused by drugs may increase the individual substance abusers susceptibility to infections (Sergio, 2013). People who misuse drugs or alcohol have a greater risk of contracting TB. In the United States of America, Sergio (2013) reported that 1 in 5 TB patients use illicit drugs or drink alcohol to excess. This is because alcohol and drugs damage a person's body and weaken their immune defenses against illnesses such as TB. They may not eat a diet that provides all the nutrients they need to stay healthy, and may spend time in places where it is easier for TB to spread, such as crowded or poorly ventilated homes or social venues. They may be around other people who have infectious TB, but do not know it. The symptoms of TB can be masked by drink and drugs and such patients may be less likely to seek early treatment. Also, substance abusers have a record of poor adherence to treatment which may cause the progression of latent TB infection to active disease because of the immune impairment. This means they then pose an increased risk of passing infectious TB on to others and/or developing drug-resistant TB.

Alcohol and other substance abuse have been cited as one of the reasons for poor TB treatment outcome. TB treatment can be complicated in people with drug and alcohol

issues because: TB medication can lead to side effects such as liver toxicity, which is particularly dangerous for people who drink too much alcohol, for example excessive alcohol use is a significant predictor of TB drug induces liver injury (Thompson et al., 1995). Additionally injecting drug users are at risk of co-infection with viral hepatitis and/or HIV, which require careful monitoring and alternative drug-regimens.

There are several concerns or implications for a patient taking alcohol whiles on medical treatment. According to the medicines and information center (2007), tobacco smoking is associated with many drug reactions; the same can be attributed to alcohol. Such drug interactions may decrease the effectiveness of medications or render them useless. This can occur in two ways, thus pharmacokinetics and pharmaco-dynamic mechanisms. Pharmacokinetic interactions are those that affect the absorption, distribution, metabolism, or elimination of other drugs, potentially causing an altered pharmacological response (Pleuvry, 2005). Such interactions may cause substance alcoholics and other substance users to require larger doses of certain drugs through an increase in plasma clearance, a decrease in absorption, enzyme induction or a combination of these factors. Pharmaco-dynamic interactions alter the expected response or actions of other drugs. In other cases, substance and drug interactions may make drugs harmful or even toxic to the body. It may cause problems such as headache, drowsiness, nausea and vomiting among others which may be attributed to the drug as side effects.

Another negative effect of smoking is the financial burden it puts on patients who smoke. This is against the background that TB is a poverty related disease and most patients are usually poor. Such patients may worsen their financial situation while they continue to smoke. According to a Mature et al., (2011), recurring use of alcohol is

mostly associated with noncompliance with medication. When one is under the influence of alcohols/he is likely to forget to take the medicines. According to a study conducted in the Russian federation, the author found out that substance abuse was associated with non-adherence to medication. The findings showed that substance abuser were about seven (7) times more likely not to adhere to medication and two (2) times more likely to result poor TB treatment outcome (Gelmanova et al., 2007). The study has demonstrated clearly the effect of alcohol and substance abuse on treatment compliance leading to poor treatment outcomes. The same study further revealed that patients with any form of substance abuse were about eleven (11) times associated with patients defaulting from treatment. These results suggest that DOTS programmes might be more likely to achieve TB control targets if they include interventions aimed at improving adherence by diagnosing and treating substance abuse concurrently with standard TB therapy (Gelmomanova et al, 2007).

Another study conducted by Chiang, et al., (2012) confirmed tobacco smoking as a risk factor to unsuccessful TB treatment outcome. Cigarette smoking causes a deficiency in respiratory function, affects the immune system and interact with the metabolism of anti TB agents leading to reduced treatment effective. The findings of this study show that continuing to smoke during therapy may significantly restrain the effectiveness of TB treatment. It is therefore important to adopt an approach to stop smoking in TB patients. The researchers therefore advocated for the inclusion of cessation of smoking in TB treatment programmes to reduce the dual global burden of TB and smoking. Garrido et al., (2012), noted in their study that alcoholism was an important predictor of treatment default. They noted that people who drank alcohol were 51% at risk of defaulting from TB treatment.

2.9.8 Co-infection (HIV and other health conditions)

TB infection has resurged with the emergence of the HIV pandemic. TB is the most common HIV related opportunistic infection and it is considered the most powerful risk factor for the progression of TB infection to disease as it weakens the body's defense system (cell mediated immunity and macrophage function) (Gupta, Shenoy, Mukhopadhyay, & Bairy, 2011). However, there are other diseases that equally compromise the immune system. Diabetes mellitus is noted to impair neutrophil and macrophage functions (Rabe et al., 2007) and can therefore increase the risk of TB disease or aggravate an existing TB disease.

The outcome of TB treatment can be influenced by HIV infection and is known to be less successful in TB-HIV co-infected patients when compared to HIV uninfected patients. The devastating consequence of the collision of HIV and TB cannot be underestimated. HIV has impacted the TB epidemic by increasing the number of cases. Several studies report poor treatment outcomes for TB-HIV co-infected patients. Findings from a study conducted in India found a significant association between HIV co-infection with unsuccessful TB treatment outcome (Mohan et al., 2012). The study reported that HIV infection as well as duration of HIV infection were significantly associated with worse TB treatment outcome. Similarly, findings from another study conducted in Iran also found that TB patients with disease conditions such as hepatitis, exacerbation of renal failure was associated with treatment cessation/interruption contributing to the unsuccessful TB treatment outcome (Heydari, Sarvghad, & Bukhari, 2008). The study revealed that about 1.3% of patients who interrupted treatment were as a result of a medical condition. Ismawati and Awang (2013), noted in their studies that the treatment success rate was poor among HIV Infected TB patients. They reported only 53.4% treatment success rate compared with WHO's target of 85%. They

further reported that HIV infected TB patients were about 2.7 times more likely to have unsuccessful TB treatment outcomes.

High default rates or non adherence (25.6%) to TB treatment has been noted among TB-HIV co-infected patients. TB-HIV patients probably become severely ill due to poor immune system and are unable to tolerate their medications. This makes it difficult for them to comply with their follow-up schedules at health facilities. Chiang et al, (2012), also confirmed a significant association between diseases like liver diseases, renal diseases, and diabetes and unsuccessful TB treatment outcome. The study revealed that patients with liver problems were about 3 times more likely to result in unsuccessful treatment outcomes. Gebremariamet al., (2010) also confirmed in their study that TB was more difficult to be cured among people with HIV. The same study revealed that because patients have the belief that the cure for TB among people with HIV may not be that easy, the patients were motivated by the fear of severe consequences of TB to take their medication properly till completion (Gebremariam et al., 2010). The same study also revealed that patients hold different views about which disease was severe. Patients views affected decisions about which drugs to discontinue due to probably drug burden and side effects. Also TB-HIV drug combination can lead to treatment default as a result of the large number and diversity of drugs and adverse effects associated with drugs (Garrido et al., 2012).

Although the greater focus is being put on TB-HIV co-infection as a major public health concern, there are other underlying risk factors which compromise the immune status.

2.10 Health system factors

Several hindrances such as inadequate infrastructure, accessibility of health services, quality of counselling/communication or health education rendered, knowledge and skills of health care providers are factors that affect the TB control programme (Annan, Singh, Dogbe, & Asante, 2013). Other health system related factors affecting the TB programme include long waiting times, staff attitude towards patients, non-availability or frequent shortage of TB medicines, lack of privacy, limited capacity of health workers to recognize TB and provider absenteeism.

Studies have revealed that the way health professionals receive and treat patients at health facilities may encourage or discourage them from coming for treatment. In effect the attitude of health worker towards TB patients may either encourage them to continue or discontinue treatment. For instance findings from a study conducted by Gebremariamet al., (2010) showed that patients were encouraged to go to health facilities for treatment because they were received with a good face by health professionals and were encouraged to finish their treatment. Findings from another study conducted in Ghana also indicated that most patients found the attitude and behaviour of health professionals towards them demeaning (Dodor, 2012). Such attitudes patients say affects their confidence and the way they relate with others in the community. Others pointed out that it discouraged them from reporting to the hospital. Several studies have cited the attitude of health workers as one of the reasons patients fail to adhere to TB treatment. Findings from another study quoted a patient to have said that she refused to go for more TB drugs after she missed treatment for just a day, with the belief that she will be scolded by the health worker (Munro et al., 2007).

Key to a successful TB treatment outcome is health education or provision of adequate information to patients about the disease and potential side effects of treatment. Patient education and counselling aims to ensure that people have sufficient knowledge and understanding to make informed choices and actively participate in their own health care. Patient education has been defined as a deliberate process of influencing patient behaviour and producing the changes in knowledge, attitudes, and practices necessary to maintain or improve health (Jm, Kredo, Volmink, et al., 2012). Providing patients with complete and current information about their health helps create an atmosphere of trust, enhances the healthcare provider-patient relationship, and empowers patients to participate in their own health care (Jm, Kredo, & Volmink, 2012). In Egypt, a study conducted by Nour El-Din, Elhoseeny and Mohsen, (2013) found that health professionals not listening to patients, not explaining TB complication and not explaining treatment side effects to patients were some of the causes of treatment default.

Adequate knowledge about the spread of TB during treatment may prevent needless social isolation, while understanding the duration of treatment gives the patient a better outlook about his/her abilities in the near future (Mkopi et al., 2013, Watkins et al, 2004, Mature et al., 2011). Also, providing adequate information on the potential side effects of TB drug before the start of the treatment can also help to sustain adherence. However, the studies revealed that providing information on the potential side effects of TB drugs did not appear to be a priority for a significant number of healthcare providers, since approximately one third of patients did not receive any information on side effects. This is even against the background that several studies have documented that side effects negatively affects adherence to TB treatment and patients who

experience side effects are more likely to discontinue treatment (Siemion-Szcześniak and Kuś, 2009,: Watkins et al, 2004). In effect the role of health education to patients before they start treatment is key to ensure successful treatment outcomes.

In this era where health care providers continue to preach client centeredness and quality assurance, it is appropriate for TB patients to be handled with utmost care and respect. This includes giving them the opportunity to select a choice of site where they can always go for the drugs. Especially so when patients are allowed under the community DOT programme to take their medication at home under the supervision of a treatment supporter. Findings from several studies have revealed that the actions of health workers could compromise patients adherence to treatment and ultimately treatment outcomes. For instance, Mkopi et al (2013) revealed in their study that patients were not given a choice by health workers concerning the place of treatment. The study revealed that facility based treatment was forced on patients, which was likely to compromise adherence, particularly in the situation where the distance between the patient's residence and the health facility was too far (Mkopi et al, 2013). Also, the cost of transportation to treatment centers could also affect patients' ability to go to treatment centers, particularly so when most TB patients are financially poor. On the other hand, if patients are forced to follow home based DOT, this may also result in poor treatment adherence, especially when they do not have a reliable treatment supporter.

Shortage or lack of staff, staff schedules and funds to perform tasks such as patient education, treatment supervision, home visits and case finding hinders the success of the TB control programme (Watkins et al, 2004). A major challenge is competing

demands on staff time. The health system runs so many programmes with few staff, one person can handle more than one programme, consequently they do not have time to visit patients. The idea of the vertical TB control programme was to have dedicated staff for TB activities, but staff at the district level are involved in several other programmes. This, coupled with dwindling financial resources makes monitoring and follow up activities difficult.

Staff level of education/capacity for TB control activities is crucial to the success of the programme. Further education of the staff in the form of in service and refresher training is considered to be the most important need of the TB programme. Watkins et al, (2004), revealed in their study that Nurses and professional paramedics stated that their training had not adequately prepared them for their role in TB control, and many staff had received little education specific to TB.

2.11 National Tuberculosis Control Programme

The mandate of the NTP is to provide leadership for the health sector response to fight TB in Ghana. The Health Service is organised into a three-tiered administrative system: national, regional and district, but is a five tiered in terms of service delivery: national, regional, district, sub-district and Community Based Health Planning and Services (CHPS). TB control is fully integrated into the health system at all these levels (Bonsu et al., 2012).

TB control in Ghana date back to the pre-independence era when the then colonial government recognized the need to combat the disease due to the threat it posed to the larger society. In July 1954, the Ghana Society for the Prevention of TB was established to support and supplement government's efforts at combating the disease. In the early 1960's, the Government of Ghana sponsored nurses to train in Israel in the

area of TB Management (they were then known as TB nurses). It also came to light that, during that same period, Mobile X-Ray Vans were used to carry out mass screening for TB according to the Ghana Health Service.

The NTP is organized to set the policy and ensure the prevention and proper management of tuberculosis cases. For effective control of TB, certain key outcomes have been identified as crucial for programme effectiveness and success. Specific targets have been set for these outcome measures; and NTP's are to strive to achieve them if they are to be successful in controlling TB in their respective countries. The prevalence of TB in Ghana is estimated at 351 per 100,000 population in 2011 (WHO, 206).

The implementation of the current TB program started in 1994 with training sessions in three regions. In the same year, Ghana adopted the WHO DOTS Strategy, based on the five pillars of political commitment; diagnosis by sputum smear microscopy, standardized supervised treatment, uninterrupted drug supply and recording and reporting system. DOTS (Directly Observed Treatment Short course) were implemented countrywide within the 5 tier health system in the public sector.

The targets for TB control in Ghana are to:

1. Achieve sputum smear conversion rates of at least 85% among new sputum smear positive patients and 80% among re-treatment cases at the end of the intensive phase of treatment

2. Cure 85% of the sputum smear-positive TB cases detected by the programme. The achievement of high cure rates is the highest priority of any NTP since it is expected to give rise to the following results that are fundamental for successful TB control, rapid decrease in the TB mortality, prevalence and hence transmission in the community, gradual decrease in the incidence due to decreased transmission

rates. Due to better cure rates (and by inference treatment completion rates) the emergence of drug resistance is expected to decrease.

3. Detect 70 % of existing cases of the sputum smear positive cases in the population. This expansion is expected to capture most of the infectious cases in the population and decrease the disease burden. However, it must be emphasized that only when the cure rates are satisfactory, should efforts be made to expand the coverage. Failure to observe this would lead to more sputum positive treatment failures and increased transmission of drug resistant strains and hence the disastrous consequences that would render the epidemic to become untreatable.

4. Ensure accurate measurement and evaluation of programme performance.

2.12 Tuberculosis Control in Bole District

Tuberculosis Control in Bole is supported by NTP of the Ghana Health Service. TB treatment and control activities in the District follow the NTP guidelines. The government of Ghana is politically committed to the programme and provides funding for the programme through the Ghana Health Service. The district health directorate coordinates the programme at the district level and TB coordinator has key roles in evaluating the programme. The district TB coordinator is responsible for the registration and case holding as well as coordinating other activities, especially logistic management. Health facilities in the country serve as treatment centers within the NTP. These facilities follow NTP guidelines for diagnosis and treatment of TB patients, and fulfill their recording and reporting requirements.

CHAPTER THREE

Methodology

3.0 Introduction

This chapter presents a comprehensive account of how the study was conducted. It describes methods and materials that were used for the research. The chapter describes the study area, study design/type, study population, limitations of the study, ethical clearance, sampling procedure and methods used in collecting data as well as the tools for analysis.

3.1 Background of the study area

3.1.1 Geographical location

Bole district is located in the western corridor of the Northern Region and shares borders with La Cote D'Ivoire in the west, Tain, Kintampo North and Kintampo South districts to the south, West Gonja and central Gonja districts to the east and Sawla-Tuna-Kalba district in the north (Appendix B).

Bole is the district capital and it is about 240 Km from Tamale, the Regional Capital. The district covers an area of about 10,500 sq km and sub-divided into six sub-districts; namely Bamboi, Bole, Mandari, Mankuma, Jama and Tinga sub-districts. These sub-divisions is for purposes of health care delivery.

3.1.2 The people

The projected population of the districts for 2013 is 73,135 with an annual growth rate of 2.9% (2010 Census projected). The population is located in 161 communities. The main tribes are Gonjas, Brifors, Vaglas, Dagaabas, Mos and Lobis. Most of the

settlements are located along the two main roads running through the district; the Bamboi – Wa trunk road and the Bole - Chache road that leads into La Cote D'Ivoire.

3.1.3 Main economic activities

Farming is the main economic activity of the people living in Bole district. The main crops cultivated are yam, maize, guinea corn, cassava and millet. Most people practice subsistence farming to meet the household needs of their nuclear family and any excess farm produce is sold on market days. A smaller number of the people engage in cashew nut plantation. Others engage in trading and hunting. Petty trading is concentrated in Bamboi and Bole lorry stations where most commercial drivers and passenger cars stop for refreshments. There has been a discovery of surface gold mining in two communities; Kui in Tinga sub-district and Cloth in Bole Sub-district. The discovery has attracted a diverse population of people into the district.

3.1.4 Transport and communication

The district is networked mostly by a maze of feeder roads and paths. The trunk road from Wa - Bole and Bole - Bamboi stretch linking Wenchi in the Brong-Ahafo region is tired. The Bole, Sawla, Damango to Tamale road has also been tired. Telephone services are provided by Mobile phone services such as Mobile Telecommunication Network Ltd (MTN), VODAFONE, Airtel and TIGO only. The district relies on Unique FM and occasionally on Radio BAR and Savana FM for information, education, entertainment and others.

3.1.5 Education

The district is endowed with a number of educational facilities, especially from Preschool to Junior High levels. Majority of children in school going age in Bole town are attending school, however those in surrounding communities, especially in the villages are not in school. Many children in these communities are not attending school. This widens the illiteracy rate in the district. The total enrolment in 2010 for district stood at 21,631 for both public and private schools. Out of this 20,625 are in the public schools whilst 976 are the private schools (GES, 2014)

The district has one Community health nurses training school, one (1) Senior High School, twenty-five (25) Junior High Schools, sixty two (62) Primary schools, sixty two (62) preschool and three (3) Vocational/Technical institutions.

3.1.6 Water and sanitation

Bole, the district capital, is the only town in the district that enjoys pipe borne water supply services. The town is supplied from four main boreholes that have been mechanized. The rest of the communities are served by boreholes, hand dug wells and dams. The district is blessed with a good water table that ensures that boreholes can be sunk in most villages to provide safe and potable water to the people.

Waste management is carried out by the District Assembly in Bole and Bamboi townships, but indiscriminate dumping on unauthorized sites is practiced in the rest of the towns and villages in the district. The drainage system is poorly planned and flooding of streets and homes is common after every heavy rainfall in Bole and the other big towns. About one third of the people in Bole have private toilets (Office of the District Environmental Health). Most people use public toilets in Bole.

3.1.7 Health care

There are 15 health facilities in the district comprising Bole district hospital, five (5) health centers, one (1) clinic and eight (8) functional Community Based Health Planning and Services compounds (CHPS).

All the facilities with the exception of Bole health centre and Martyrs of Uganda health center offer 24-hour services to the communities they serve. The district hospital serves as the highest referral point for patients in the district and has a catchment area extending beyond the borders of the country into neighbouring Cote D'Ivoire.

The population in the district, especially in the remote settlements, is served by eight functional Community-based Health Planning and Services (CHPS) facilities. Additional source of access to health services in the district is the many outreach service points created in many larger communities scattered in the rural and remote settlements.

3.2 Study Design/type

A study design is a procedural plan that is adopted by a researcher to answer questions validly, objectively, accurately and economically (Kumar, 2011). A quantitative, cross-sectional, descriptive and comparative study of TB patients who started TB treatment between January 2009 and April 2013 in the Bole District was conducted.

3.3 Study Population

This refers to individuals, organizations, groups or communities from which the required information about a research problem is obtained. In other words, it is the full set of individuals who could be included in the study and around which the researcher

would like to generalize the findings. The study population comprised of all TB patients who were put on the treatment during the period proposed for the study (January 2009 to Jun 2013). Study participants were persons who defaulted TB treatment and those who successfully completed treatment. A defaulter was a patient who has stopped taking the treatment for at least two months and completed treatment, patients were those declared cured or treatment completed by a clinician after the standard duration of treatment.

In addition, in-depth interviews were conducted with frontline health workers involved with the TB control programme in the district. The participants of health workers were purposely selected from the list of health workers in the District Health Management Team (DHMT), sub-district and health facility level. The participants were made up of the district TB coordinator (1), the district hospital institutional TB coordinator (1), sub-district leaders (4) and sub-district TB coordinators (3).

3.4 Study units

In this study, both frontline health care providers and patients who had been diagnosed as having TB and registered in the district TB register during the years January 2009 to June 2013 were recruited. Categories of treatment outcomes that were used in this study were based on the WHO recommended guidelines. A set of five possible and mutually exclusive categories of treatment outcome was used. These categories are cured, treatment completed, treatment failure, death and defaulter. However, patients who died were excluded from the study.

Definitions of categories of treatment outcomes according to WHO:

- Cure: a sputum smear positive TB patient who had completed full anti-tuberculosis treatment and was culture negative at the end of the treatment.

- Treatment completed: Patient who had completed the assigned treatment, but final sputum cultures were not obtained and the supervising health personnel decided that the patient required no further treatment.
- Default: Patient who had taken anti-tuberculosis drugs for one or more months and interrupted treatment for two or more months.
- Treatment failure: Patient in whom sputum culture remained or became positive at 5 and 6 months of anti-tuberculosis treatment.
- Death: Patient who died for any reason during anti-tuberculosis treatment.

The study was done in two stages; the first phase involved extracting patient's records from the TB register and patients' folders. The second stage involved sampling patients to be interviewed according to structured questionnaire (Appendix C).

3.5 Sample size

A total of 105 TB patients made up of 35 defaulters and 70 completed treatment patients were purposefully selected for the study considering the total number of TB patients registered for treatment during the period under study, willingness of patients to participate in the study and the ability to trace and locate patients in the communities.

3.6 Sampling Methods

A sample is the selected subset of a population from which information is collected in a study. Sampling is the process of selecting subjects or individuals from the entire population of interest to be used for the study. The District TB register which records the patient's name, registration number, date of starting and completion of treatment or outcome, demographic details, address and treatment outcomes was used to develop the

sampling frame. Study participants were selected using the purposive sampling method on the basis of patients' willingness to participate in the study and the ability to trace patients.

3.7 Study Variables and data sources

A variable is a property that can assume different values. Primary data was collected from patients and health workers. Patients' characteristics such as demographic and socio-economic variables such as age, sex of respondents (patients), as well as income and occupational status were assessed. Level of formal education of patients was also be assessed. Factors that affect TB management in the district were also assessed; the focus was to explore both individual patient factors as well as health system related factors.

Table 1: Study variables

VARIABLE	DEFINITION
Age group	The age group a patient fall within with reference to his/her date of birth
Sex	Biological in terms of male or female
Place of residence	Where patients stay in terms of rural or urban (rural areas are places without hospitals or health centers and poor access to the main towns in the district
Occupation	Usual work done by patients on a day to day basis
Income level	Annual income respondents
Treatment outcome	Status of patient after treatment duration e.g. defaulter, cured, treatment failure, treatment completed. The final classification of treatment outcomes is successful and unsuccessful
Marital status	Expressed in terms of, married, single, divorce etc.
Distance to health facility	Distance from community where patients stay to where patients access TB care in terms of km
Educational level	Educational attainment of a patient in terms of primary, JHS, SHS & tertiary
Waiting time	Time spent at the facility when accessing TB care from entry to exit
Level of knowledge on TB	Ability to identify TB cardinal signs & symptoms correctly and state the duration of treatment
Health provider attitude	How health worker treat and handle clients

3.8 Study instruments

An Interview Guide (Appendix C) was used to solicit information from patients. The data collection instrument was developed in line with the study objectives and was pretested in the Mankuma Sub-district within the Bole district. The purpose of the protesting was to test the validity and reliability of the data collecting instruments. Anomalies that were identified through the protesting were corrected before final data collection.

3.9 Data Analysis and presentation methods

Data was entered, cleaned and analysed using the Epi info 7 software. Summary output tables of percentage distribution were produced. For association of factors Chi-square test was used. If $p<0.05$ the test was considered statistically significant.

3.10 Quality control

1. Data collected in the field was double checked to ensure that all the information required was captured and recorded.
2. In the situation where a questionnaire was not properly filled, the data collector was made to re-administer the questionnaire on the respondent.
3. Data security was maintained by entering the data on a personal computer secured with a password.
4. To ensure the quality of data entered into the computer, another person was made to independently crosscheck each entry.

3.11 Ethical Considerations

Permission to assess data at the Bole District Health Directorate for the study was sought from the District Direct of Health Services through the Head of Department of the Department of Allied Health Sciences, University for Development Studies (Appendix A).

Preceding the study, approval was sought from the ethics committee of the University for Development Studies. Permission was also obtained from the district health directorate to carry out the study in the Bole district.

Informed consent was sought from each participant. Confidentiality of information for each study participant was maintained and respondents were informed that this information would not be made available to persons outside the study team. Respondents were further assured that no persons-identifiers would be used for publication.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the results and findings as proposed by the study. The findings are presented based on the specific objectives of the study.

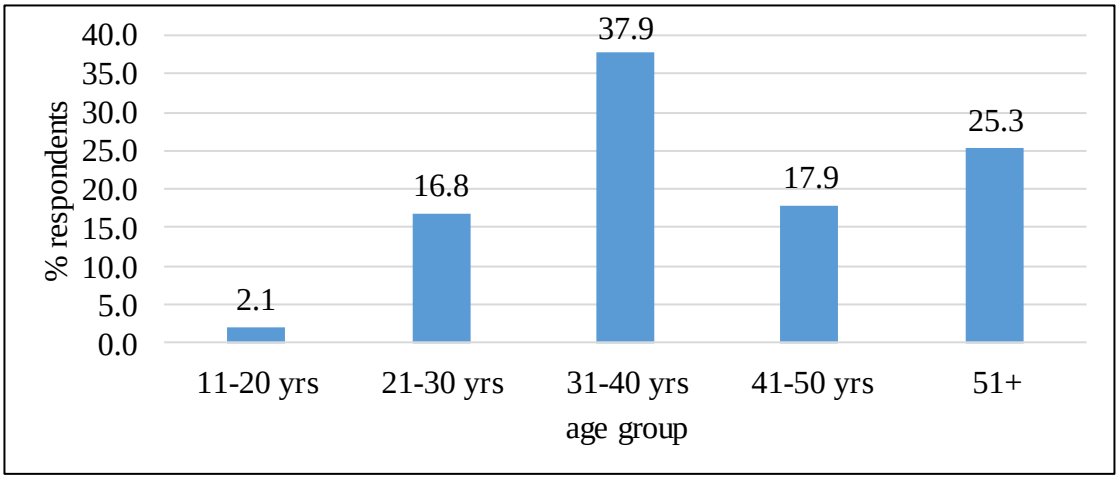
Specific objectives of the study were:

- To determine demographic and social factors that affect TB treatment.
- To investigate patient related factors that affect TB treatment
- To assess health service related factors that affect TB treatment success
- To explore the factors that influence TB treatment from the perspective of care providers.

The sample size for the study consisted of one hundred and five (105) participants; thirty five (35) defaulter and treatment failures classified as unsuccessful treated and seventy (70) cured and treatment completed classified as successfully treated. A list of all the respondents with their contact details such as address and telephone numbers and each participant traced to their individual communities. Only twenty five (25) out of the thirty five (35) treatment defaulters could be found. This category of study respondents were more difficult to trace as some had left the district and others gave wrong addresses and telephone numbers which could not be reached. Seven of the defaulters could not be traced due to wrong addresses and relocation and three were also reported to have died. For the completed treatment clients, a participant who could not be traced was replaced.

4.1 Demographic factors

The demographic characteristics include age group of respondents, sex, educational level, marital status and religion. A total of ninety five (95) respondents were interviewed: 25 defaulters and 70 completed treatment patients.



Source: Field survey, 2014

Figure 2: Distribution of respondents by age groups

Over 50% of the respondents were between the ages of 21 – 40 years (54.7%) (Figure 2). Greater proportions of the defaulters were also within the same age group of 21-40 years (68%). Only 7 (28.0%) of the respondents who defaulted treatment were over 40 years, whiles 33 (47.1%) of respondents who successfully completed treatment were over 40 years.

Table 2: Sex distribution of respondents

Sex	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
Female	15 (60.0)	23 (32.9)	38 (40.0)	5.655	0.031
Male	10 (40.0)	47 (67.1)	57 (60.0)		
Total	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

Of the 95 participants interviewed, there were 57 (60%) males and 38 (40%) females (Table 2). There were, however, a higher proportion of females 15 (60%) in the treatment default group than males 10 (40%). Sex of respondents was significantly associated with treatment default (p=0.031).

Respondents' level of education

Greater number of the participants (63; 66.3%) had no formal education. The highest level of education reported in this study was senior high school 5 (5.3%). On the other hand, a higher proportion of the defaulters 21 (84.0%) did not have any form of formal education. Again, unlike the successfully completed treatment category the highest level of education for the default group was junior high school where only person 1 (4.0%) was recorded. Level of education did not account for any significant difference between the two groups (p=0.232)

Marital status of respondents

Respondents' marital status was also obtained. Over three quarters of the respondents were married 74 (77.9%). Only 17 (17.9%) were never married and a greater percent of the respondents who were married were in the successful completed treatment group 56 (80.0%). Marital status did not account for any significant difference between the two groups (p=0.189)

Table 3: District of residence of respondents

District	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
Bole	13 (52.0)	58 (82.9)	71 (74.7)	9.290	0.004
Other districts	12 (48.0)	12 (17.1)	24 (25.3)		
Total	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

Respondent's place of residence was assessed according to rural/urban. For the purpose of the study an urban community was one with adequate facilities such as a hospital or a health center to provide TB treatment. Over 60% of respondents lived in rural communities 65 (68.4%). Only 30 (31.6%) lived in urban communities. Over seventy percent of the respondents were resident in the Bole district. However, some patients resided in districts outside Bole district. Twenty three (24.2%) of the participants were resident in the Sawla-Tuna-Kalba district with only 1(1.1%) resident in the Kumasi metropolis (table 3).

Religious background of respondents

Respondent's religious background was also assessed. The religious background was assessed because it can determine where and the type of health care a client decides to seek. Nearly 50% of respondents reported they were Christians 47 (49.5%), 28 (29.5%) were Muslims whiles 19 (20.0%) were traditionalist. Only 1 (1.1%) of respondent's did not have any religious affiliation. Religious affiliation of the participants was not significantly associated with treatment default (p=0.074).

Ethnic backgrounds of respondents

Regarding ethnicity, Briffos were 23 (24.2%), Dagartis 28 (29.5%) and Gonjas 22 (23.2%) constituted the major ethnic groups in this study. Thirteen (13; 13.7%) of the respondents were Mos and other minority tribes including Vaglas were 9 (9.5%). Greater proportion of the defaulters were Dagarti's (Dagao). There was no statistical significant association between ethnicity and treatment default (p=0.221).

Table 4: Occupational status of respondents

Occupation	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
Farmer	9 (36.0)	37 (52.9)	46 (48.4)		
Fisherman	0	4 (5.7)	4 (4.2)		
Formal	1 (4.0)	8 (11.4)	9 (9.5)		
House wife	6 (24.0)	6 (8.6)	12 (12.6)	8.540	0.137
Miners	1 (4.0)	2 (2.9)	3 (3.2)		
Trader	2 (8.0)	5 (7.1)	7 (7.4)		
Unemployed	6 (24.0)	8 (11.4)	14 (14.7)		
Total	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

The employment history of respondents was also assessed. Over 70% of respondents were gainfully employed either by self or by the Government or NGO (Table 4). Nearly 50% of the respondents were farmers 46 (48.4%). However, a number of the respondents were unemployed 26 (27.4%). Additionally 24.0% of the defaulter patients were unemployed. The study however did not find any statistically significant association between occupation status of respondents and treatment default (p=0.137).

Table 5: Annual income level of respondents

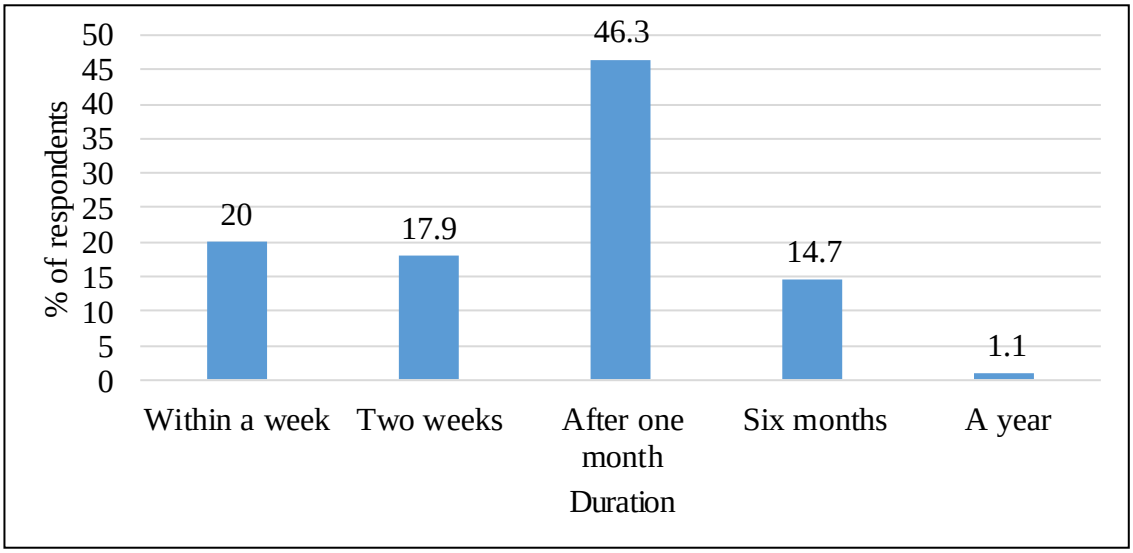
Annual income level	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
<500	7 (28.0)	15 (21.4)	22 (23.2)	8.868	0.074
600-2000	9 (36.0)	43 (61.4)	52 (54.7)		
2100-5000	0 (0.0)	2 (2.9)	2 (2.1)		
5100+	2 (8.0)	3 (4.3)	5 (5.3)		
don't know	7 (28.0)	7 (10.0)	14 (14.7)		
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

Respondent's annual income levels were also determined. Over 70% of the respondents 74 (77.9%) reported an annual income level of GH¢ 0-2000.00, which translates to an average monthly income of GH¢ 166.67 (Table 5). Only 7 (9.4%) of the respondents earn up to GH¢ 4000 and above. However, 14 (14.7%) of respondents could not tell their annual income because they were not employed and could not tell the amount they earn in a year. Half of the respondents who could not tell their annual income did not complete their treatment. The annual income level of respondents did not account for a significant difference between the two groups (p=0.074).

4.2 Essential Knowledge, attitude and practices of patients

Duration of TB symptoms before seeking health care was assessed. This is because how long a patient spends at home with a condition before seeking health care have several adverse consequences. The patient's condition may deteriorate to a point that their lives may not be able to be saved when they finally decide to seek health care at the hospital; such patients may also transmit the disease to close contact.



Source: Field survey, 2014

Figure 3: Length of time taken to report to health facility to be diagnosed with TB

Majority of the respondents 44 (46.3%) sought for health care after one month of onset of symptoms (figure 3). Similarly 15 (60%) of the default patients sought for care after one month of onset of symptoms. Only 31 (37.9%) of respondents sought for care within a period of one week or two. Length of time spent at home before reporting to the health facility to be diagnosed and put on TB treatment was significantly associated with treatment default (p=0.012).

Respondents' knowledge about the type of illness

Respondents' knowledge of the type of illness suffered was assessed as well. Majority of the respondents 36 (37.9%) considered the condition an ordinary cough. However, a number of them 33 (34.7%) did not know what was wrong with them at the onset of the illness. Nine, (9; 9.5%) thought they were suffering from malaria or fever whiles 6 (6.3%) thought they were infected with HIV. Five, (5; 5.3%) of the participants thought they were suffering from a spiritual illness/problem and 6 (6.3) believed it was TB.

Similarly, respondent's knowledge about the cause of their illness was assessed. This is because the knowledge of an individual on the cause of illness would define the remedies to seek. Participants gave varied thought about the cause of the illness. Causes of the disease as reported by respondents include witch craft, got it from an infected person, acquired the infection from their work side, cold weather as well as being beaten by rain. There were, however, patients who did not know the cause of the illness they were suffering at the early stages. Patients perception about the cause of their condition include beaten by rain, cold weather. Patients who did not know the cause of their illness constituted 72.6% of the respondents, 13.7% of respondents felt they got the disease from their work whiles 7.4% of respondents believed they acquired the condition from an infected person they stayed with. However, 6.3% of respondents believed they were bewitched.

Table 6: Patients first point of call to access health care

Places patients first sought health care	**Treatment defaults n (%)**	**Completed treatment n (%)**	**Total n (%)**
Chemical shop	8 (32.0)	26 (37.1)	34 (35.8)
Health facility	4 (16.0)	17 (24.3)	21 (22.1)
Herbalist/traditional	6 (24.0)	7 (10.0)	13 (13.7)
Multiple sources at a time	7 (28.0)	20 (28.6)	27 (28.4)
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**

Source: Field survey, 2014

Most patients sought health care from one or multiple sources. Patients' first point of call included chemical shops, traditional medicine practitioners in the community and health facilities including CHPS compounds, health centres and hospital. Other patients

utilized all the above sources of health care. Majority of the respondents 34 (35.8%) first visited the chemical shop to buy drugs for their illness (Table 6). A number of the participants 27 (28.4%) patronized chemical shops, traditional medicine as well as health facilities. Twenty-one (21; 22.1%) of respondents visited a health facility, only 4 (16.0%) of the unsuccessfully completed treatment patients visited a health facility as a first point of contact. Thirteen, (13; 13.7%) of participants went to a traditional medicine practitioner or herbalist for care.

The type of facility visited determined the treatment given the patients. Over 50% of respondents said they received cough medicine during their first visit to the health facilities, 23 (24.2%) of the respondents mentioned that they took a combination of remedies including cough medicines as well as herbal and spiritual remedies in the form of animal sacrifices. Only 9 (9.5%) of respondents were put on TB treatment out of which only 2 (8.0%) were unsuccessfully completed treatment patients.

Respondents' life style (habit of smoking and alcohol consumption)

Cigarette smoking has widely been known to aggravate the symptoms of pulmonary TB medicine and information center (2007). Although nearly three quarters 68 (71.6%) of the participants reported that they have never smoked in their life time, a number of them 27 (28.4%) had smoked in their life time before. Among the respondents who ever smoked in their life 13 (54.2%) further indicated that they stopped smoking upon the advice of the health workers when they were diagnosed as having TB. However, 76.0% of the defaulters without smoking history could not complete their treatment successfully. History of smoking was not significantly associated with treatment default ($p=0.57$).

On the other hand, fifty (50; 52.6%) of the participants reported ever consuming alcohol in their life time, while 45 (47.4%) of respondents never drank alcohol in their life time. Of those who have ever drunk alcohol, 12 (48.0%) did not successfully complete their treatment compared to 13 (52.0%) patients in the same group who had never drank alcohol. History of smoking was not found to be associated with treatment default (p=0.31).

Table 7: Patients with treatment supporters

Treatment supporter	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
No	11 (44.0)	8 (11.4)	19 (20.0)		
Yes	14 (56.0)	62 (88.6)	76 (80.0)	12.214	0.001
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

Most of the patients 76 (80.0%) had treatment supporters when they were on TB treatment and 19 (20.0%) did not have (Table 7). Fourteen, (14; 56.0%) of patients within the unsuccessfully completed treatment group had treatment supporters as compared to 11 (44.0%) who did not have. There was a statistical association between not having a treatment supporter and poor TB treatment outcome (p=0.001, Table 7).

The role of treatment supporters as reported by participants include; reminding them to take their medication 60 (78.9%) and collecting drugs from the treatment centre for patients 11 (14.5%). However, 5 (6.5%) said their treatment supporters did not play any role in assisting them to take the medication because they either travelled or were not staying together in the same house. Of the treatment supporters, 98.9% were family

members, 2.1% were community members (friends) and 9.5% were health care workers.

The reasons given by participants who did not have treatment supporters were, clients not told by health workers to bring a treatment supporter 12 (63.2%), no body agreed to be clients treatment supporter 2 (10.5%) and 5 (26.3%) concluded they had no treatment supporter because their supporters travelled out of their community and did not help them take the medication.

Table 8: Patients reaction when told of their condition

Patients reaction when told of their condition	**Treatment defaults n (%)**	**Completed treatment n (%)**	**Total n (%)**
Disappointed	3 (12.0)	3 (4.3)	6 (6.3)
felt relieved because they now knew what is wrong with them	17 (68.0)	59 (84.3)	76 (80.0)
Shocked	5 (20.0)	8 (11.4)	13 (13.7)
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**

Source: Field survey, 2014

Majority of the patients 76 (80.0%) felt relieved when they were told of their condition (Table 8). This is because they did not know what was wrong with them initially. Some patients even thought it was HIV whiles others ascribed spirituality to the condition. A few 19 (20.0%) of them were disappointed, sad or shocked to hear they were suffering from TB.

Participant's knowledge about duration of treatment

Over 80% of respondents knew that TB treatment would last for 6 months. Only 6.3% of the participants did not know the duration for treatment because they were not told by the health worker or could not remember. Four (16.0%) of the respondents' who could not remember how long TB treatment would last did not complete their treatment.

4.3 Factors related to the health system affecting the treatment outcome

The health system related factors takes into account the attitude of health workers towards TB patients during visits, convenience of treatment centres in terms of access and privacy, adequacy of health education given clients about their condition including how to take medicine and duration of treatment, distance and cost of transportation to the treatment centre. Finally, the availability of medicines at the treatment centre at all times.

Table 9: Attitude of health workers towards clients

Attitude of health workers	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
Poor	0	4 (5.7)	4 (4.2)	14.811	0.001
Good	18 (72.0)	20 (28.6)	38 (40.0)		
Very good	7 (28.0)	46 (65.7)	53 (55.8)		
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

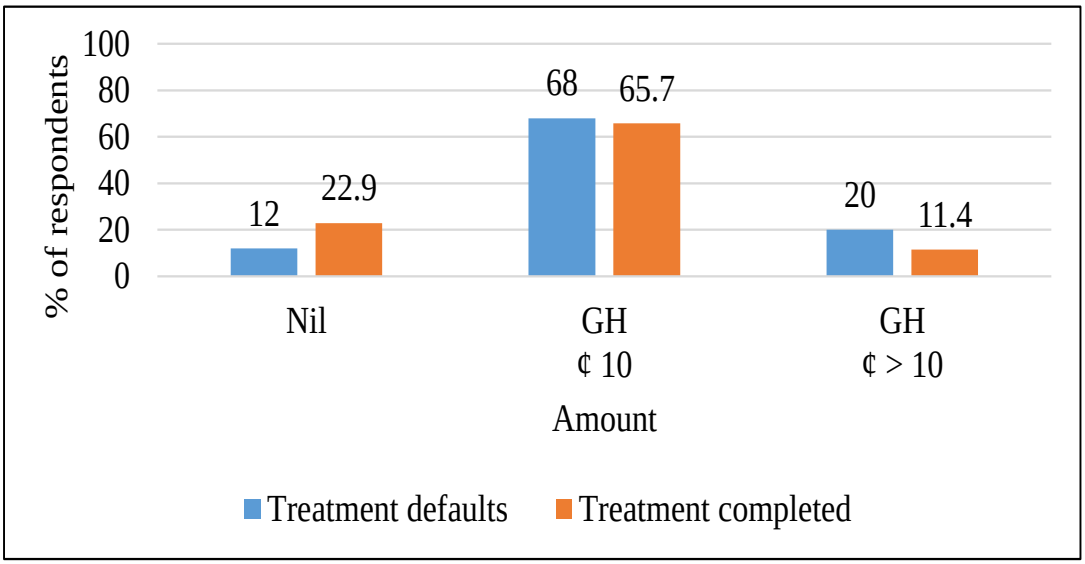
The attitude of health workers towards clients was rated by participants as follows: 53 (55.8%) very good, 38 (40.0%) good and 4 (4.2%) as poor. None of the defaulters rated the attitude of the health workers towards them to be poor (Table 9).

Table 10: Distance travelled by patients to TB treatment center

Distance to facility	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
< 5	4 (16.0)	17 (24.3)	21 (22.1)		
6-20	3 (12.0)	9 (12.9)	12 (12.6)		
21-30	2 (8.0)	8 (11.4)	10 (10.5)		
31-40	3 (12.0)	2 (2.9)	5 (5.3)	9.3	0.002
41-50	0 (0)	8 (11.4)	8 (8.4)		
51+	13 (52.0)	26 (37.1)	39 (41.1)		
TOTAL	25	70 (100.0)	95 (100.0)		

Source: Field survey, 2014

Majority of the participants 39 (41.1%) travelled over 51 kilometres to the treatment centre for their medication. Only 22 (21.1%) of the participants travelled a walking distance of less than 5 kilometres to the facility. Majority of the unsuccessfully completed treatment outcome patients also travelled over 51 kilometres to the facility and 4 (16.0%) travelled a walking distance of less than 5 kilometres (Table 10). The number of kilometres travelled to the treatment center for medication affected treatment compliance (p=0.002).



Source: Field survey, 2014

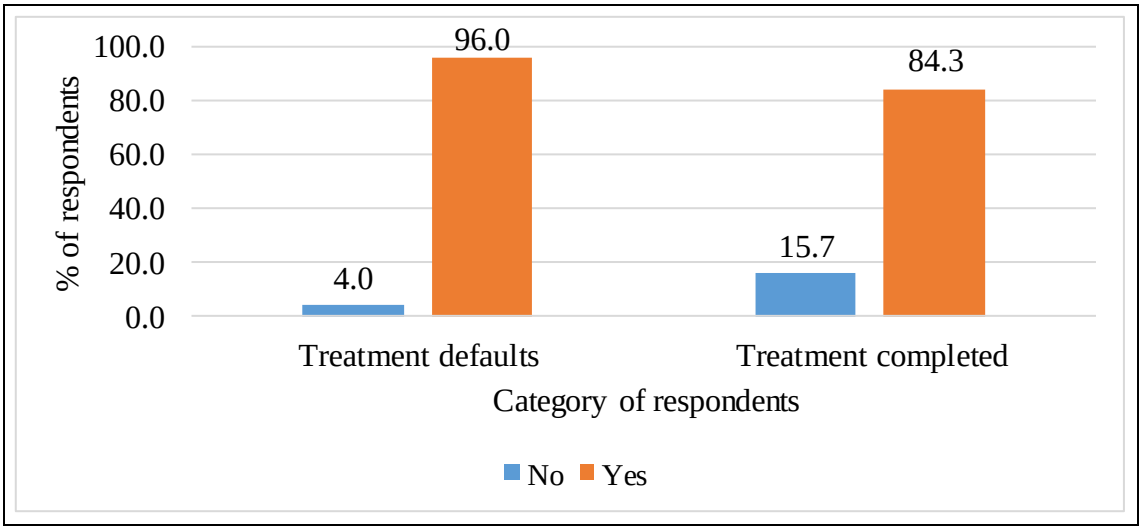
Figure 4: Cost involved in travelling to the treatment center for drugs

Participants were also asked to indicate the amount spent on transportation to the treatment centre in cedis. Out of 95 respondents, 63 (66.3%) spent between GH¢ 2-10, 13 (13.7%) spent GH¢10.0 and above, whiles 19 (20.0%) did not pay any amount to get to the facility (figure 4). Amount spent took into consideration respondents who used motor bikes and had to buy fuel (petrol) to be able to reach the health facility for their medication.

Participants' response on waiting time at the treatment center

Time spent at the treatment centre before receiving care was also assessed. Patients who wait for a longer time at a health facility may consider the facility unfriendly and are likely to stop going for their medication. Out of a total of 95 responses, 85 (89.5%) of the respondents said they waited less than an hour before been attended to by health workers, 2 (2.1%) had to wait for 1-2 hours whiles 8 (8.4%) waited up to 2 hours

before they were taken care of by the health staff. Only 4 out of the 8 who waited for up to 2 hours did not completed their treatment. Length of time spent at the treatment center before been attended to did not have any significant impact on treatment compliance (p=0.158).



Source: Field survey, 2014

Figure 5: Respondents assessment of the convenience of treatment center

In addition, participants` thought about the convenience of the treatment centre was assessed, and 83 (87.4%) felt the treatment centre was convenient for them in terms of protecting their privacy and easy access to their medication (figure 5). However, 12 (12.6%) of the participants thought otherwise. They felt the centre was not convenient to them in terms of distance 7 (77.8%), adding that they had to pay high lorry fear to come to the treatment centre. Others 2 (22.2%) indicated that the health workers were not friendly to them and often made to wait for a long time before attending to them. Convenience of treatment center to patients did not show any significant association with treatment default (0.296).

Education of patients on the condition

Majority of the participant 88 (92.6%) thought they were given enough health education about the condition including the cause and treatment. Only 7 (7.4%) of the participants felt they were not given enough education as they would have wished. As to the duration of treatment, majority of the participants 87 (91.6%) indicated they were told treatment would last for 6 months whiles 8 (8.4%) said they were not told or could not remember. In adequate health education on TB to patients was significantly associated treatment default (p=0.028)

Receipt of monthly drug supplies by clients

Greater number of the participants 90 (94.7%) said they received their monthly supplies of drugs during each visit. Only 5 (5.3%) said they did not receive their monthly drug supplies for some months. Only 1 person out of the 5 who did not receive all their monthly drug supplies was unsuccessfully treated. The reason given for not receiving drugs was unavailability of medicines at the time of visit to the facility. Receipt of monthly supplies of drugs by clients did not show any significant association with treatment default (p=0.742).

4.4 Social factors that affect patient compliance to treatment

Social factors looked at the relationship between respondents and their family as well as community members. The negative attitude toward TB patients by friends, family and community members were reported by patients. How community and family members related to patients affected patients' willingness to disclose their TB status.

Table 11: Disclosure of condition to friend and family members

Disclosure of condition to friend or family members	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
No	8 (32.0)	8 (11.4)	16 (16.8)		
Yes	17 (68.0)	62 (88.6)	79 (83.2)	3.016	0.118
TOTAL	25 (100.0)	70 (100.0)	95 (100.0)		

Source: Field survey, 2014

Over eighty percent (83.2%) of respondents disclosed their TB status to friends and family members, only 16.8% did not disclose their status. Of those who disclosed their status to friends and family members, 78.7% said those they disclosed their status to, sympathized with them and encouraged them to adhere to the treatment given them (Table 11). Those who reported that they have been avoided by those they disclosed their status to was 6.7%, whiles 16.4% of the respondents said people they informed about their condition just did not say anything to them (Table 11). Though later on some encouraged them to take their medication seriously, whiles others reported they were later neglected completely by such people.

Similarly, over fifty percent (56.8%) of the participants said people within the communities they lived with were also aware of their condition. Only 44.2% of the participants said community members did not know their TB status. Majority (77.4%) of the respondents who said community members were aware of their TB status did not report any negative attitude or experience from the community. Only 22.6% of the respondents said they experience some negative response from community members. They mentioned avoidance, back biting and isolation from community members during

community gathering and in the mosque. A respondent said "*in the mosques nobody wants to sit closer to me because of my frequent cough*". Another participant *"reported that people in the community always talk about him when he is passing by"* though he didn't know what exactly about him they were always talking of.

Effect of TB on patients' daily life

Over eight percent of respondents acknowledged the fact that suffering from TB affected their daily life in one way or the other. Majority (73.7%) of the respondents said they could not do their daily work as before, including going to the farm as a result of suffering from TB. Others reported that they lost their job because they could no longer go to work. A participant reported *"I use to work on the Bui dam project, but I lost my job because I could not work as before"*. Another respondent said "*I am a fisherman, but when I became sick, I could no longer go for fishing*". Indeed, many of the respondents also reported the negative effect the disease had on them in terms of low productivity. Most respondents who were farmers also reported a reduction in the amounts of the produces they use to get from their farms. About 11% of the respondents described how TB affected their daily life in terms of not being able to associate with people on a daily basis. Only 15.8% reported that having TB did not affect their daily life in any negative way. They said they could still do their work normally as before.

4.5 Factors related to drugs that affect patients' compliance to treatment

Participants were asked a couple of questions to ascertain whether there were some medicine related factors that contributed to the successful or unsuccessful treatment outcomes.

Table 12: Clients experience of drug side effects

Patients Experience Of Side Effects	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)	Chi-square (X^2)	P-values
Yes	13 (52.0)	17 (24.3)	30 (31.6)		
No	12 (48.0)	53 (75.7)	65 (68.4)	6.548	0.014
TOTAL	**25 (100.0)**	**70 (100.0)**	**95 (100.0)**		

Source: Field survey, 2014

Respondents were asked if they experienced any side effects whiles on TB medication. Majority 65 (68.4%) of the respondents said they didn't experience any side effects whiles taking the medicines (Table 12). Only 30 (31.6%) of respondents reported they experience side effects whiles on the TB drug. Three (3) of the respondents who reported experiencing side effects during treatment did not have successful treatment outcomes. They reported stopping the medicines because of the side effect. Some of the side effects mentioned include intense nausea and vomiting, diarrhoea, frequent headaches and body weakness, limb and joint pains.

Table 13: Type of drug side effects experiences

Side Effects Experienced	Treatment defaults n (%)	Completed treatment n (%)	Total n (%)
Diarrhoea	2 (11.1)	9 (30.0)	11 (22.9)
Skin rashes	2 (11.1)	2 (6.7)	4 (8.3)
Headaches& body weakness	5 (27.8)	12 (40.0)	17 (35.4)
Numb/swollen feet and legs	0 (0)	7 (23.3)	7 (14.6)
Painful limbs	1 (5.6)	0 (0)	1 (2.1)
Nausea and vomiting	8 (44.4)	0 (0)	8 (16.7)
Total	**18 (100.0)**	**30 (100.0)**	**48 (100.0)**

Source: Field survey, 2014

Majority 35.4% of the respondents reported frequent headache and body weakness as the side effects of the drugs. Other side effects reported include diarrhoea, nausea and vomiting as indicated in Table 13 above.

4.6 Factors that motivates or discourages patients from treatment compliance

A range of factors motivated participants to comply with treatment and successfully completed treatment. Forty four (44) thus 62.9% of respondents said they were motivated by the fact that they wanted to get well take a look at this table numbers. Other reasons given by participants as motivating factors for them to complete the treatment include; I didn't want to die 4 (5.7%), I believed that the medicine can cure me, 5 (7.1%), traditional medicine didn't work for me 2 (2.9%) and encouragement

from health workers and family members. About 3.0% of the respondents indicated that they received some monetary help from the health workers as transport fare to be able to attend the health facility for their medication.

4.7 Views of health service providers on the factors that influence TB treatment

This study also tried to explore the opinions of health care providers on the factors that influence the treatment of TB patients in the Bole district. In-depth interviews were conducted with frontline health workers involved with the TB control programme in the district. The participants of health workers were purposely selected from the list of health workers in the District Health Management Team (DHMT), sub-district and health facility level.

4.7.1 Background and work schedule of health service providers

The participants were made up of the district TB coordinator (1), the district hospital institutional TB coordinator (1), sub-district leaders (4) and sub-district TB coordinators (3). The respondents work experience with the TB control programme varied from one year to over three years. Four of the participants (44.4%) have worked with the TB control programme for more than 3 years, while only 2 (22.2%) of the respondents worked with the programme for just one year at the time of the interview.

The professions of the respondent are disease control officers (3), physician assistants (2) and general nurses (4). All respondents said they had received training on TB control activities. Majority (66.7%) of the participants reported that the last time they had training on TB was April 2014 whiles the others 3 (33.3%) was in August 2013. They all received their training through a workshop organized by the NTP through the

district health directorate. The period of training for majority 8 (88.9%) of the respondents lasted for about one week.

All respondents mentioned the role they each play with respect to the TB control programme. The district TB coordinator reported that he coordinates monitors and supervise all TB control activities in the district. He liaises with the regional health directorate to acquire logistics such as TB drugs, diagnostic equipment, sputum containers, registers and laboratory reagents for the district. Additionally, he monitors patients' treatment and maintain patient records in the TB register and treatment cards. He further indicated that he budgets for TB control activities on an annual basis for the district, compile TB quarterly returns for onward submission to the region and also helps to provide public education on TB in the district.

All 8 (88.9%) of the other respondents search for TB cases, detect/notify the cases, treat patients and trace defaulters. They also educate the public on TB issues and supervise patients to take their medication.

4.7.2 Knowledge of health care providers on TB

All respondents, 9 (100.0%) reported that TB is caused by *Mycobacterium tuberculosis* and that the disease is contracted when a susceptible individual inhales the TB bacilli when an infected person coughs releasing the microbes into the air. However, one respondent added that TB can be gotten when a susceptible individual drink unpasteurized milk containing the TB bacilli.

All respondents, 9 (100.0%) knew the cardinal symptoms of TB; cough for more than two weeks, chest pain, weight loss and night sweat were mentioned by participants as some of the symptoms of TB infection. Only one respondent added coughing out blood

and fever as signs and symptoms of TB. People living with HIV & AIDS, children less than 5 years old, close contacts with TB patients and the poor were mentioned as people who were at greater risk of contracting the infection. Respondents mentioned sputum smear microscopy and chest x-ray examination as the methods of diagnosing TB.

Respondents gave varied periods for TB treatment, 5 (55.5%) of the participants said TB treatment lasts for 6 months, 2 (22.2%) of the respondents said TB treatment lasts for 6-8 months while 1 (11.1%) said the treatment last for 6-9 months. It was only one respondent was who explicitly indicated the treatment duration for new TB and retreatment case (6 months for new cases and 8 months for retreatment cases). All respondents, 9 (100.0%) also indicated that patients drug dosage was determined according to the weight of the patients. Respondents again gave varied responses with regard to months for TB follow up test. Five (55.6%) of respondents said the follow up test is done at month 1 and 5 after the commencement of treatment, 1 (11.1%) said the follow test is done at month 2 and 4, 1 (11.1%) also said the test is done at month 2 and 3 while another 1 (11.1%) said it is done at month 2, 3 and 6.

4.7.3 Care of TB patients by health providers

Greater number of the respondents, 6 (66.7%) said they maintain patient records at their various health facilities. The records are maintained in the form of registration into a TB treatment register, and a TB treatment card usually known by the code TB05. Only 3 (33.3%) of the participants said they do not maintain patient records at their facilities. The reasons cited include not having a TB treatment register at their facility and that TB patients detected at their facilities are usually referred to the district to be put on

treatment. While others said they have not detected any TB case in their facility before, hence the reason for not maintaining patients' records.

All the respondents indicated that they provide health education to patients, and that a health education session for patients last for 15 to 30 minutes. The majority of the respondents 5 (83.3%) said the education is done at every visit the patient make to the facility to access TB services whiles only 1 (16.7%) of the respondents said the education is done at the time of putting the patient on treatment. The education is focussed on the need to comply with treatment, how to take the drugs; and mark on treatment card, side effects, how to protect others from contracting the infection and good nutrition. The respondents also indicated that the treatment supporters are given a form of education as well. This is to enable the treatment supporters acquire adequate knowledge about the condition and effectively assist the patients throughout the period they are on medication.

4.7.4 Challenges face/and appraised by health providers in managing TB patients

Majority (88.9%) of the respondents mentioned that they have patients under their supervision defaulting treatment at one point or the other. They added that when this situation arises such patients are traced, counselled or educated about the need to comply with treatment and put on treatment again. Over 55% of the respondents, however, indicated that they face some challenges in tracing these defaulters. Inadequate or lack of means of transport and fuel (11.1%) as well as wrong or non-existing addresses (66.7%) given by TB patients are major challenges confronting health workers in the district in tracing TB treatment defaulters. Other respondents (22.2%) raised a concern that some of the patients travelled out of the district without informing the health workers taking care of them. A respondents said "*you only get to*

know that the patient have travelled after he or she haven't come for drugs and you make a follow up to the community to be told he or she has travelled or migrated".

All respondents, 9 (100%) said drug supply to the district was regular and consistent except for the category three drugs that needs to be requested from the regional level when a case of treatment failure is to be put on that regimen, which sometimes take about a week depending on the regimen availability in the region. The participants also thought that clients (TB patients) were comfortable with the places drugs were served to them. Usually the TB patients collect their medications from the hospital pharmacy and they are not made to join the queue that other clients (non-TB patients) to the hospital join to collect their medication. This reduces the waiting time for TB clients at the hospital and serves as an encouragement to come whenever they run out of drugs.

Participants expressed varied opinions about receipt of funds by the district or their respective sub-district for TB activities. About 56% of respondents said the district or sub-district receives funds from the region or district depending on the level of the respondents (district or sub-district level). They also indicated that funds were released on a quarterly basis, though at times the funds delay in coming. A sub-district leader added that the district director of health services at one point allowed them to use their internally generated funds (IGF) to fund TB control activities such as conducting case searches in the communities, organizing durbars in communities to educate the public on TB and transporting sputum to the district laboratory for testing.

4.7.5 Health care providers' knowledge on response of TB patients on nature of care

The respondents also held the view that TB clients were satisfied and happy with the attitude of health workers toward them. About 56% of the respondents said they would have had feedback in the form of complains either from clients themselves or relatives of clients who are closer to health workers. Others said some patients freely asked questions about the disease and felt that if the patients were not comfortable with the attitude of the staff, they would have felt intimidated and would not be able to ask such questions. Whiles 11.1% of the participants thought that the fact that a client never complained of the attitude of the health staff meant they were satisfied with clients' attitude.

4.7.6 Factors motivating TB patients to comply or default treatment

Health workers also held the belief that some factors motivated some patients to comply with treatment whiles some factors also hindered other patients from complying with treatment. Good relationships between health workers and TB patients, reduced waiting time for clients, regular supply of drugs and visiting patients at home were among the factors mentioned as motivators for some clients to successfully complete treatment. A respondent also added that the TB control programme has a package known as the enablers' package, which is usually a token of money given to patients to be used as transport fare to the facility to collect their drugs. Also in recent times, just like the National AIDS Control Programme (NACP), the National Tuberculosis Control Programme (NTP) has also started rationing food to TB clients on treatment. A respondent added that because of the food, now all the patients come on a monthly basis for their medication and food ration.

However, a number of concerns were raised by the health care providers as factors hindering treatment compliance. About 17% of the health workers said some patients complained about the duration of treatment coupled with the quantity of tablets to take, with accompanying side effects at times. A respondent added that a retreatment patient complained about the pain of having to take injection for two months and the cost of transport and considered withdrawing from the treatment. Other patients complained of their financial situation and the fact that they have to travel to Bole every month for their medicines.

Another view held by some of the respondents is the fact that some patients do not have treatment supporters' whiles on treatment. Other views include stigma from community members and inadequate education on the condition by some health workers to patients.

4.7.7 Factors affecting the TB control programme

Finally, the views on factors that generally affect the TB control programme were also sought from the participants. Varied responses were obtained, among them include, but not limited to, lack of interest by some health workers on the TB control programme. According to the district TB coordinator, the low or lack of interest by some health staff, particularly some of the clinic staff has accounted for a low TB case detection in most of the health facilities. There is also the belief among health workers that TB control activities are the responsibility of disease control officers. This has manifested in the Bole district hospital where there is an institutional TB coordinator, but all TB cases and everything about TB control in the hospital is referred to the disease control unit at the district health directorate. Even maintenance and updating of the district hospital TB register is done by disease control officers from the health directorate. The

same observation was noted in some of the sub-districts the questionnaire was administered. For instance, at a particular sub-district a staff contacted to respond to the questionnaire was reluctant to be interviewed. He said "*go to the disease control officer, he is responsible for TB activities here*". It appears that staff are apathetic about the TB control programme because of the perceived financial package involved in the programme which they perceive only a certain group of professions benefits.

Another challenge reported by respondents confronting the TB control programme is inadequate and inconsistent release of funds to the district for TB control activities. The only source of funding for TB control activities in the district is the funds received from the NTP, which normally delay in coming to the district. Though at the sub-district level facility IGF is sometimes used to implement some TB control activities such as durbars to educate the public about TB, case searches, defaulter tracing and transporting sputum specimen to the laboratory; delays in re-reimbursing facilities by the national health insurance scheme (NHIS) is putting a setback on this initiative. The issue of stigma from community members towards TB patients continues to emerge as a factor negatively affecting the TB control programme. "*This may result in patients reporting late to the health facilities for treatment or make patients stop treatment*" said a respondent. About 15.4 percent of the responses obtained from health workers showed that the level of health education given to TB clients was inadequate. This may also negatively affect treatment outcomes, especially when the duration of treatment and possible side effects of the TB drugs are not communicated to the understanding of TB clients.

One of the fundamental pillars of a successful TB control programme revolves around the quality of monitoring and evaluation of the programme. Responses gathered from participants show that the monitoring and evaluation aspect of the programme was not

adequately done at all levels within the district. Respondents from the district level feel that the staff at the health centers and CHPS zones are not doing enough when it comes to monitoring and supervising patients' treatment. "*This weakness is, however, attributed to inconsistent and inadequate receipt of funds*` said a respondent. The respondents further stressed *"it is through monitoring and supervision that information can be gathered to improve the efficiency of the programme"*.

CHAPTER FIVE

Discussion

5.0 Introduction

This chapter presents the discussion, conclusion and recommendation. The discussion focuses on the research objectives of the study while comparing the findings of the study with other literature. This study, conducted in the Bole district aimed at assessing factors that influence TB treatment outcome in the Bole district.

The control of TB largely depends on how successful cases are treated. Noncompliance to TB treatment is associated with continuous transmission of the disease, development of drug resistance, increased cost of treatment of the disease and ultimately death. TB treatment compliance is widely acknowledged as a major challenge in the efforts to control the disease. The most often cited factors that affect TB treatment include demographic factors such as age, sex, educational level, marital status, ethnicity and religion. Other factors include occupation and income levels of clients, drug or medicine related side effects, patient related factors such as knowledge about TB, and health system related factors such as availability of drugs and attitude of health care providers as well as distance to health facilities and transport challenges (Boyle et al., 2002; Mohamed et al, 2013).

The study revealed that non-compliance to TB treatment is linked with multiple factors: these factors include female sex, staying outside Bole district whiles been treated in Bole, lack of a treatment supporter, side effects of drugs, non-disclosure of TB status and distance travelled to treatment center for medicines. These factors were found to

have a direct statistical significance between patients who defaulted treatment and those who successfully completed treatment.

5.1 Demographic and background factors

The socio-demographic factors considered in this study included age, sex, educational level, ethnicity and religion of respondents. Though there were more males 57 (60%) than females 38 (40%) in the study, there were, however, more females 15 (60%) in the default group than males 10 (40%). The women, most of whom are housewives and unemployed helped their husbands to farm and for that matter do not have their own money to go to the health facility. Such women depend on their husbands for lorry fare, in the situation where the husband has no money to give or is not around when the woman is due for the next visit then the woman is unable to make it to the facility. Also the culture of seeking permission from the family heads who mostly are male affected women ability to visit the facilities for their medication when the time is due in the absence of the husband. This finding is in contrast to the finding of a study conducted by Norgbe et al., (2011) which reported that treatment default was associated with males than females, according to the findings of their study. In Turkey, a study conducted by Babalik, et al., (2013) also reported a contrasting finding, associating the males rather than the females as reported by this study to adverse treatment outcomes. Also in Kenya results from a study conducted by Muture et al, (2011) also found that male sex was associated with treatment default. The study found a statistical significance, indicating a relationship between sex and non-compliance with treatment (P=0. 031).

Although majority of the respondents were in the 31-40 age group, participants in the 21-30 (44.0%) age group defaulted TB treatment more than any other age group. The

study did not show any significant association between age and non-compliant with TB treatment. The finding is consistent with a study conducted by Modise (2011) in which age of patients was not found to be associated with treatment non-compliance. In Egypt a study conducted by Nour El-Din et al., (2013) were less than 30 years were more likely to default from treatment.

In this study, compliance was higher amongst married participants (80.0%) compared to those who are single (15.7%) and those who were divorced (4.3%). Marital status was also not found to be associated with non-compliance to TB treatment (p=0.189). This finding was consistent with a study conducted by Kaona et al. (2004) in which marital status was not found to be associated with treatment non-compliance.

Majority of the participants (29.5%) were Dagartis followed by the Briffos (24.2%). Similarly a greater proportion of the defaulters were also Dagartis (40.0%). Statistically ethnicity was not associated with treatment non-compliance (p=0.221).

About 66.3% of the respondents had no formal education. Similarly, greater proportion of the defaulters were also people without formal education (80.0%). Statistically educational level was not associated with treatment non-compliance (p=0.326). This is in contrast with the findings by Gad et al. (1997) which associate low educational level to treatment non-compliance.

Over seventy (74.7%) of the participants lived in the Bole district with 76.0% of the clients living in rural communities and majority (54.8%) of the respondents travel over 30km to the treatment center for their medication. Staying outside the Bole district whiles on treatment was significantly associated with treatment default (p=0.011). Distance travelled to the treatment center for their medication was also significantly associated with non-compliance with treatment (p=0.002). Patients who reside outside

the district need to travel long distance to the treatment center for their medication. One contributing factor is the low income earned by the majority of participants thus unable to afford the high cost of travelling long distance, hence delay in seeking treatment and/or defaulting.

5.2 Socioeconomic factors

Occupational status and income level of respondents which also influence TB treatment outcomes were assessed. Over 70% of the respondents had a form of employment either through the government or NGO and self-employment compared to 27.4% who were unemployed. There was no statistical significant association between occupational status and non-compliance to TB treatment (p=0.137). In contrast to this result, several studies have demonstrated the negative effect of poor socio-economic conditions of patients to treatment outcomes. A study conducted in Georgia found that low household income linked to unemployment was associated with poor treatment outcomes (Djibuti, Mirvelashvili, Makharashvili, & Magee, 2014). Similar results were found in a study conducted in Kenya where low income of patients was a risk factor for TB treatment default (Muture et al, 2011).

5.3 Patients related factors

Patients related factors assessed in the study are behaviours, habits or lifestyle of patients that affects TB treatment. The factors include history of smoking, alcoholism, health seeking behaviours, patient's perception about the cause of TB and availability of treatment supporter. The TB control programme recommends that TB patients stopped smoking and consumption of alcohol. It also encourages patients to report timely to a health care facility when one coughs for at least two weeks. The programme

further requires that every patient under treatment have a treatment supporter to assist him/her take the medication.

There are several concerns or implications for a patient taking alcohol whiles on medical treatment. According to the medicines and information center (2007), tobacco smoking is associated with many drug reactions; the same can be attributed to alcohol. Such drug interactions may decrease the effectiveness of medications or render them useless. These can occur in two ways, thus pharmacokinetic and pharmacodynamic mechanisms. Pharmacokinetic interactions are those that affect the absorption, distribution, metabolism, or elimination of other drugs, potentially causing an altered pharmacological response. Pharmacodynamic interactions alter the expected response or actions of other drugs. In other cases, substance and drug interactions may make drugs harmful or even toxic to the body. It may cause problems such as headache, drowsiness, nausea and vomiting among others which may be attributed to the drug as side effects. Another negative effect of smoking is the financial burden it puts on patients who smoke. This is against the background that TB is a poverty related disease and most patients are usually poor. Such patients may worsen their financial situation while they continue to smoke. Nearly 30% of respondents had smoked in their life time. Similarly, 24.0% of the respondents had taken alcohol in their lifetime before. Out of the number of patients who smoked 77.8% of them stopped upon initiation of TB treatment after being advised by health workers to quit smoking. Only, 14.8% of participants continued to smoke against medical advice.

Eighty percent (80.0%) of the participants said they had a treatment supporter while they were on treatment. A significant number of the defaulters 11 (44.0%) did not have treatment supporters. The treatment supporter is expected to play the role of a DOT observer at home to patients, reminding and observing the patient take their medication

and also help to collect medication from the health facility for patients in situations where the patient is unable to go to the health facility in person. However, the situation is different for some patients where they do not even live with their supposed treatment supporters. Such patients usually look for relatives in Bole town to stand in as their treatment supporters when the health staffs requests that they get someone to assist them with their medication. Out of the total number of patients who had treatment supporters 5 (6.6%) of the respondents raised concerns that their supposed treatment supporters did not play any role in their treatment. This is because the said supporters travelled or did not stay at the same place with the patient. Patients who did not have treatment supporters said they were not told to select a treatment supporter (63.2%), those selected travelled and never played any role in their treatment hence the conclusion that they did not have a treatment supporter (26.3%) and others gave the reason that nobody agreed to be their treatment supporter 2 (10.5%). Refusing to be a treatment supporter for TB patients may be as a result of the stigma associated with the condition. Thus, such persons gave reasons like "*I would not have the time to help you take your drugs*" as by some of the respondents for not having treatment supporters. In China a study conducted by Xu et al., (2010) found supervision of patient treatment by health workers contributed to treatment success. However, in this study, not having a treatment supporter was significantly associated with treatment default (p=0.001).

Nearly seventy percent of patients reported to the health facility to seek for care after one month of the onset of cough. Prior to attending a health facility majority of the patients had either bought cough medicines at the chemical shop or visited a herbalist whiles other combined multiple sources including health facilities. Seeking treatment from herbalist is a common practice in Ghana, financial and cultural belief could account for this habit. This finding is consistent with the findings of Ahorlu and Bonsu

(2013) and Dodor (2012), where patients reported that they went to herbalist when the condition started and only decided to go to the hospital upon the advice of relatives or friends. Other patients reportedly went to the health facility on several occasions before they were finally referred for laboratory test for TB. The finding means that the suspicion rate of health professionals for TB was low. This also accounts for the low TB case detection in the district and delays in the diagnosis of cases. It could also mean that patients concealed some danger signs of TB such as prolonged cough and haemoptysis from health workers during visits, accounting for the multiple visits because they think health workers may blame them for reporting late to the facility. Also contributing to the phenomenon is what has been termed the health culture of people who are at risk of TB. The health culture is the information and understanding that people have learned from their family, friends and neighbours as to the nature of a health problem, its cause and its implication. According to Arthur and Garro, (1992) sick people use their health culture to assign them severity, organize them into a named syndrome, decide with whom to consult and for how long to remain in treatment. It is therefore not surprising that in this study seeking for health care at least a month after onset of illness was significantly associated with poor treatment outcome (p=0.032). The place of first visit by clients to seek for help was influenced by the patient's perception about the type of illness and the cause of the illness.

Patients' knowledge about their illness and the appropriate treatment was also assessed. Though 72.6% of the respondents said they did not know the cause of their illness, others gave reason like "*I got it from my work, the cold weather made me sick, I was beaten by rain and I got the disease whiles others thought they were bewitched*". Only 7 (7.4%) of the respondents thought they acquired the infection from an infected person they made contact with. Also, patients had varied perception concerning the illness,

they were suffering from "s*piritual problem, HIV, ordinary cough and malaria*" were some of the conditions that the patients perceived they were suffering from. This made patients to go to the nearest chemical shops to buy cough medicine to treat their condition. Also, patients who believe in traditional medicines also resorted to that system of treatment where they were given herbal medicines or spiritual remedies to cure them of their illness whiles others visited health facilities. This finding is consistent with the findings of a study conducted by Dodor (2012), which reported that patients recognized the signs and symptoms of their condition as malaria or ordinary cough rather than TB. In Kenya, a study conducted by Mature et al., (2011) showed that majority of patients did not suspect their condition to be TB or were just unaware what they were suffering from before they visited the health facilities. It is therefore prudent that on diagnosis such patients are offered a sufficient explanation of their condition, they should be made to understand the treatment requirements, the possible side effects whiles on treatment and how to manage them and above all the need to comply with treatment till completion.

As many as 34.7% of the respondents did not know what they were suffering from, this also made such patients to do health shopping in seeking for remedies to their illness. As mentioned by a respondent "*Since I didn't know what was wrong with me, I had to consult the medicine man in my village to tell me the sickness*". He added that "*when the condition was getting worse a friend told me to visit the hospital and see what they can also do*". Others believe they got it through sex. This finding is consistent with finding from a study conducted by Ahorlu and Bonsu (2013), where respondents attributed the cause of TB to a wide range of things including sex and evil spirits or gods. Only, 6.3% of the participants suspected that their condition could be TB and immediately visited the health facility for treatment. Even so, a patient said she had to

visit the health center on three occasions before the nurse finally referred her to the district hospital to do a laboratory test which she subsequently turn to be positive for TB and was put on TB treatment. Other patients claimed, according to their traditional belief systems that condition had no cure. This contributed to the delay in seeking care at the health facility.

5.4 Health system related factors

Health professionals' attitudes, availability of drugs, accessibility (geographical and cost of transportation to health facility), and waiting time at health facilities and provision of enough health education to patients are significant factors affecting TB treatment compliance.

TB treatment involves a lot of interaction between patients and health care providers. Meaning the attitude of the health care providers towards the patient remains an important factor that can keep the patients on treatment or make them break the treatment or abandon it. Unfriendly attitude or harassment of patients by health care providers might make patients feel threatened and unwelcome leading to treatment interruption. Majority (95.8%) of the respondents in the study perceived health workers as being friendly and ranked the attitude of health workers from good to very good. However, a significant percent (27.5%) of those who ranked the attitude of the health care workers as good to very good did not complete their TB treatment. This finding was in contrast to the finding of a study conducted by Bernard et al., (2011) where majority of the respondents cited the attitude of the health care providers as unfriendly, unsympathetic and lack of dignity. However, in the Central Region of Ghana, a study conducted by Annan et al., (2013) reported a consistent finding with this study. Respondents rated as satisfactorily the attitude of health workers at the TB clinic and

reported that they were comfortable with the health staff and the services at the health facilities. This motivated patients to comply with treatment.

Over 80% of respondents were comfortable with the treatment center. They did not think their privacy was compromised in terms of where they collected their medication whenever they came for the drugs. Though they collected their medicines at the Bole District Hospital's pharmacy, they are not made to join the queue which other patients follow to collect drugs. Majority of the respondents reported a less than an hour waiting time at the facility before being attended to. Among those who felt the place where they collect their drugs was not convenient, over 70% of them looked at convenience in terms of the distance they travel to the center and the high cost of transportation. Even though TB treatment is provided free to patients with the aim of reducing cost to them, most of the patients had to pay a substantial amount of money for transportation to the hospital to collect their drugs. They would have preferred to go to the nearest health facilities in their various communities for their medication. This could have helped to save the money and time they use to transport themselves to Bole for their medication. Therefore, stocking of TB medicines at all health facilities in the district may be necessary. Especially so, when more than 50% of the patients travelled over 30 kilometers and pay a transport fare ranging GH¢ 2 to 50 to collect their TB medication. Travelling over 30 kilometres to the treatment center for medication was significantly associated with treatment default (p=0.03). This was consistent with the finding of Mature et al., (2011) where defaulters attributed their status to the long travelling distance to the health facilities for their medication. In Indonesia a study conducted by Bagoes et al., 2009reported that 40% of respondents who defaulted from treatment mentioned that cost involved in transportation to the hospital to collect their drugs played a role in determining whether they adhered to treatment. A similar finding has

been reported in Nigeria, where long distance to health facilities and cost of travel were cited as risk factors for non-adherence to TB treatment (Ibrahim et al., 2014).

Majority (94.7%) of the participants reported that TB drugs were available each time they visited the facility to collect their monthly stock of drugs. It can be said that the logistics, supply system for drugs under the TB control programme was therefore satisfactory in the district. Non availability of drugs at the treatment center meant that even if the patient comes to the facility to collect his or her drugs and they are not available such patients will definitely interrupt treatment.

Majority of the patients said they were given some form of information concerning the disease and how to take the medicines. Only 8.4% of the respondents said they were not given adequate education on the disease as they would have wished to know. A respondent said "*the health worker only gave me the medicine and told me to take four tablets a day*". Five out of the eight respondents who said they were not given adequate information about the disease and its treatment, defaulted from treatment. It was obvious that such patients were not told the need for treatment compliance and the consequences of defaulting treatment to the patients and the TB control programme in general. The consequences of not successfully completing TB treatment include treatment failure which may lead to drug resistance TB and increase cost for the TB programme. This is because the cost is involved in the treatment of drug resistant TB is very high. Not successfully completing treatment may cause deterioration of patients' condition which may lead to death, including the high financial burden on families to cater for such patients. Inadequate health education on TB to patients was significantly associated with treatment default (p=0.03).

5.5 Social factors

Social factors looked at the relationship between respondents and their family as well as community members. Studies have established that family and other support systems play a significant role in treatment adherence. The negative attitude toward TB patients by friends, family and community members were reported by patients. How community and family members related to patients affected patients' willingness to disclose their TB status. Over 80% of respondents disclosed their status to friends and family members. Only 16.8% of patients did not disclose their TB status to anyone, for fear of being isolated by friends or relatives and no one to trust were some of the reasons given for not disclosing their status to people. About 22% of those who failed to disclose their status did not complete their treatment. A similar finding was observed by Ahorlu and Bonsu (2013), where they noted that patients tried to hide their condition from others. According to such patients TB is considered a dangerous disease, so people do not want to associate with those who are suffering from it. Makanjuola, et al., (2014) noted in their work that where family and social support is lacking there is a strong perception of stigma associated with TB. In this study a respondent further added that in the mosque people did not want to sit closer to him because of his frequent coughs., This finding is consistent with the finding of a study conducted in Ghana, where participants reported that other members of the community did not want to sit close to them or shake hands with them during public gathering (Dodor, 2012). The issue of stigma even extends to the health care professional, where health workers did not want to work in TB clinic, considering posting to the TB clinic as a punishment (Amo-Adjei and Awusabo-Asare, 2013). According to Amo-Ajei and Awusabo-Asare (2013), colleagues of staff who worked at the TB clinic did not want to associate themselves

with them, thinking they will be infected with the disease when they associate with them.

Despite these barriers a number of patients still managed to successfully complete their treatment course, because they had support from their relatives and friends in the form of encouragement and sometimes financial as transportation fare. Makanjuola et al., (2014) stated in their study that patients who successfully completed treatment were more likely to have family members or friends who provided them support, including the decision to go for treatment and discouraging non adherence. For instance, among patients who disclosed their status, over 80% of them said relatives and friends empathized with them and encouraged them to take their medication as directed by the health workers. Such patients also had either a family member or a friend as their treatment supporters. This is consistent with the findings of Sagbakken, et al., (2008), where they reported in their study that majority of TB patients were able to complete their treatment regimen because they received support from family members and friend. The support, according to them were in the form of encouragement, financial and provision of food to TB patients whiles others had their relatives going to the treatment center to collect their medicines for them whenever they could go there in person. This clearly emphasizes the positive role social support from family member and friends have on TB treatment. Only 6.7% of these patients complained of being avoided by friends and other family members. Another patient said even my wife did not want to sleep in the same room with me. This finding was consistent with findings from a study conducted in Ghana by Ahorlu and Bonsu (2013), where respondents were reported to have said that "*I will not eat or have sex with her or eat any left over from her plate*". There is therefore the need to provide adequate health education to inform the general public about the causes of TB and the availability of effective

treatment at health facilities. It is also appropriate that the education not only concentrate on correcting the misconceptions people have about the disease, but also to make people aware of the biomedical cause and that TB is treatable.

Disclosure status of patients was significantly associated with a treatment default (p=0.02). The implication of a patient not disclosing his or her TB status means such patients may not have a treatment supporter who would supervise them to take their medication on a daily basis.

5.6 Drug related factors

TB treatment involves burdening patients with a number of pills per day for the entire duration of treatment. This high pill burden may adversely affect patients' compliance to treatment. Additionally, patients may experience side effects from the drugs. Especially so when some of the patients in addition to TB treatment, patients reported taking other medicines, including herbal medicines to complement the effects of the TB medicines. The above mentioned factors require that health care workers provide adequate health education to patients on possible minor side effects of drugs to ensure they comply with their treatment.

About 32% of the respondents experienced at least one form of side effect of the TB drug, the most reported side effects were nausea, headache, dizziness and body weakness (35.4%), diarrhoea (31.6%), and numb/swollen feet (14.6%). Even though only 15.6% of the respondents reported that the experience of side effects affected them taking of the drug, the experience of side effects was significantly associated with treatment default (p=0.02). The influence of side effect on treatment compliance was also identified in literature, for example study conducted in South Africa confirmed that

patients failed to comply with treatment because of their experience of side effect of the drug (Maswanganyi, Lebese, Mashau, & Khoza, 2014). The study further revealed that some of the patients who experienced side effects from the drugs did not inform the care providers, but continued to collect their medication to give the perception that they were taking the drugs. A similar finding has been observed by Widjanarkon et al., (2009) in the study that some patients who did not adhere to treatment gave side effect of the medication as a reason for not complying with treatment. The authors added that 30% of the patients reported they were not told about possible side effects of the drugs. Mature et al., (2011) also reported a consistent finding with regards to the effects of side reactions of drugs to treatment compliance. This situation could probably be attributed to inadequate education offered patients about the possible side effects of the TB drugs including how to manage them.

It is therefore prudent to provide health education to patients at the point of putting them on treatment, so that they anticipate them. It is also important that patients are told to report immediately to the health care provide any side effects experienced, so that they can be managed appropriately as soon as they occur.

Other drug related factors reported by respondents were the fact that some patients stopped taking the drug with the belief that the drug was not working (4.0%) whiles others stopped when they felt better after a period on the drug (16.0%). This finding is consistent with a study conducted by Widjanarko et al., (2009), where patients` feeling well after a period on the drug was a reason for patients to stop taking the medicines. A patient feeling better after a period of the treatment means that the drugs are effectively working and it is expected that such patients would be motivated to successfully complete their treatment. This finding could be attributed to lack of adequate health

education, especially emphasizing the need for patients to take their medication for the stipulated period of time.

5.7 Default factors

Out of the twenty five respondents who did not complete their TB treatment, they cited side effects 2 (8.0), non-availability of drugs 1 (4.0%), feeling better 4 (16.0%), medicines not working 1 (4.0%) and travelled 16 (64.0%) of the district whiles on treatment as some of the reasons for defaulting treatment. Consistent results were observed in a study by Ahorlu and Bonsu (2013) indicating that patients feeling better, side effects and preferences for other remedies because they think the TB drug is not effective after a period on medication as reasons for patients defaulting treatment. Similar results were also reported by Mature et al., 2011, where feeling better and experience of side effects were the reasons attributed to treatment default by patients.

Respondents who reported the history of travel as a reason for defaulting also said they were not aware that they could continue with their treatment anywhere in the country. Some argued that even whiles in the Bole district they have to travel to Bole to collect their drugs in the hospital. This might have given the patients the perception that the drugs are only available in Bole hospital. It is therefore necessary that as part of the health educational messages provided to patients they are made to know that the drugs are available in health facilities all over the country and that any time they want to travel they can come for a referral note to any health facility at their travelling destination. In Kenya a similar result was found in a study conducted by Mature et al. (2011) where the history of travelling away from the treatment site by patients was a reason for treatment default.

5.8 Views of health care providers on factors that influence TB treatment

The study explored the views of health workers on the TB control programme. Generally, the views expressed by health workers were factors that are associated with the health system, community structures and the patients. The respondents were people who have been involved with the TB control programme and possess a worth of experience on the programme implementation in the district, the successes and the difficulties facing the programme. The professions of the respondents were disease control, physician and general nurses; each respondent plays a role with respect to the TB control programme. The role played by the respondents with respect to the programme include case detection and notification, treating and monitoring patients on treatment and coordinating TB activities within the district.

All respondents have had training in TB control activities and could all identify the cardinal signs and symptoms of TB, which meant that any of those respondents could appropriately suspect a TB case and refer for testing. It was also evident that all respondents knew the causative organism of TB and how the disease is transmitted. However, the research participants expressed varied views with respect to duration of treatment. It therefore meant that depending on the view held or knowledge of the respondent a patient could be misinformed about the duration of treatment. This could have contributed to some patients defaulting treatment, for instance a patient who took the drug for five months. All participants also knew that the dose of drug for each patient is determined according the weight band of the patients. This also meant that any of the staff is most likely to appropriately give the correct dose of medication to a client.

Again the participants' responses varied with respect to the frequency and months of follow up test for patients. Only, 55.6% of the respondent could state the appropriate

frequency and follow up months to re-examine patents. This could also have an implication on the care of patients, particularly giving tracking the progress of treatment for patients. For instance, three out of the nine respondents could not state the sequence of follow up test and the action required for every certain outcome during the follow up test. They did not know that when a pulmonary positive TB patient still test positive after the intensive phase of treatment that phase of treatment is prolonged for another month and the follow up test repeated on the fourth month.

All of the research participants claimed they provide health education to TB patients and their treatment supporters. While majority of the respondents, 88.9% said health education is provided during each visit made by the patients, only 11.1% of the respondents said health education is given once at the time of putting the patients on treatment. The duration of a health education session ranges from 15 to 30 minutes, according to the responses received. The issue of noncompliance to TB medication is of great concern. According to Souza, (2003), two categories of non compliance to TB treatment can be identified as unintentional (accidental) and intentional (deliberate) treatment defaulter. Unintentional noncompliance may result from poor communication from health workers to patients in terms of information given to patients or lack of ability on the part of the patient to follow the advice offered by health care providers. Intentional noncompliance occurs when the patient knows what is required, but decide not to follow the advice. Improvement in adherence to treatment would require better communication and improved education to patients by health workers. Literature has confirmed that there is a higher probability of treatment completion among patients who received adequate intensive health education. A study in India conducted by Souza, (2003) confirms this assertion. Similar finding has been reported by Clark et al., (2007) confirming the role of effective health education on treatment adherence. His

study reported that the adherence to treatment of patients who received pharmacist-directed patient education was greater than that of patients who did not. In Nigeria, findings from a study conducted by Olayemi et al., (2009), showed that health education provided to patients had a significant impact onpatients's understanding of the disease and its management and increased awareness, including knowing the side effects of TB medication and what to do when the need arose.

Several concerns were raised by participants that affects the progromme, over 60% of the health workers said stigma still plays a role in the care of TB patients particularly at the community level where patients are discriminated against and neglected. Adding that this could discourage patients from seeking care early or default from treatment. The story of a woman who defaulted from TB treatment from the treatment center for herbal medicine was cited. According to the respondent the said woman was totally neglected by her husband after knowing that the woman was a TB patient. The woman was forced to resort to herbal treatment because she could not get money to come to the facility for her medication. It is therefore necessary to engage communities in stigma reduction programmes.

Participants also raised the concern of the challenges they face in tracing patients who defaulted treatment. Inadequate or lack of means of transport/fuel to trace defaulting patients has been reported as a challenge to them. Respondents also said some patients give wrong contact addresses making it difficult to trace them when they stop coming to the health facility for their medication. A respondent also raised a concern of patients travelling out of the district without informing the health care providers taking care of them.

Perceived factors that motivate patients to comply with treatment according to the respondents include, visiting clients at home to see how they are faring, reduced waiting time for patients at the facility whenever they come for their drugs and being friendly and relating well with the patients. Other motivating factors include providing health education, the enablers' package given to patients from time to time and recently the provision of food ration to the patients. In South Africa, Lutge et al., (2013) found that providing economic support to TB patients in the form of giving a voucher that can be used to purchase food for their households lead to an improvement in the TB treatment success rate. The aim was to improve household food security and the nutritional status of patients. It was also hoped that the voucher would free up money spent on foodstuffs to meet other expenditure, such as transport to the TB treatment center. On the other hand perceived factors that hinders TB treatment adherence by health care providers include, the long distance patients have to travel to the Bole district hospital to collect their drugs coupled with the fact that most of these patients are poor. Long duration of treatment, lack of treatment supporters for some patients, stigma from friends, family and community members and inadequate health education rendered to patients are other factors that negatively affect adherence to TB treatment.

Finally, the attitude of health workers toward the TB control programme was also highlighted. He was, however quick to add that the situation is now improving with continuous encouragement and motivation by the health authorities in the district. The actions of some health workers appear to confirm the assertion of the district TB coordinator, they perceive TB control activities as the responsibility of disease control officers and so sub-districts/facilities without disease control officers usually have TB control activities stagnated.

CHAPTER SIX

6.0 Conclusion

This study pointed out several factors associated with non-compliance to TB treatment in the Bole District. Residing outside the Bole district whiles coming to Bole for their medication, lack of a TB treatment supporter and travelling over 30 km to the treatment center for medication were associated with treatment non-compliance.

The major area in the fight against TB is to enhance treatment compliance. This study, therefore suggests that the enforcement of the NTP's recommendation of decentralizing TB treatment to all health facilities and adequate health education to patients could improve TB treatment outcome.

6.1 Recommendation

Based on the findings from this study, the following recommendations are made:

1. Health workers should provide adequate health education to all TB patients and their treatment supporters on the duration of TB treatment and expected side effects of the drugs, especially when putting patients on treatment for the first time and reinforce the education during each visit. The counselling skills of health workers involved in the TB control activities need to be improved. Just like the HIV/AIDS control programme, all health staff involved in the TB control programme should be taken through counselling. In addition, the district health directorate should intensify health education on TB in the communities, including schools, churches and mosques through the school health programme and durbars to sensitize community members on the disease. The education should cover the signs and symptoms, durations of treatment, free treatment of TB patients and above all the need to seek for early treatment.

2. Decentralize TB treatment to at least the health centers as prescribed by the NTP, this will bring the services closer to the clients and reduce the long distance patients travel to the district hospital for their drugs. It will also reduce the cost incurred by patients to transport themselves to and from the treatment center.
3. All health workers should be made to know that TB control activities are part of their routine duties and for that matter all activities concerning TB control should be integrated into existing health services such as outreach programmes. This would improve defaulter tracing to the community.
4. Health workers at the treatment centers should follow strictly the policy on treatment supporters. Every patient must be made to nominate a treatment supporter before being put on treatment.
5. Chemical sellers and traditional medicine practitioners must be sensitized on the signs and symptoms of TB and encourage them to refer patients they suspect of having TB to the nearby health facility.
6. All patients who are not resident in the Bole district should be counselled appropriately and referred to their resident district or the nearest health facility to continue their treatment. It should also be made known to patients that TB treatment can be obtained free of charge in every district or public hospital throughout the country.

6.2 Limitation(s) of the Study

Limitations are weaknesses or challenges in a study that may compromise the findings to be generalized to other settings.

1. The study estimated a sample size of 105 TB patients but ended up with 95 respondents. This could have affected the findings of the study.

2. The study made use of secondary data from the district health directorate which was not originally meant for research projects like this, hence some data elements may be found missing.
3. There is the likelihood of recall bias on the part of the respondents because the study sought to solicit information on events that happened retrospectively.

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APPENDIX A: Introduction Letter

UNIVERSITY FOR DEVELOPMENT STUDIES

(School of Medicine and Health Sciences)

Tel: 03720-93295

Our Ref:
Your Ref:

P.O. Box 1883
Tamale, Ghana

Date: 21/03/2014

Department of Allied Health Sciences

THE DIRECTOR
BOLE HEALTH DIRECTORATE
P O. BOX 11
BOLE

Dear Sir,

LETTER OF INTRODUCTION

I write to introduce to you **MR. ELIASU YAKUBU,** an MPhil. (Community Health and Development Student),of the Department of Allied Health Sciences, School of Medicine and Health Sciences of the University for Development Studies.

He is undertaking a thesis titled: **"FACTORS THAT HINDERS OR ENHANCES MANAGEMENT OF TUBERCULOSIS IN THE BOLE DISTRICT OF THE NORTHERN REGION".**

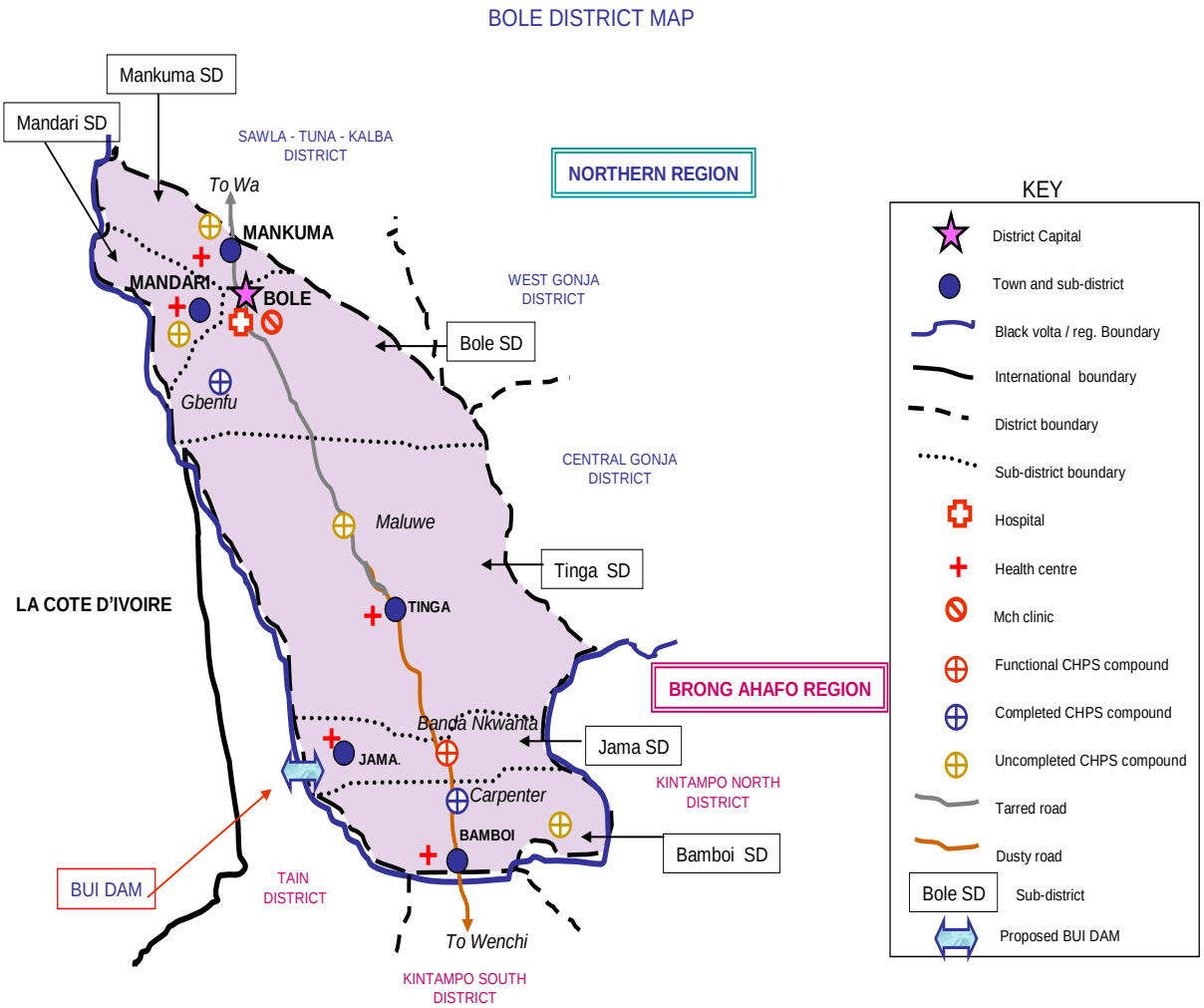
Kindly assist him to collect the appropriate data to answer his research questions.

Thank you.

Yours sincerely,

Dr. Robert Kuganab-Lem
(Head of Department)

Appendix B: Bole District Map



Appendix C: data collection tool for TB patients

UNIVERSITY FOR DEVELOPMENT STUDIES

SCHOOL OF MEDICINE AND HEALTH SCIENCES

PROGRAMME (COMMUNITY HEALTH AND DEVELOPMENT)

INTERVIEW GUIDE FOR TB PATIENTS

I am .....,

This data collection tool is aimed at soliciting from you information about the TB treatment in this district. You have under gone TB treatment and possess good information that may help officials of the TB control programme improve upon how to handle other people including your relatives who may develop the disease.

I assure you that all information you provide would be kept confidential. You have the liberty to participate in this research as a respondent or otherwise.

On this note I want to find out from you, are you willing to participate in the research as a respondent? **Yes or No**

INSTRUCTIONS TO COMPLETED FORM

Please circle appropriate response for questions with options and fill in space provided for questions without options.

TREATMENT OUTCOME: Please Tick the outcome of patients to be interviewed

☐**Cured**

☐**Defaulter**

☐**Treatment failure**

☐**Treatment completed**

DEMOGRAPHIC BACKGROUND

1. Name of community: .....
2. Age group
   a. 0 – 10 years
   b. 11 – 20 years
   c. 21 – 30 year
   d. 31 – 40 years
   e. 41-50 years
   f. 51+ years
3. Sex
   a. Male
   b. Female
4. Education Level
   a. No education
   b. Primary
   c. JHS/middle school
   d. Tertiary (College, Polytechnic & University)
5. Marital status
   a. Single

b. Married

c. Co-habitation

d. Divorces

6. Place of residence

a. Urban

b. Rural

(Note: Bole, Tinga, Bamboi, Sawla and Tuna qualifies as urban areas)

7. Religion

a. Traditionalist

b. Islam

c. Christian

d. Others.....

8. Ethnicity

a. Gonja

b. Dagao

c. Briffo

d. Mo

e. Vagla

f. Others (specify).....

SOCIOECONOMIC STATUS

9. Occupation

a. unemployed

b. Farmer

c. Fisherman

d. Trader

e. Small scale miner

f. Formal (civil servants, public servant & NGO workers)

g. Others.....

10. Annual income level of patient/care taker? GH¢.....

11. During the period you were on treatment, can you tell me how having TB affected your daily life? Example your Work and family-life

.....

12. What distance (km) do you travel to collect your TB medicines?

a. <5

b. 5-10]

c. 11-15

d. 16-20

e. >20

13. How did you come to the health facility for your medication?

a. By car

b. On motorbike

c. On bicycle

d. On foot

14. How much did it cost you to get to the health facility? (GH¢).....

SYMPTOMS, VULNERABILITY, SEVERITY UNDERSTANDING AND ACTION

15. Can you tell me when you felt the first signs of being ill?

.....

16. What signs/symptoms did you notice that prompted you to seek for treatment?

    a. Chronic cough
    b. Fever
    c. Weight loss
    d. Others (specify).....

17. How long did it take you to seek medical treatment after the first signs/symptoms?

    a. Within a week
    b. After one month
    c. After six months
    d. A year
    e. Others.....

18. What did you think you were suffering from?

    a. Did not know
    b. Fever/malaria
    c. cough
    d. Others (specify).....

19. Where did you go first to seek for care when you first felt ill and why?

    a. Herbalist
    b. Prayer camp
    c. Chemical shop

d. Health facility

e. Others (specify).....

20. What treatment did you receive?

a. Herbal medicine

b. Prayers

c. Cough medicine

d. TB treatment

e. Others.....

21. How do you think you got this condition?

a. I was bewitched

b. Through sex

c. Curse

d. I got it from my work

e. From an infected person I stayed with

f. Others (specify).....

LIFE STYLE FACTORS

22. Have you ever smoked cigarette in your life?

a. Yes

b. No

If yes, when was the last time you smoked cigarette?

a. a year ago

b. less than a year ago

c. cannot remember

d. Others.....

23. Have you ever drunk alcohol in your life?

    a. Yes

    b. No

If yes, when was the last time you drunk alcohol?

a. a year ago
b. less than a year ago
c. cannot remember
d. Others.....

24. Did you have a treatment supporter when you were on treatment? Yes/No **if No go to 25**

25. If yes, what role did the supporter play in your treatment?

a. No support
b. Reminded me on my medication
c. Collected medication from the health facility for me
d. Others.....

26. If No, why?

a. I did not want a treatment supporter
b. Nobody agreed to be my treatment supporter
c. I was not told to choose a treatment supporter
d. Others (specify).....

ASSESSING THE HEALTH SYSTEM

27. Where were you collecting your TB medicines?

Name of facility: .....

Was the place you take your drugs convenient for you? Yes/No

If No, why?

.....

28. Were you given enough information about your condition including how to take the drug? Yes/No

29. Were you told the disease you are suffering from? Yes/No

If yes what disease?

30. How long were you told you would take the medicines?

a. 2 months
b. 4 months
c. 6 months
d. others

31. Did you receive your monthly stock of medicines for each visit to the health facility? Yes/No

32. If No, why?

a. Medicines not available

b. No staff to service me medicines

c. TB clinic closed

d. Others (specify).....

33. How much time do you usually wait at the facility before being attended?

a. <1hr

b. 1-2 hrs.

c. >2hrs

34. How would you describe the attitude of the health providers towards you when attending to you?

a. Poor

b. Good

c. Very good

d. Others.....

35. Have any of the above issues affected your ability to take your medication? Yes/No

If yes, how?

.....

36. Who supervised you when you were taking your TB medicine? (DOT Status)

a. None

b. Health Worker at the facility

c. Family member

d. Community member

e. Health Volunteer

37. I just want to take some time to find out what you know about TB. The following are symptoms of TB tick any you know

    a. Coughing

    b. Night sweats

    c. Loss of Weight

    d. Chest Pains

38. For how long were you told TB treatment should last?

    a. 6 months

    b. One feels better then stop on your own

    c. 6 months completed and health worker tells you to stop

SOCIAL RELATION

39. How did you react when you received the news that you were suffering from TB?

    a. Shocked

    b. Disappointed

    c. Ashamed

    d. Angry

    e. Others (specify).....

40. Did you inform your family or friends that you have TB?

    a. Yes b. No

If yes, what was the person's reaction and subsequent attitude towards you? **Tick all that are applicable**

a. Mocked me
b. Sympathised with me
c. Avoided me
d. Others (specify).....

If no, why?

a. Fear of being isolated by friends or relatives
b. No one to trust
c. Other reasons (specify).....

41. Did people in your community know that you were suffering from TB? Yes/No

If yes, have you had any negative experience from people around you and the community members relating to the fact that you have TB? Yes/No

If yes, what experience?

a. They avoid me
b. The mock at me
c. Insult me
d. Others (specify).....

DISEASE AND MEDICINE RELATED

a. Did you experience any side effects when you were taking TB treatment? a. Yes b. No

If yes to above question, which side effects did you experience?

a. Diarrhoea

b. Vomiting

c. Skin rashes

d. Headaches and dizziness

e. Numb feet or hands

f. Yellow eyes

g. Painful limbs

h. Other

42. Did your experience of the side effects affect how you took the medication? Yes/No

If yes, how?

a. I stopped taking the medicine

b. I reduce the quantity of tablets that I usually take for a day

c. Others (specify).....

43. Did you complete your TB treatment?

a. Yes b. No If No go to 43b.

43a. If yes, what motivated you to complete your treatment?

.....

43b. If No, what were the reasons that made you to stop treatment?

a. Side effects

b. Feeling well

c. Too many tablets

d. Stigma from community members

e. Long distance to treatment centre

f. Cost of travel to treatment centre

g. Lack of family support

h. No food

i. Inadequate supply of medicines

j. Medicine not working

k. Not feel better on medicines

l. Other reasons (specify).....

44. What would you have done to make sure that all the patients completed their treatment if you were in-charge of treating patients?

.....

This is the end of the interview. I thank you for your time and responses offered.

Appendix D: Data collection tool for Health staff

UNIVERSITY FOR DEVELOPMENT STUDIES

SCHOOL OF MEDICINE AND HEALTH SCIENCES

PROGRAMME (MASTERS IN COMMUNITY HEALTH AND DEVELOPMENT)

INTERVIEW GUIDE FOR HEALTH WORKERS

I am Yakubu Eliasu, a postgraduate student of University for Development Studies working on the project titled factors that enhances or hinders the treatment of TB in the Bole District of the Northern Region for my research work.

This data collection tool is aimed at soliciting from you information about the TB control programme in this district or facility. You are involved with the TB programme and possess good information that may help me for the research project.

I assure you that all information you provide would be kept confidential. You have the liberty to participate in this research as a respondent or otherwise.

☐**DISTRICT TB COORDINATOR**

☐**SUB-DISTRICT INCHARGE**

☐**FACILITY TB COORDINATOR**

☐**OTHERS**

1. Designation of respondent:

   …….

2. What is your academic qualification?

   a. Certificate holder (FT, CHN, EN, others ……)

   b. Diploma (RGN, physician asst., TO, others ……)

   c. 1st degree (Nursing, Public health, others ...…….……)

   d. Others ……

3. How long have you been involved with the TB programme?

   a. < 1 year

   b. 1 year

   c. 1-3 years

   d. Above 3 years

4. Have you had training on TB management before? Yes or No

5. If yes, when was the last time you had training on TB control activities?

   DD/MM/YYYY (…….)

6. In what form was the training?

   a. On the job training

   b. Workshop

   c. In school

   d. Others ……

7. What was the duration for the training?

   a. A day

   b. 2 to 7 days

   c. 2 weeks

   d. Others ……..

8. What role do you play with respect to the TB control programme?

……

KNOWLEDGE ABOUT TB

9. What causes TB? Please name the causative organism:

……

10. How is the condition transmitted?

……

11. Who has a higher risk in developing TB?

……

12. What are the most common symptoms of developing TB? List

    a. ……

    b. ……

    c. ……

    d. ……..

13. How is TB diagnosed?

……

14. How long (in months) is the TB treatment for patients)?

……

15. How do you determine the dosage of drug for a patient?

……

16. What is the frequency for follow up sputum test for Smear positive patients under the programme? Please state months sequentially.

……

CARE OF TB PATIENTS

17. Do you maintain records of patients in a TB treatment register? Yes or No
18. If No, why?

……

19. Do you provide health education to patients? Yes or No
20. If yes, how often?

……

21. How long does a health education session for a patient last (in minutes)?
22. What information is given to patients when educating them?

……

23. If No, to question 19 why?

……

24. Do you provide health education to TB treatment supporters? Yes or No
25. If yes, how often?

……

26. How long does a health education session for a treatment supporter last (in minutes)?

.....

27. If No, to question 24 why?

……

28. Do you have patients defaulting treatment? Yes or No
29. If yes to question 28 what action do you take?

……

30. Do you have a challenge tracing defaulters? Yes or No

31. If yes to question 30 what is the nature of the challenge?

……

32. Does the district or facility receive enough drug supplies for patients? Yes or No

33. If No to question 32 why?

……

34. Do you think clients are comfortable with where they are served their medication? Yes or No

35. If No why?

……

36. Do you think clients are happy with how you talk to them whenever they come for their drugs? Yes or No

37. If yes, why do you think so?

……

38. If No, why do you think so?

……

39. Does the district or facility receive funds for the implementation of TB control activities in the district or facility? Yes or No

40. If yes, how often? ……

41. If No, why?

……

42. What factors do you think affect TB treatment of patients?

    a. Motivating factors for treatment success

        i. ……

        ii. ……

iii. ……

iv. ……

b. Factors that contribute to poor treatment success

v. ……

vi. ……

vii. ……

viii. ……

43. What are the general challenges confronting the TB control programme in the district or facility?

……

44. How can these challenges be overcome?

……

Thank you!!!