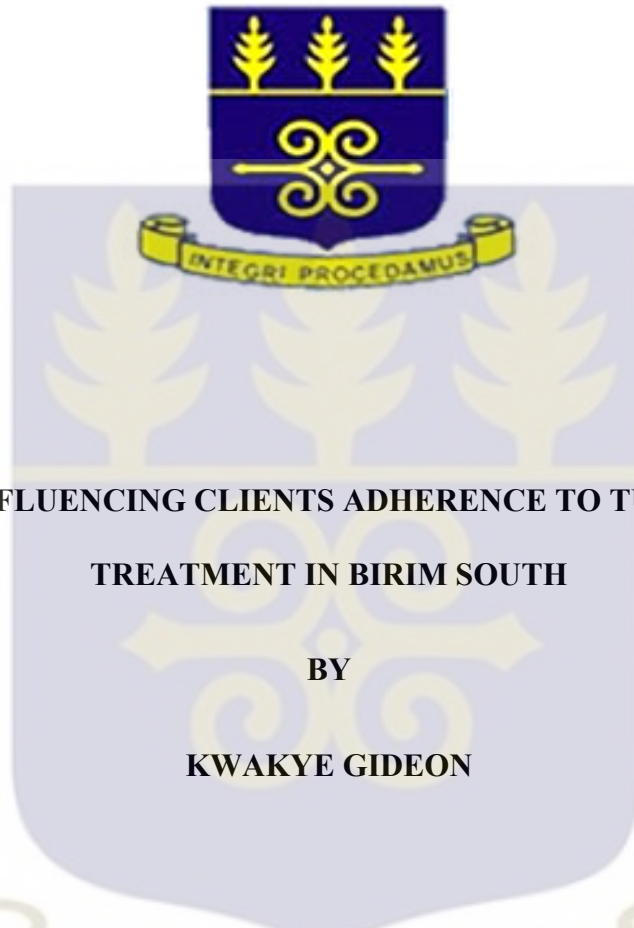


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**



**FACTORS INFLUENCING CLIENTS ADHERENCE TO TUBERCULOSIS
TREATMENT IN BIRIM SOUTH
BY
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**THIS DESERTATION IS SUBMITTED TO THE UNIVERSITY OF GHAN, LEGON, IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTERS OF PUBLIC HEALTH (MPH) DEGREE.**

JULY, 2019

DECLARATION

I hereby declare that this thesis is the result of my independent work. References to other works have been duly acknowledged. I take full responsibility for any shortcomings in this work.

.....

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DATE

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DR. KWABENA OPOKU-MENSAH

(ACADEMIC SUPERVISOR)

.....

DATE

DEDICATION

I dedicate this piece of work to my wife, Esther Nabauk, my lovely daughter, Maridel Lingmi Kamajor, my mother, Eunice Kupoir and to the memory of my late father, Peter Lingmi.

ACKNOWLEDGEMENTS

Glory be to God almighty for giving me the strength, capacity and grace to complete my dissertation. My sincere appreciation goes to my supervisor for his guidance, inspiration and support. Dr. Kwabena Opoku-Mensah, may God reward you abundantly. I appreciate the warm reception from the health workers in Birim South District Health Directorate. I am grateful for your support. To my family and friends, thank you for being there for me. Cherry, Abigail, Christabella, Adupoku, and Essien may God bless you. This research would have been impossible to undertake without the permission from the District Director of Health services at Birim South. I am very grateful for giving me the opportunity to use your facilities for the study.

ABSTRACT

Introduction: Tuberculosis (TB) is one major cause of illness and death worldwide especially in Asia and Africa. Globally, tuberculosis is one of the leading causes of death (WHO, 2017). However, TB is curable. The National TB Control Programme introduced the Directly Observed Treatment, Short Course (DOTS) to improve treatment success rates. Despite these efforts, the number of Multiple Drug Resistance Tuberculosis (MDR-TB) cases is increasing at a fast rate.

Objective: The study assessed the factors influencing tuberculosis treatment adherence among TB clients in Birim South District and also determined the influence of individual, service related factors and community factors that influence adherence to anti-TB drugs.

Methods: A cross-sectional study design and quantitative approach was used to collect data. Pre-coded Structured questionnaires were used to collect data which included a standardized and validated eight-item. Morisky Medication Adherence Scale (MMAS-8) adapted to measure adherence. All consecutive TB patients who visited each of the selected sub-district facilities of Achiasse Health Centre and Akim Swedru Catholic Clinic were enrolled into the study, if found eligible, census approach was used for the study with sample size of 127. Data were entered into Excel and analyzed in STATA 15. Proportion of TB patient's adherent was derived and data were assessed for association using Pearson's Chi square test and simple logistic regression. Multiple logistic regression was done to adjust for confounders. Odds ratios of association between adherence and independent variables were recorded to determine factors that influence adherence to TB medication. Statistical significance was set at $p\text{-values} \leq 0.05$.

Results: The proportion of TB clients who adhered to TB treatment was 30%. After adjusting for other variables, the odds of adhering to TB treatment was 7.5 times as high among respondents

who had some form of education as compared to those with no formal education (aOR = 7.52; 95% CI = 1.33 – 42.41; p = 0.022). However, after adjusting for all other variables, respondents who did not understand the instructions given had a 95% reduction in their odds of adhering to TB treatment as compared to those who understood the instructions given. Respondents who were provided with further source for clarification, their odds of adhering to TB treatment was significantly 6.9 times as high compared to those who were not provided with a source for further clarification after adjusting for all other variables (aOR = 6.99; 95% CI = 1.06 – 46.13; p = 0.043). However, after adjusting for other variables the odds of adhering to TB treatment was significantly 4.8 times as high among respondents who experienced no side effects as compared to those who experienced side effects (aOR = 4.

Conclusion: From this study the proportion of TB patients who were adherent (medium to high adherence) to TB treatment were 30%. Health service factors such as unclear instructions given by pharmacist or physician was found to be a significant predictor of adherence to TB treatment. Also, for respondents who were not provided with further source for clarification, their odds of adhering to TB treatment was significantly higher compared to those who needed a source for further clarification after adjusting for all other variables. Side effects of TB treatment significantly predicts adherence.

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LIST OF ABBREVIATION

AIDS	-	Acquired Immune Deficiency Syndrome
aOR	-	Adjusted Odds Ratio
ART	-	Anti-retroviral Therapy
DOTS	-	Directly Observed Treatment Short Course
GHS	-	Ghana Health service
HIV	-	Human Immunodeficiency Virus
HR	-	Isoniazid, Rifampicin
HZRE	-	Isoniazid, Rifampicin, Pyrazinamide, and Ethambutol
IRB	-	Institutional Review Board
ERC	-	Ethical Review Committee
M	-	Mycobacterium
MDR	-	Multi Drug Resistant
MOH	-	Ministry of Health
NTP	-	National Tuberculosis Control Programme
TB	-	Tuberculosis
WHO	-	World Health Organization
XDR	-	Extensive -Drug Resistance

CHAPTER ONE

1.0 INTRODUCTION

1.1 Introduction

Randa, (2014) described adherence as a process, in which the correct treatment is decided after an appropriate counseling with the client. Tuberculosis (TB), often believed to be of a disease from the past, is still widespread in large parts of the world. With 1.5 million deaths yearly, it is the most imperative cause of death due to its infectiousness worldwide (KNCV, 2015).

For fifteen years, worldwide and countrywide struggles to decrease the affliction of tuberculosis (TB) remained concentrated on attaining targets established inside the framework of MDGs. In 2016, the MDGs were substituted with a fresh fixed objective, known as the Sustainable Development Goals (SDGs). TB Strategy was universally sanctioned and approved by all Member states at a meeting that took effect from 2016 and ended at 2035. The strategy is to end tuberculosis infections and be responsible for nationwide and international to close tuberculosis widespread throughout that era (WHO, 2018).

Today, about 10% to 50% of all TB clients do not complete their prescribed medication; subject to the type of TB the patient is infected with. The results of failure to comply to TB management are dreadful, swelling the possibility of client morbidity and mortality, disease setback, drug-resistance, and transmission of TB (Pai, Editor, Chedore & Co-author, 2018).

In Ghana, it was projected 44,000 new TB cases were recorded which transforms to 165 newly infected people per 100,000 populations. This put Ghana as one of the high TB endemic

countries globally in reference to an incidence rate of ≥ 40 per 100,000 in the world (WHO, 2014).

Defaulter in TB management is explained as refusal to appear to the hospital for greater than 30 uninterrupted times once the arranged date of return was due. This singularity has been associated to death caused by TB, the infection, occurrence and multidrug resistance, which results to reduced cure proportions and a lessened efficiency of TB control programs (Mainbourg, Belchior, Goncalves & Ferreira-Gonçalves, 2016).

Poor adherence influences deteriorating of TB illness not only by swelling numbers but however, bringing about drug resistance. The struggle to adhere to TB medication has turn to be an impediment regarding management of the infections. The WHO endorses minimum 85% treatment rate of all identified TB cases. For us to accomplish this treatment rate, compliance needs to be in the order of 85–90% (Gugssa, Boru, Shimels & Bilal, 2017).

The medicine endorsed by WHO have been made known to be extremely efficacious for both inhibiting and managing infections of TB, however, failure to complete the treatment is the main challenges worldwide in the disease management (Cremers et al., 2015). TB is an infectious disease, therefore non-compliance to a recommended management upsurges the dangers of illness, death and medication resistance at both the specific and community level. Observance to the extended path of TB management is a multifaceted, vibrant singularity with a wide variety of factors impacting on treatment which can be influenced by the collaboration of a number of these elements (Mweemba, Haruzivishe, Siziya, Chipimo, Cristenson & Johansson, 2010).

Furthermore, the situation is significant to recognize the particular kind of non-adherence inside the treatment use process. Common non-adherence occurs when clients fail to return for their scheduled medication. Non-persistence is when the clients discontinue taking the medication without informing the service provider (Osman, Ali, & Prins, 2016).

Besides, ‘non-conforming’, non-adherence comprises a diversity of ways whereby clients take their own decision on how they take the medication contrary to how the drugs are recommended. Failure at one or more of these stages will have consequences for patients’ health. Additionally, what constitutes non-adherence for one medication may be clinically inconsequential for another medication (Zachary, Marcum, Pharm, Walid & Gellad, 2013).

During the initial phase of the treatment, almost all clients are strictly monitored on daily basis for the whole period which is known as the intensive phase and this occurs at the initial first two months of treatment. Conversely, clients who have other medical complications are admitted and managed under supervision. (Tachfouti, Slama, Berraho & Nejjari, 2012).

Above and beyond causing distinct harm, non-adherence place and put the public health at risk; it may lengthen the infectivity and upsurge the probability of illness spread. Furthermore, the accurate management necessitates the use of extraordinary management schedules with other antibiotics for extended periods, making it more costly and decreasing the probabilities of cure (Furlan, Oliveira & Marcon, 2012).

1.2 Problem statement

Intercontinentally, tuberculosis is among ten causes of morbidity, and the prominent reason since a particular communicable agent. It has been projected that for the past two years, tuberculosis

has caused an estimated 1.3 million deaths world-wide (WHO, 2018). Tuberculosis is mostly prevalent wherever there is poverty, overcrowding and chronic debilitating illness. Failure to complete tuberculosis management remains the main impediments to the management of tuberculosis control. Appreciative of numerous causes liable to management and lost to follow up may well help to accomplish better compliance from patients (Oyugi, Garama, Kweri, Malik, Bett & Biego, 2017). Clients who unsuccessfully finish the management schedule may advance to multidrug resistant and extensively drug resistant tuberculosis. This state endangers the hindrance and control approach of tuberculosis and that possibly cost of management on the nation.

Numerous implementation strategies have been instituted by Birim South district health directorate including re-training of all categories of staff in the district. Targeted clients through notices and reminders, incentives for those who strictly follow treatment schedules, enticements and refunds and encouragement of family support. Additional activities are focused at service providers such as staff incentives and monitoring or method of management distribution and drug packaging (Jm, Kredo, Volmink, Imunya, Kredo, & Volmink, 2012).

Communal influences that are identified to be fueling the international upsurge in tuberculosis cases include; congestion especially in cities and slums areas, delayance and late identification, non-adherence to management timetable, absence of support on the part of family and community level, absence of education, health care organization challenges and poverty (Ahorlu & Bonsu, 2013).

In Birim South, non-adherence rate keeps on increasing year after year from 20% in 2015 to 28% in 2016 and further to 35% in 2017 (DHMT Annual Report, 2017). This has an undesirable effect on the health structure, the patient, family system and nation as a whole. It drains the finances of the health system as it is more expensive to care for patients with complications. Therefore there is the need to improve adherence among clients in the district. This can be done by identifying factors that affect adherence at Birim South and putting interventions in place to deal with the menace.

1.3 Research Questions

From the problem statement stated, the following questions are being asked;

1. What proportion of clients adheres to tuberculosis treatment in Birim South District?
2. What are the individual factors that influence adherence?
3. What is the service related factors influencing adherence to tuberculosis treatment?
4. What is the community related factors influencing adherence?

1.3.1 General objective

To determine the factors influencing tuberculosis treatment adherence among TB clients in Birim South District.

1.4 Specific Objectives

1. To determine the proportion of TB clients who adhere to tuberculosis treatment.
2. To assess individual factors that influence adherence to tuberculosis treatment.
3. To identify service related factors influencing adherence to tuberculosis treatment.

4. To identify community related factors influencing adherence.

1.5 Justification and significance of study

It has been observed that many people with chronic conditions requiring prolonged or lifetime treatment are not aware about their conditions and why they have been prescribed the medicines they are taking. This constitutes the single most important factor that contributes to non-adherence to medications. The magnitude of inability by clients to complete treatment has damning consequences, that may lead to resistance and wasteful use of medical resources and increase hospital admissions (Tiemersma & Hafidz, 2014). Non-compliance to TB medication long-established been accepted as a substantial obstruction to attaining better endings for patients (Cutler & Everett, 2010).

In 2017 alone, one third of clients who were diagnosed with tuberculosis were reported to have been on treatment and had been documented and proven that they were tested for resistance to rifampicin a component of TB medication (WHO, 2018). The situation was so high that 24% fresh TB clients and 70% were those previously treated respectively. In fact, the worldwide picture is that we are recording a lot of multidrug-resistant TB and rifampicin-resistant TB (MDR/RR-TB) and in the last two years alone, six hundred and eighty four new cases were registered in 2017 (WHO, 2018). Globally, patients who fail to adhere to tuberculosis treatment regimen is answerable for the development of resistant TB strains that the world all over is fighting now.

Managing multidrug resistance of tuberculosis requires huge financial commitment on the part of governments which serves as drain to the already strained health budgets of any developing

nation like Ghana. Moreover, the regimens adopted for management drugs resistance TB has severe side effects on the patient. Furthermore, positive treatment outcome with success for resistant TB is as much as low 48% compared to normal TB infections with success rate of 85% (WHO, 2012).

However, nations are currently helpless in dealing with the situation for there is little or no evidence based information available to trigger policy directions. Consequently, understanding the factors considered important by patients which may contribute to treatment adherence will go a long way to facilitate the reduction of resistant TB cases and reduce the number of new infections globally. This research seeks to contribute to the provision of evidence-based information by to substantiate the elements influencing the adherence in Tuberculosis treatment regimen in the Birim South District. This study therefore when completed, will contribute to policy makers' ideas when formulating laws guiding TB treatment as well as make recommendations to implementers for enhancing TB prevention and control strategies.

1.6 Conceptual framework

The framework in figure 1 below clearly illustrates several direct and indirect factors which could likely be accountable for non-adherence to TB treatment in the study area. Conversely, for the purpose of this study, the researcher sought for more of the direct factors as in patient related factors as well as service provider factors as direct contributors to TB treatment.

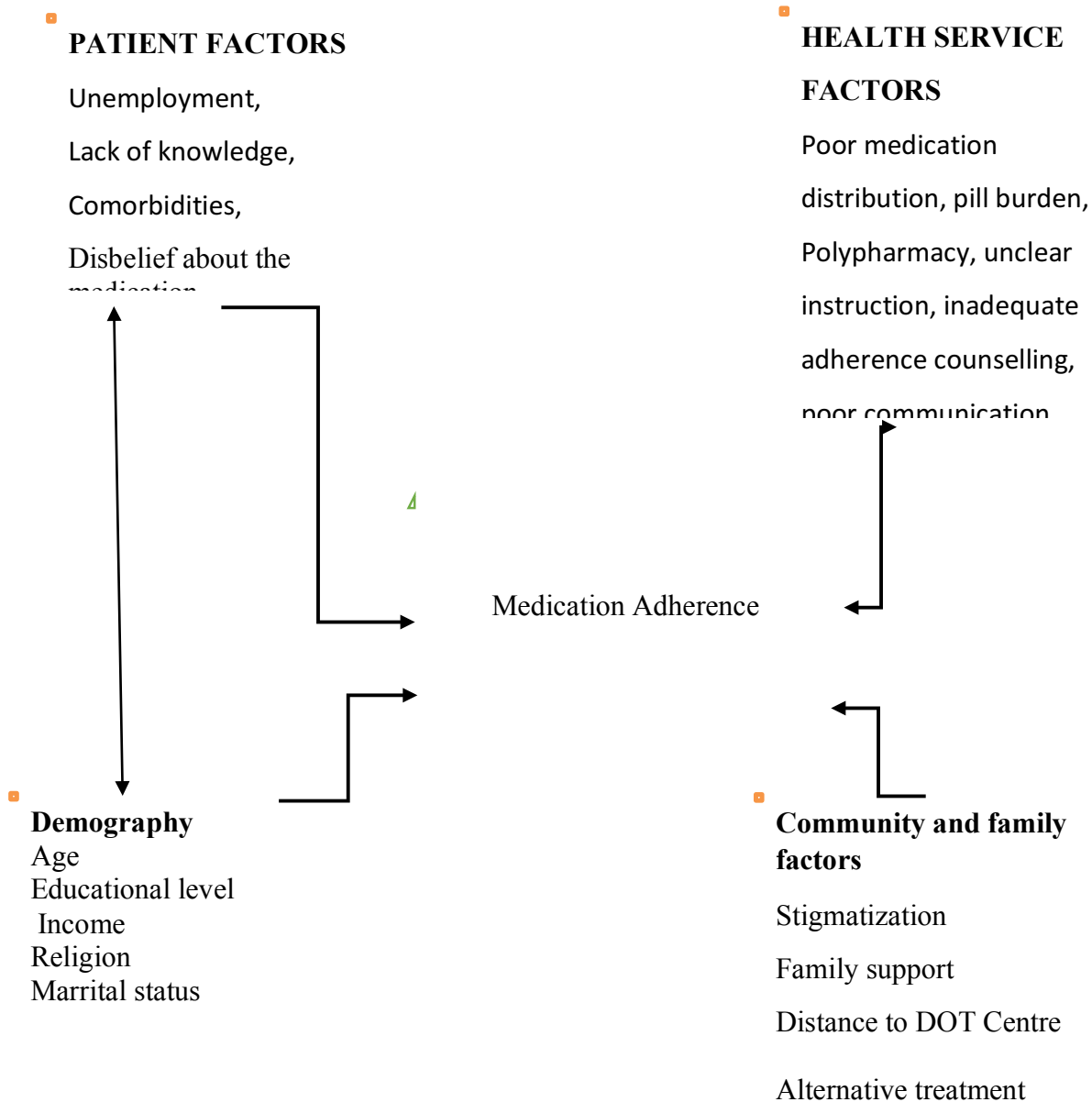


Figure 1.1: Conceptual Framework of the Study

1.7 Theoretical Frame-Health Belief Model

Lack of adherence to health-promoting advice challenges the successful prevention and management of many conditions. The Health Belief Model (HBM) was developed in 1966 to predict health-promoting behaviour and has been used in patients with wide variety of disease

(Zare & Ghodsbin, 2016). The Health Belief Model (HBM) was developed in the early 1950s by social scientists at the U.S. Public Health Service in order to understand the failure of people to adopt disease prevention strategies or screening tests for the early detection of disease. Later uses of HBM were for patients' responses to symptoms and compliance with medical treatments. The HBM suggests that a person's belief in a personal threat of an illness or disease together with a person's belief in the effectiveness of the recommended health behavior or action will predict the likelihood the person will adopt the behavior.

The HBM derives from psychological and behavioral theory with the foundation that the two components of health-related behavior are 1) the desire to avoid illness, or conversely get well if already ill; and, 2) the belief that a specific health action will prevent, or cure, illness. Ultimately, an individual's course of action often depends on the person's perceptions of the benefits and barriers related to health behavior. There are six constructs of the HBM. The first four constructs were developed as the original tenets of the HBM. The last two were added as research about the HBM evolved.

The notion of the health belief model (HBM) is that individual beliefs about and perceptions of a disease contribute greatly to their health behaviours (Louis, 2016). Tola, Karimi, & Yekaninejad, (2017), expounded that, this theory was advanced in the 1950s by social scientists at the United States Public Health Service in order to understand the failure of people to accept disease prevention. This psychological model explains why screening programmes, especially tuberculosis were not successful. The model argues that four main constructs independently or in combination can be used to explain individual behaviour towards health issues. These concepts

include perceived seriousness, perceived susceptibility, perceived benefits and perceived barriers. Upon modification, motivating factors, self-efficacy and cues for action have been added to the constructs (Tarkang & Zotor, 2015).

The health belief model will be used to explain the findings of this study under its six main tenets explained below. First, perceived seriousness refers to an individual's feelings of the severity of contracting a disease and living with the disease untreated. Tola, Karimi, & Yekaninejad, (2017), indicate that a person's feeling of severity varies with an evaluation of medical consequences and social effect. With reference to this study, TB patients' knowledge of TB, educational level, and counselling received at the health facility. Thus, an individual highly educated is likely to perceive health threats and take necessary actions on time compared to infected persons who are illiterates. Second, perceived susceptibility describes an individual's personal perception of the danger of acquiring an illness or disease.

There is wide variation in a person's feelings of personal vulnerability to an illness or disease. It is logical that individuals would take actions to prevent the occurrence of diseases that make them vulnerable. The opposite is however true. Thus, individuals are more likely to engage in unhealthy behaviours perceiving they are at no risk of a disease (Kamran, S, Biria, Malepour, & Heydari, n.d.). Hence, one current health status (comorbidity), alcohol consumption, smoky behaviour and attitude of healthcare providers inform their perceived susceptibility. Third, perceived benefits refer to a person's perception of the efficacy of various actions available to lessen the threat of a disease or to a cure disease.

Actions people take in a disease condition depend on assessment of both perceived vulnerability and perceived benefit. People would accept the recommended health action if it was perceived as beneficial (Louis, 2016).

TB patients are more likely to resort to traditional medicines among other alternative treatment for TB available to them, should they perceive those options as effective. Fourth, perceived barriers denote to a person's feelings of the hitches to accomplishing a suggested health action.

There is a wide discrepancy in a person's feelings of obstacles which lead to a cost/benefit analysis. The person assesses the effectiveness of the actions against the perceptions that it may be costly, dangerous, painful, time-consuming, or inconvenient. Thus, the benefits of a new health behaviour should outweigh the consequences of continuing the old behaviour (Tarkang & Zotor, 2015). Some of the barriers impeding successful TB treatment outcomes include stigma, attitude of healthcare providers, income, family support, adverse side effect of medication and waiting time. In addition to the four beliefs, cue to action is the spur needed to initiate the decision-making process to accept a suggested health action.

These cues can be from within an individual (chest pains, wheezing) or external (advice from others, illness of family member, newspaper article.). Cues of actions are events, things or people that move an individual to change their behaviour (Tola, Karimi, & Yekaninejad, (2017). Counselling, drug side effect and family support are factors that could cause a TB infected person to adhere to treatment or otherwise.

Finally, self-efficacy depends on the level of an individual's confidence in his or her capacity to effectively perform a behaviour. Self-efficacy is a concept in many behavioural models which

relates to whether a person implements a desired behaviour. Thus, if people do perceive that an intervention is beneficial yet they do not see themselves as capable of doing it, chances are that the intervention will not be tried. Therefore, personal beliefs in one's ability to daily take TB medicines for six or more continuous months informs whether the individual will even attempt in the first place to start with TB medication.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section presents an examination of studies conducted on TB treatment adherence, socio-economic, patients and service related factors influencing adherence.

2.1 Epidemiology of Tuberculosis

Majority of people with an infectious disease are associated with tuberculosis globally. The disease affects people with low socio-economic status. Out of every ten population, one is seen to have dormant tuberculosis which will eventually develop to become active TB in their life span (Gebreweld et al., 2018). This mostly affects people in their industrious years. Most of them are located in the underdeveloped and developing nations where greater number of deaths transpire. The immense majority of TB passing away are in the developing world, and more than half of all deaths occur in Asia. More than 95% of TB cases and deaths occur in low and middle-income countries of which Ghana is no exception (WHO, 2015).

The TB burden in Ghana in 2014 stood at 290 cases per 100,000 people with more than half of the adult population estimated to be infected (GHS, 2015). However, among those infected, 90% remain dormant within the body. The projected global incidence rate fell to 139 cases per 100 000 population in 2018 after climaxing in 2015 at 143 cases per 100 000. Rates are dropping very gradually in 5 WHO regions (WHO, 2017).

Tuberculosis (TB) remains a source of morbidity and mortality and a substantial world-wide public health issue disturbing about one – third of the world’s population notwithstanding the

carrying out of protective and control procedures over the years. It's the second principal cause of death amid contagious disease internationally (Ahorlu & Bonsu, 2013).

2.2 Treatment of Tuberculosis

TB is identified among clients who visit the out-patient and in-patient unit of the health facilities. Persons who present with cough duration for 2 weeks or more are made to undertake screening process and if presumed to have TB, are referred to undergo sputum smear microscopy. Those confirmed positive are registered and enrolled on treatment. The treatment are of two phases thus, the intensive phase and continuation phase. The regimens for treating TB have an initial stage of 2 months, followed by a continuation stage of either 4 or 6 months total of 6 to 8 months for treatment respectively (Dodor & Afenyadu, 2005).

Almost all patients are strictly monitored on daily basis for the entire intensive phase. Conversely, clients who have other medical complications are admitted and managed under supervision. This standard treatment regimen provided in Ghana are recommended by the WHO. Currently, WHO recommends that treatment supporter should be assigned to every TB patient and it could be a friend, a relative or a lay person who works as a treatment supervisor or supporter. Treatment monitoring may also be achieved with real-time video observing and video direct observation therapy by another person (WHO, 2017).

2.3. Risk factors of Tuberculosis

Mycobacterium tuberculosis is the main cause of tuberculosis and occurs when these invisible tiny organisms enter into lungs and subsequently develop in the lungs and cause infections. (American Thoracic Society, 2017). It is projected that most of the people who are infected

with TB are those living with HIV/AIDS globally. On the other way round, people with HIV have the highest chance of developing TB because the HIV infections compromises their immune system paving the way the tuberculosis to set in. If the person's immune system becomes weak, conversely, the bacilli will begin to increase (House, 2010).

Persons who dwell in the equal family or been in persistent close contact with the index case with infectious TB, are likely to contract the infections. Those living in unwholesome or extreme crowded environments, including those who are displaced or worked for a long time in a dusty environment has high degree of developing TB (NHS, 2007).

Tuberculosis and people with low socio-economic state are closely intertwined. Coupled with congested environments in which dependency rate is high, they are more possible to be infected with tuberculosis. The effect of those who get tuberculosis are also more likely to lead into poverty, given the economic consequences of the disease. Both the likelihood of infected with the disease, however, the odds of progressing to clinical disease are linked with poor diet, congestion, poor air movement and environmental factors also connected with poverty (Stop TB Initiative, 2000).

Individuals whose defence mechanisms have been destroyed are most at possibility of developing active tuberculosis. HIV destroys the immune system, making the body prone to control TB bacteria. It has also been established that those who use tobacco too are prone to developing active TB. Other conditions like, chronic infections, and individual who are undertaking cancer treatment, and very young individuals, the aged, and people who live

promiscuous life and drug addicts are all at risk developing the disease (WHO, 2017). Health personnel's involved in screening and treating people are likely to get infected because of the close constant contact with the infected persons. Even though, most people may become infected with TB but not all of them will develop active TB because age and immune function can have a significant influence (CDC, 2016).

2.4 TB treatment adherence

Fagundez Perez-Freixo, Eyene, Momo, Biye, Esono and Herrador (2016) found that, those who could not read and write, absence of household care and inadequate therapeutic counselling concerning the infection were expressively connected to worse adherence level. Patients with resurgence and those who have finished their medications yet, still testing positive to laboratory investigation and those who have experienced irregular drug supply were also less adherent as well as side-effects of medication and duration of treatment. Norgbe, Smith, Cur, Du Toit, and Cur (2011) discovered that patients' failure to their treatment schedule is a multifaceted behavioural issue comprising multiple causes, such as social and health care factors as well as side-effects of medication and period of treatment.

Danso, Addo, and Ampomah, (2015) opined in their studies that, medical condition, substance misuse, financial problems, and long duration of treatment were identified to discourage patients' compliance to medication. Some patients also ascribed supernatural justification to source of the disease which negatively affected compliance. Gebremariam, Bjune, and Frich (2010) established that interaction of dynamics is complicated in the choice about medication consumption. Reasons that affect adherence to TB treatment

positively were beliefs in the treatment of TB, views in the severity of TB in the presence of HIV infection and support from families and health professionals. Obstacles to treatment adherence were undergoing side effects, pill burden, economic limitations, lack of food, stigma with lack of expose, and lack of adequate communication with health professionals. The commonest reasons given for stopping treatment were side-effects (Wares, Singh, Acharya, & Dangi, 2003).

A study was undertaken in tuberculosis clients who were taking tuberculosis regimens in a health facility in North Gondar district of which a total of two hundred and eighty (280) tuberculosis clients were enrolled and interviewed. Among these participants, males were the majority of the respondents and the rest of the participants were dwellers in the city (Adane, Alene, Koye, & Zeleke, 2013).

A study carried out at defining the proportion of adherence to tuberculosis treatment in Equatorial Guinea and its factors, two thirds of the participants were adherent according to the Morisky-Green-Levine test. inadequate educational status, non-existence of family support and absence of proper instructions and counselling about the infection were considerably linked to lower adherence level (Fagundez et al., 2016a).

2.4.1 Patient related factors

The following client related factors have been identified in literature to have influence on the adherence to tuberculosis treatment.

2.4.1.1 Comorbidity

Studies by Brown & Bussell, (2011) identified that patients who have many medical conditions, approximately 50% of them are likely not to follow the treatment protocol given. Poor medication adherence is frequently common in the aged with several protracted diseases. Non-adherence to prescribed medications results in poor treatment outcome among people with comorbidities and so lots of persons are not enjoying appropriate care from the drugs they are prescribed (Corsonello, Pedone, Garasto, Maiuri, Carelli, Zottola, & Lattanzio, 2010).

Diabetes and HIV are the most common comorbidities confronting TB patients in India. These patients who are already taking their medication for life are finding it difficult as additional burden to adhere to the TB medication. They fear the risk and tendency of developing some medical complications and other uncomfortable drug interactions (Pai, Editor, & Chedore, 2018).

A methodical evaluation on epidemiological records and retrospective reviews on the association between psychiatric conditions and tuberculosis indicated high prevalence rates of depression. It was found out that some psychological reactions affects treatment adherence to tuberculosis treatment (Pachi, Bratis, Moussas, & Tselebis, 2013).

2.4.1.2 Illiteracy

Gopi, Vasantha , Muniyandi, Chandrasekaran , Balasubramanian and Narayanan , (2007) observed in their study of risk factors affecting adherence to tuberculosis treatment, it appeared

that, among 1,666 participants involved in the study, it emerged that 39% of the interviewees were illiterate. Another study conducted by Liefoghe & Mynck, (2001) showed poor adherence rate among illiterate clients who visit the chest clinic for their TB medication.

A research conducted among 15,077 cases of which 84.2% were new cases. The study was among male patients who are less than 40 years old. It emerged that non adherence was very higher than national rates. Young alcoholics, unemployed individuals with low education were likely not to adhere to TB regimens (Furlan, Oliveira & Marcon, 2012).

Krasniqi, Jakupi, Daci, Tigani, Jupolli-Krasniqi, Pira and Neziri (2017) in their study opined that there was a correlation between tuberculosis treatment adherence and educational level of patients. Those with lower educational background of 37.4% had understanding about their condition despite the explanation by staff and turn not to adhere to the treatment. Studies on social-demographic factors influencing non-adherence in Sudan, the results of the studies identified one of the associated with tuberculosis treatment to be low educational level (Ali & Prins, 2016).

2.4.1.3 Lack of adequate knowledge

Knowledge on tuberculosis demystifies the causes of the condition. Available evidence of knowledge on TB treatment suggests that, patients with some level of knowledge on TB will adhere to treatment successfully. Patients with knowledge on causes of TB, treatment duration and side effects will adhere strictly to treatment protocol, while clients lacking knowledge will have adherence challenges (Salifu, Eliason & Mensah, 2018).

Poor treatment outcome has also been associated to inadequate knowledge of the disease. Results from studies conducted in Kosovo confirmed that clients with some level of knowledge about tuberculosis, when they are enrolled on treatment, they will adhere to it. The study alluded that individuals with poor knowledge of the condition will not adhere to the treatment regiments (Krasniqi et al., 2017).

Lack of knowledge on tuberculosis treatment has influence on treatment adherence (Chani, 2010). In Morocco, participants who were recruited to take part in a study treatment duration and the effects of not completing the treatment, it was established that the major reason for not able to complete treatment was the wrong notion that they have been cured. The central cause advocated why most of the clients on treatment could not complete their scheduled treatment was due to the fact that majority of the clients had the impression of having been cured.

The outcome of the review demonstrates that lack of knowledge among the clients contribute to failure to adhere to treatment (Chani, 2010). The study by El-muttalut and Khidirelnimeiri (2017) discovered that clients discontinue taking their medication when they noticed that there is improvement which is wrongly perceived as been cured. Non-compliance has been found to be influenced by numerous influences, comprising deficiency of clients' status, influence of the family members, inadequate knowledge on the effects on non-adherence and age of the clients.

Rare knowledge on tuberculosis disease was thought to be predictor of treatment outcome of studies by Mainbourg, Belchior, Goncalves, & Ferreira-Gonyalves (2016). The results of their studies revealed that patient sufficient knowledge on the state of condition will influence adherence. In other words, clients with poor knowledge on the condition are likely to default when notice improvement in their health.

2.4.1.4 Disbelief in medication

Studies on 100 hypertensive patients indicate that, 35% were not observing their treatment regimens and the reason was simply that they did not have hope in the medication issued them so they use other unconventional remedies and resort to spiritual consultations, followed by traditional healing and over-the-counter drugs which was affecting adherence (Dias, Pereira, Monteiro, & Santos, 2014).

Appreciative of client's perspective of treatment given for chronic conditions, it was postulated that patients who have belief in their medication will actually adhere to appropriate instructions (Horne et al., 2013). Studies to explore the medicine taking behaviours, and beliefs concerning the medication they were taking, it emerged that disbelief of diagnosis influenced adherence (Kumar, Greenfield, Raza, Gill & Stack, 2016).

Zagozdzon and Wrotkowska (2017) in their study group of psychiatric conditions, it was identified that those who were on medication religious background appeared to be a conjecturer of poorer treatment outcome. Conversely, divine direction was revealed to significantly influence the rescue from non-adherence. Those with strong spiritual background was

perceived to have a better treatment adherence. As much as religious philosophies and religiousness may represent an important source of hope and meaning, they often interfere with treatment adherence.

Study showed relations between views of Swedish patients with stroke about medicines and adherence. Optimistic beliefs of patients about their prescription and diagnosis were less common and negative more common among non-adherent. To increase adherence, clients' views about medicines and diagnosis should be well-thought-out (Sjolander, Eriksson & Glader, 2013).

2.5.0 Service related factors

The following service related factors have been identified in literature to have influence on adherence to tuberculosis treatment.

2.5.1 Poor adherence counselling

Engler, Lènart, Lessard, Toupin and Lebouché (2018) identified in their studies and recommended that introduction to medication counseling and behavioural interventions increase adherence, and decrease in undesirable clinical outcomes. Taitel Jiang, Rudkin, Ewing and Duncan (2012) in their retrospective cohort study evaluated a program that was implemented in 76 national community pharmacies located in the Midwest USA. The program comprised two confrontational patient counseling gatherings with a pharmacologist addressing patient obstacles to adherence. Patients who took part in brief head-on counselling gatherings which involves instructions from a community pharmacologist as to how to take the

medications and provided further sources of clarifications at the commencement of the therapy proved greater treatment adherence and consistency than a comparison group.

An observational study conducted in 1,844-bed hospital in France and pre and post counselling was organized for some TB patients who were on admission. It was clearly shown that, patients who received counselling upon discharge after seventh day of their discharge shown increased in adherence of their TB medication as compared to the other patients who were not counseled upon discharge (Leguelinel-Blache Dubois, Roux-Marson, Arnaud & Castelli., 2015).

Patients with a poor appreciative of their condition and treatment schedule and their personal concerns of non-adherence are more expected not to take their prescriptions correctly. Adequate education about the importance of treatment and what may transpire if medicines are not taken as recommended (Tanzi, 2012).

Study on impact of patient counseling on medication adherence, beliefs and satisfaction about oral chemotherapies in patients with metastatic cancer at a super specialty hospital determines that all-inclusive patient instruction has made known to improve adherence to oral chemotherapy (Ramesh, Rajanandh, Thanmayee, Merin, Suresh & Srinivas, 2015).

Importance of clinical counselling for patients initially who defaulted treatment by clinical pharmacist and the results of the survey confirmed that clinical pharmacist counselling increases patient results and well-being, results in firmer observance to treatment and modifications in

patient behaviour, and backs to better outcomes and faster restoration (Carollo, Adamo, Giorgio & Polidori, 2013).

Patients' adherence to medication mostly depends on the quality of messages presented to them. Pharmacist should spend adequate time in communicating to the patient on the need to take their prescribed medications and the consequences of not taking. This information when done effectively, will increase adherence (Jm et al., 2012).

Study on influence of client education on medication adherence, principles and contentment about oral medicine in patients with cancer at an excellent specialty health facility determines that all-inclusive patient instruction has made known to improve adherence to oral chemotherapy (Ramesh, Rajanandh, Thanmayee, Merin, Suresh & Srinivas, 2015).

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2.5.2 Poor instruction, pill burden and polypharmacy

A compound prescription regimen, high pill burden and numerous medication modifications can result in non-adherence and poor management of protracted conditions (Farrell, French Merkle & Ingar, 2013). Tuberculosis conditions is largely associated with older age which may be prescribed with other multiple medication use (i.e., polypharmacy). To manage some chronic conditions like HIV/AIDs , diabetes, asthma and other common factors such as intellectual deficiency , functional limitations, financial limitations, and transportation limitations most significant potential consequences of polypharmacy could be its impact on medication adherence in the older age (Zachary, Marcum, Pharm, Walid & Gellad, 2013).

Kumar, Kumar, Iyer, Kumar and Kempegowda, (2014) identified in their study that pill load was a major cause influencing patient drug compliance. Between July and December 2015 (Atinga, Yamey and Gavu, 2018), conducted a qualitative study aimed at health care providers and their clients with diabetes and hypertensive on re-admission at the Korle Bu Teaching Hospital due to non-adherence to recommended medication . One of the factors discovered among those who were re-admitted after default was issue of burden polypharmacy

2.6 Summary

Generally, adherence to anti-TB drugs is highly dependent on the patient, drug-related factors, social factors and facility factors. Literature revised indicated that, majority of the studies pertaining to adherence to TB medication were carried out in other countries with limited studies in Ghana. In addition, most of these known studies revised used either a quantitative or qualitative

research method. Furthermore, most of the literature reviewed acknowledged that, individual, service related and community factors has effect on tuberculosis adherence.

CHAPTER THREE

3.0 METHODS

3.1 Study Design

A cross sectional study of respondents aged 18 years and above was carried out. The study assessed the factors influencing clients' adherence to tuberculosis treatment in Birim South.

3.2 Study Site

The Birim South District is located in the South of the country but specifically, in the Eastern Region of Ghana. Akim Swedru is its capital. The District shares boundaries with Birim Central in the North-East, Assin North to the West, and Asikuma Odoben-Brakwa and Akyemansa to the South. The total population of the district for the year 2019 is 143,014. The population was projected at 2.1% of the 2010 projected population.

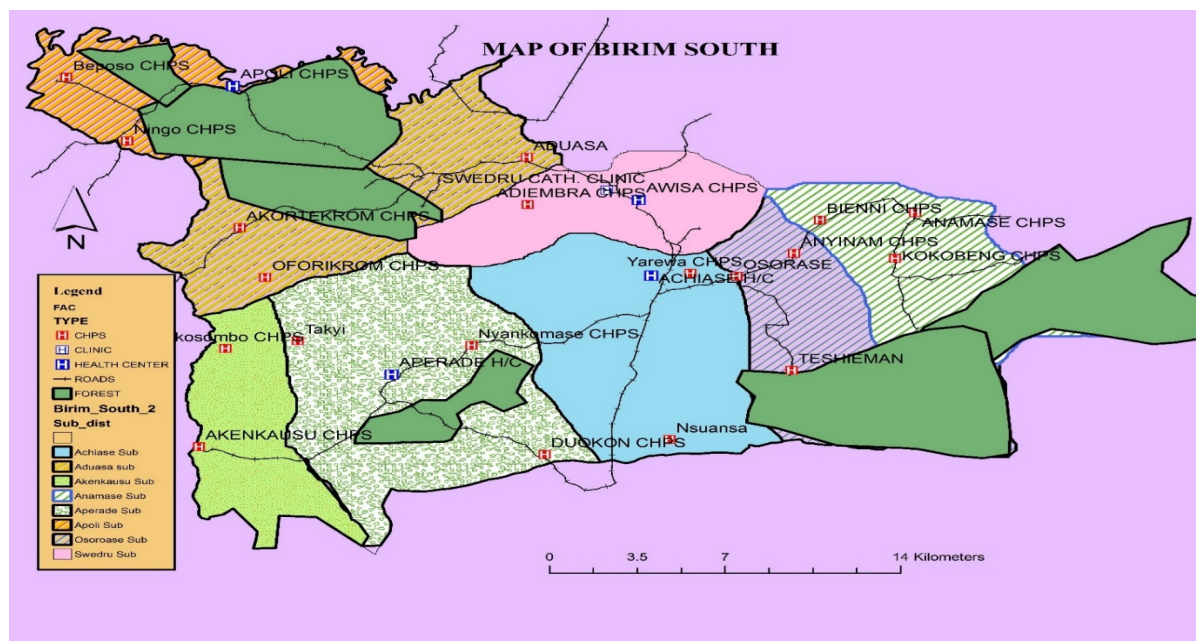


Figure 2.1: Map of the Birim South District

Source: Birim South District Health Directorate

Education

The District has 59 Kindergarten schools, out of which 19 are private; 94 Primary schools, out of which 31 are private and 57 Junior High Schools, out of which 14 are private. There are 5 second cycle institutions.

Health

Health Facilities in the District

The District has 25 operational health facilities. These include 1 CHAG clinic, 4 health centres, and 20 CHPS compounds. The study was done at the two biggest facilities in the district with laboratory facilities. These facilities included Achiase Health Centre and Akim Swedru Catholic Clinic and Maternity. These facilities serve as referral point for tuberculosis activities to other facilities because that is the diagnosis for all the cases in the district.

3.3 Study Population

The study population were made up of all TB clients aged above 18 years whose names were captured in the Facility TB registers and put on anti-TB medication of the communities in which the study was conducted.

3.4 Sampling Technique

For this study, total sampling technique was applied to select all TB cases in 2018 and early part of 2019 at the Achiase Health Centre and Akim Swedru Catholic Clinic and Maternity. Total population sampling is a technique where the entire population that meets selection criteria is included in the study (Thompson, 2013). Total population sampling is often used where the

number of cases under investigation is relatively small (Thompson, 2013). This technique helped the researcher to review all TB case documents in 2018 and part of 2019 (January to March). The researcher used 2018 and first quarter cases in 2019 because most TB patients from previous years might have either completed treatment, defaulted or declared cured. One of the advantages of this census method is the accuracy as each and every unit of the population is studied before drawing conclusion on the study.

3.5 Sample Size

A total of 127 tuberculosis clients who met the inclusion criteria were used for the study. Census method was used to select the qualified participants for the study.

3.6 Inclusion and Exclusion criteria

The following were the inclusion and exclusion criteria used to select the respondents.

3.6.1 Inclusion Criteria

- I. TB clients Aged 18years and above who are on treatment for at least two months and above at Achiase health Centre and Catholic Clinic and maternity at Akim Swedru.
2. TB clients on treatment and receiving ART while on anti-TB treatment for at least two months

3.6.2 Exclusion Criteria

1. Tuberculosis clients on DOTS who did not consent to participate in the study.

2. Clients who fall within the inclusion criteria but too ill to grant an interview.

3.7 Variables

The dependent and independent variables were as follows;

3.7.1 Dependent variables

The variable for this study was adherence to TB treatment in the Birim South District.

3.7.2 Independent variables

- Demographic characteristics such as age, sex, religion, occupational status and family history of TB.
- Client factors such as unemployment, lack of knowledge, comorbidities, disbelief about medication
- Service related factors as Poor medication distribution, pill burden, polypharmacy, unclear instruction, inadequate adherence counselling, poor communication
- Community related factors such as community support, stigmatization, etc.

3.8 Data collection Methods and Instruments

TB clients who were on treatment were followed up to their homes after they were contacted through their mobile phones or taking to their homes by the institutional coordinators. The contacts and traceable address of such clients were obtained from the TB register in the facility. Relevant information pertaining to demographic characteristics of patients, risk factors for TB and factors associated with adherence to TB treatment was gathered using structured questionnaire.

The research assistants visited the clients in their respective homes after booking for an appointment to take the data. Research assistants explained into details, the study to be conducted to get their approval to become participants. Only those who signed or thumb printed the consent form were enrolled into the study. Self-administered structured questionnaires were given to participants to fill on one on one basis. For participants who could not read, the research assistants interpreted questions in the *Twi* language since all the clients understood the language and helped them to thumb print in the presence of impartial witness.

The questionnaire had four sections: the first section collected data on individual factors and demography which influenced adherence to anti-TB drugs; the second section collected data on social factors including family of support, existence of stigmatization, culture and religion, which influenced adherence to anti-TB drugs; the third section elicited data on service delivery factors including relationship with health professionals, availability of drugs and waiting time, means of travel to facility, travel time to facility, health education and counseling, which may potentially influence adherence to anti-TB drugs; and fourth sought to find out clients' adherence to anti-TB drugs using the eight item Morisky Medication Adherence Scale (MMAS-8) to measure adherence among TB patients. In this study, the total score was dichotomized into two levels; adherence (score ≥ 7) and non-adherence (score ≤ 6).

3.9 Data management and analysis

Pre-coded data were entered into excel, cleaned and subsequently migrated into STATA 15 Software for statistical analysis. Frequency distribution was done to compute proportions on adherence, gender, religion, educational level, occupation, Mean age and Mean income and their respective standard deviations were computed. Tests of significance on socio-demographic

factors that influence TB drug adherence was done using Chi Square, with statistical significance was set at p-values ≤ 0.05 .

Multiple logistic regression analysis was used to assess the strength of association between the Anti-TB drug adherence and each independent variable. This was done by first running a bivariate analysis between adherence and all the independent variables (Age, gender, occupation, income, availability of drugs, means of transport to facility, travel time to facility, Alternative treatment, Side effects, Co-infection with HIV, Waiting time, Educational level, Alcoholism, Attitude of Health Workers, Counseling and Health education). Independent variables with p-values ≤ 0.05 in bivariate analysis were fitted in the final multiple logistic regression model to assess the strength of association looking at the Adjusted Odds Ratio (aOR) with 95% confidence interval (CI). The level of adherence was estimated using Morisky Medication Adherence Scale (MMAS). The score for each of the 8 items was added to create a total adherence score which range from 0-8. Less than 6 was defined as low adherence and 6 and above as high adherence. The dependent variable was defined as low adherence and high adherence.

3.10 Quality control

Data quality control was done through comprehensive training and close field supervision was ensured for compliance to the data collection process. During actual field work, the principal investigator did not engage in data collection but rather supervised research assistants on daily basis to ensure that, guidelines were adhered to. Strict adherence to the participation of sample participants was observed. Daily on the field, quality control checks were performed for

completeness, internal consistency and accuracy of data collection by different research assistants. All mistakes that were identified were corrected before returning to the field.

3.11 Ethical Consideration

Approval of the study was obtained from Ghana Health Service Ethical Review Committee (GHS-ERC: C033/02/19) see the attached appendix no.3. After that, permission was taken from the sub-district leaders of the health facilities before data were collected. Similarly, each respondent was asked to express consent prior to participation. Also, before the participants filled the questionnaires, each was given a consent form to read and sign. Individuals who could not read, had the purpose of the study explained to them in the *Twi* language. Benefits of the study and their rights as participants were also explained to them. Thumbprints of those accepted to be part of the study were taken.

Participants were informed that privacy and confidentiality would be ensured as no names would be mentioned. They were assured that the outcome of the study would be very beneficial to individuals who access the facility as a whole and the national TB programme in Ghana.

All respondents were given assurance that the information they provided was strictly going to be used purely for academic purposes. Respondents were assured that no expected risk or cost except their precious time that they will spend answering the questionnaire. Privacy was ensured during the data collection process. Questionnaires were given on a one on one basis. Respondents were given the liberty to choose a place of convenience to respond to the questionnaires.

3.12 Limitations of the Study

The study may be limited in design regarding sample size and how adherence was measured. This was cross-sectional, hence time related, or causal relationships between variables were not assessed. The sample size was small and may therefore have been able to determine important associations. That notwithstanding, the study used a standardized and well validated Morisky medication adherence scale to minimize potential response bias on adherence.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

The results section of this chapter has been presented in seven sections. Section one provides a descriptive statistics of socio-demographic characteristics of respondents. Section two reports findings on adherence level among participants. Sections three, four, five, six and seven report socio-demographic characteristics, client related factors, service related factors, community related factors associated with adherence to tuberculosis treatment, and results from multiple logistic regression on factors associated with adherence to TB treatment, respectively.

4.2 Socio-demographic characteristics of respondents

The results in table 4.1 below shows the socio-demographic characteristics of respondents. The mean age of respondents was 42.9 years \pm 15.6 SD. The male respondents constituted 71.7% of all participants. Christians were in the majority (86.6%). Majority of respondents (76.4%) had some form of formal education as compared to those who had no formal education (23.6%). About (53%) of respondents were married. Also, 48% of respondents were self-employed. Majority of respondents (55.1%) received some form of financial assistance during treatment. The mean income of respondents was 1273.3 \pm 1142.5 Ghana cedis (GHc).

Table 4.1: Socio-demographic characteristics of respondents (n = 127)

Variables	Frequency	Percent (%)
Age in years (M ± SD)	42.9 ± 15.6	
Gender		
male	91	71.7
female	36	28.3
Religion		
Christian	110	86.6
Muslim	15	11.8
traditional	2	1.6
Educational level		
no formal education	30	23.6
primary	44	34.6
middle school	30	23.6
technical	20	15.8
tertiary	3	2.4
Marital status		
single	37	29.1
married	67	52.8
divorced	10	7.9
widowed	13	10.2
Employment status		
self-employed	61	48.0
private sector	20	15.8
public sector	6	4.7
Unemployed	27	21.3
students/apprentice	13	10.2
Financial assistance from From family or service providers		
No	57	44.9
Yes	70	55.1
Mean income in Ghana cedis (M ± SD)	1273.3 ± 1142.5	

4.3 Adherence level

Figure 4.1 below is a pie-chart showing the distribution of adherence level to TB treatment among respondents. Only 5.5% of respondents had Morisky scores of zero (0) and hence had high adherence to TB treatment. Nearly twenty four percent (24.4%) of respondents had medium adherence (Morisky score 1 to 2). Majority of respondents had (70.1%) low adherence (Morisky score > 2).

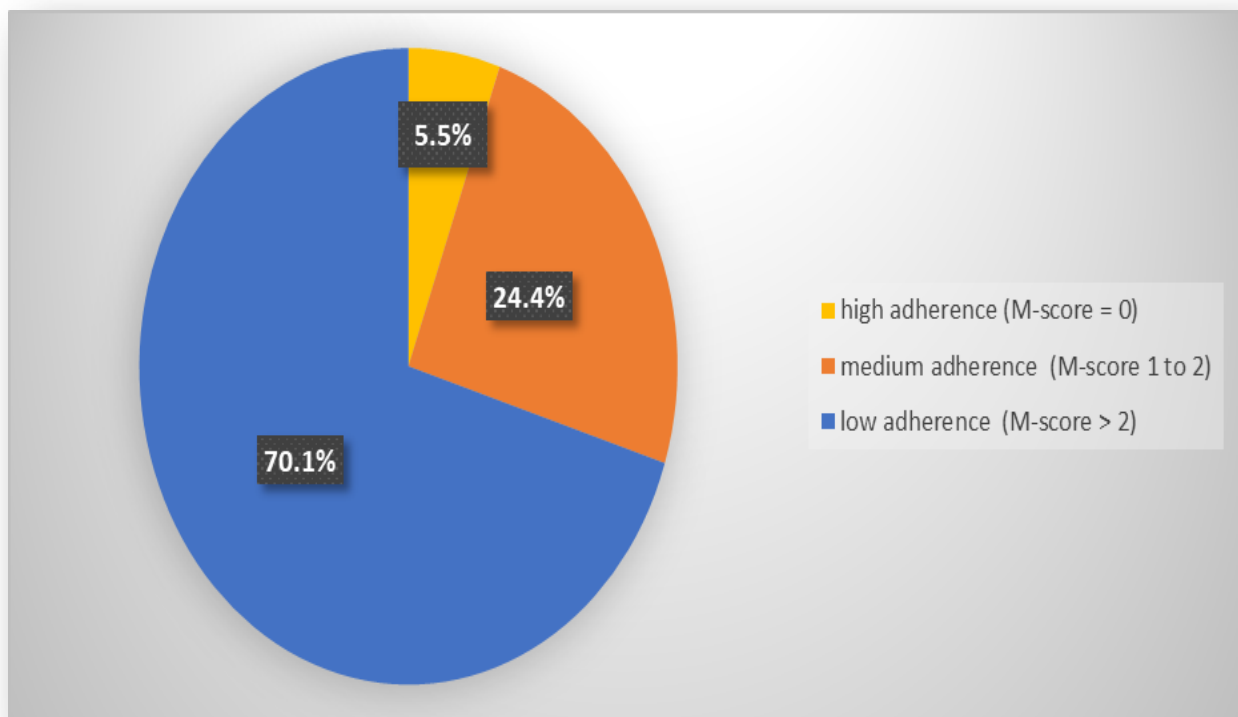


Figure 4.1 Proportion of adherence among respondents

4.2 Proportion of adherence

Figure 4.2 shows adherence levels dichotomized into two. That is (medium adherence + high adherence = adherence) and (low adherence = non adherence). With this dichotomization, 30% of respondents were deemed to have adherence towards their TB treatment and about 70% having no adherence to TB treatment.

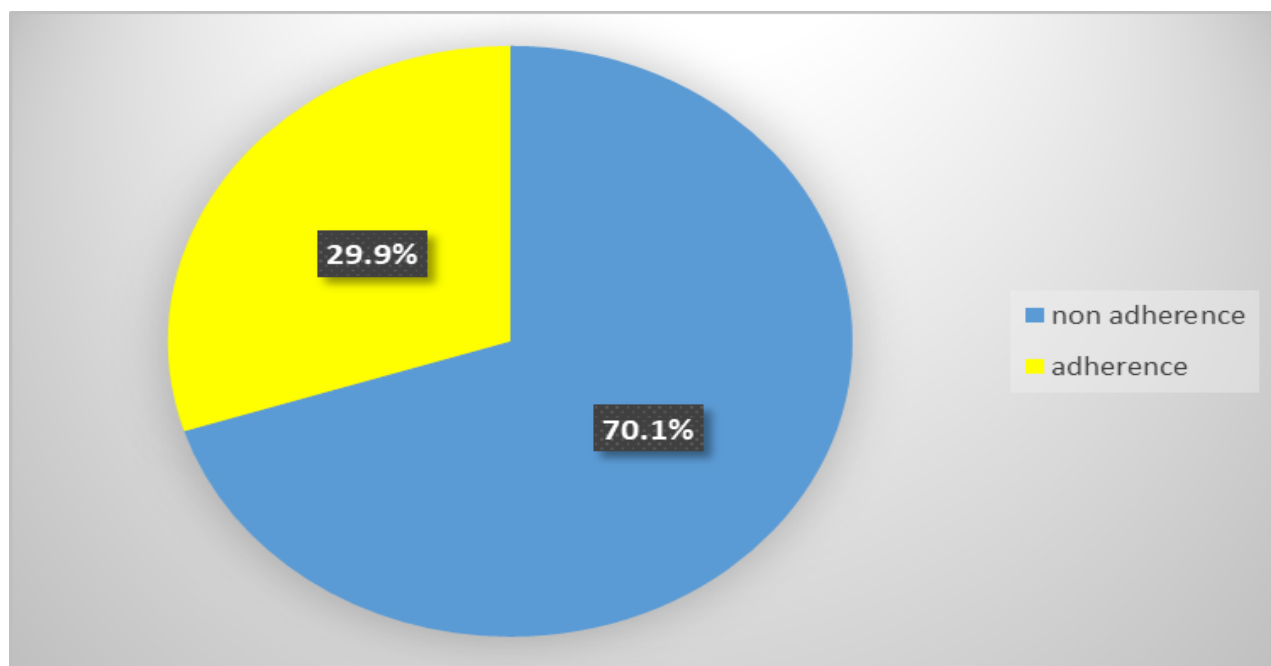


Figure 4.2 Proportion of adherence among respondents dichotomized into two levels

4.4 Socio-demographic characteristics associated with adherence to TB treatment

The odds of adhering to TB treatment was 3.5 times as high among respondents with primary education as compared to those with no formal education (cOR = 3.46; 95% CI = 1.11 – 10.75; p = 0.032) as indicated in Table 4.2a and those who have some form of education as seen in the 4.2b below.

A one year increase in age significantly reduces the odds of adherence to TB treatment by 4% (cOR = 0.96; 95% CI = 0.94 – 0.99; p = 0.022). This is presented in Table 4.2b.

Table 4.2a: Socio-demographic characteristics associated with Adherence to TB treatment

Variables	Adherence to TB treatment		χ^2	cOR(95% CI)	p-value
	Adherence (n = 38)	Non-adherence (n = 89)			
Gender			0.597		
male	26(28.6)	65(71.4)		1.00	
female	12(33.3)	24(66.7)		1.25 (0.55 - 2.86)	0.598
Religion			+0.681		
christian	32(29.1)	78(70.9)		1.00	
muslim	5(33.3)	10(66.7)		1.22 (0.39 - 3.85)	0.736
traditional	1(50.0)	1(50.0)		2.44 (0.15 - 40.17)	0.533
Educational level			+0.160		
no formal education	5(16.7)	25(83.3)		1.00	
primary	18(40.9)	26(59.1)		3.46 (1.11 - 10.75)	0.032
middle school	10(33.3)	20(66.7)		2.5 (0.74 - 8.50)	0.142
Technical/SHS	4(20.0)	16(80.0)		1.25 (0.29 - 5.37)	0.764
tertiary	1(33.3)	2(66.7)		2.5 (0.19 - 33.17)	0.487
Marital status			+0.780		
single	13(35.1)	24(64.9)		1.00	
married	20(29.9)	47(70.2)		0.79 (0.33 - 1.85)	0.580
divorced	2(20.0)	8(80.0)		0.46 (0.09 - 2.50)	0.370
widowed	3(23.1)	10(76.9)		0.55 (0.13 - 2.38)	0.426

⁺(fisher's exact)

*(statistically significant, p≤0.05)

Table 4.2b: Socio-demographic characteristics associated with Adherence to TB treatment

Variables	Adherence to TB treatment	Non-adherence	χ^2	cOR(95% CI)	p-value
	Adherence (n = 38)	Non-adherence (n = 89)			
Employment status			0.91		
self-employed	19(31.2)	42(68.9)		1	
private sector	5(25.0)	15(75.0)		0.74 (0.23 - 2.32)	0.602
public sector	2(33.3)	4(66.7)		1.10 (0.19 - 6.57)	0.912
unemployed	7(25.9)	20(74.1)		0.77 (0.28 - 2.14)	0.621
students/apprentice	5(38.5)	8(61.5)		1.38 (0.39 - 4.78)	0.61
Financial assistance			0.114		
no	13(22.8)	44(77.2)		1	
yes	25(35.7)	45(64.3)		1.88 (0.85 - 4.14)	0.117
Age in years (M ± SD)				0.96 (0.94 - 0.99)	0.022
Income (M ± SD)				1.00 (0.99 - 1.00)	0.638

⁺(fisher's exact)

*(statistically significant, $p \leq 0.05$)

4.5 Client related factors associated with Adherence to TB treatment

The test outcome presented in Table 4.3 show that all client related factors in this study showed no statistically significant association with adherence to TB treatment. For example; the proportion of respondents who travelled to the health facility at a cost of 11 – 20 GHC and were adherent to TB treatment was 17.9% as against 35% of their counterparts who travelled to the health facility at a cost of 5 – 10 GHC. Thus, the odds of adherence to TB treatment was reduced by 61% amongst those who travelled to the health facility at a cost of 11 – 20 GHC as compared

to their counterparts who travelled to the health facility at a cost of 5 – 10 GHC but this association as stated earlier was not statistically significant (cOR = 0.39; 95% CI = 0.15 – 1.02; p = 0.055) as indicated in Table 4.3 below.

Table 4.3: Client related factors associated with Adherence to TB treatment

Variables	Adherence to TB treatment		χ^2	cOR(95% CI)	p-value
	Adherence (n = 38)	Non adherence (n = 89)			
Presence of a primary care giver			0.367		
primary care giver present	31(31.9)	66(68.0)		1.00	
no primary care giver	7(23.3)	23(76.7)		0.65 (0.25 - 1.67)	0.369
Treatment supervisor			⁺ 0.623		
nobody	8(25.0)	24(75.0)		1.00	
health worker	2(22.2)	7(77.8)		0.86 (0.15 - 4.99)	0.864
family member	27(34.2)	52(65.8)		1.56 (0.62 - 3.93)	0.348
community member	1(14.3)	6(85.7)		0.50 (0.05 - 4.81)	0.548
Cost of travel to health facility			⁺ 0.131		
5 - 10 GH	27(35.5)	49(64.5)		1.00	
11 - 20 GH	7(17.9)	32(82.1)		0.39 (0.15 - 1.02)	0.055
21 - 30 GH	4(33.3)	8(66.7)		0.91 (0.25 - 3.29)	0.883

⁺ (fisher's exact)

*(statistically significant, p≤0.05)

4.6 Health care system related factors associated with Adherence to TB treatment

Participants' whose medications numbered four had an 83% reduction in their odds of adhering to TB treatment as compared to those who took medications numbered two (cOR = 0.17; 95% CI = 0.03 – 0.99; p = 0.049).

Respondents who experienced no side effects had significantly 6.3 times the odds of adhering to TB treatment as compared to those who experienced side effects (cOR = 6.32; 95% CI = 2.75 – 14.51; p < 0.001).

Table 4.4: Health care system related factors associated with Adherence to TB treatment

Variables	Adherence to TB treatment		χ^2	cOR(95% CI)	p-value
	Adherence (n = 38)	Non adherence (n = 89)			
Number of medications			+0.001*		
2	3(50.0)	3(50.0)		1.00	
3	26(43.3)	34(56.7)		0.76 (0.14 - 4.10)	0.754
4	9(14.8)	52(85.2)		0.17 (0.03 - 0.99)	0.049
Instructions on how to take medications			+0.299		
instructions given	37(29.4)	89(70.6)		1.00	
instructions not given	1(100.0)	0(0.0)		1	
Understanding of instructions			+0.171		
instructions understood	37(31.9)	79(68.1)		1.00	
instructions not understood	1(9.1)	10(90.9)		0.21 (0.03 - 1.73)	0.148
Source for further clarification if needed			0.122		
source provided	27(26.7)	74(73.3)		1.00	
no source provided	15(57.7)	11(42.3)		2.01 (0.82 - 4.91)	0.126
Attitude of staff			+0.668		
satisfactory	37(30.6)	84(69.4)		1.00	
not satisfactory	1(16.7)	5(83.3)		0.45 (0.05 - 4.02)	0.478
Experienced side effects			<0.001*		
side effects present	14(16.7)	70(83.3)		1.00	
no side effects	24(55.8)	19(44.2)		6.32 (2.75 - 14.51)	0.000

⁺ (fisher's exact)

^{*}(statistically significant, $p \leq 0.05$)

4.7 Community related factors associated with Adherence to TB treatment

Persons who lived in communities where members were unaware of their condition had significantly 4.1 times the odds of adhering to TB treatment as compared to those who had their community members aware of their condition (cOR = 4.05; 95% CI = 1.80 – 9.12; p = 0.001)

Table 4.5: Community related factors associated with Adherence to TB treatment

Variables	Adherence to TB treatment		χ^2	cOR(95% CI)	p-value
	Adherence (n = 38)	Non adherence (n = 89)			
Distance travelled to collect TB medicines			0.413		
1 - 10km	18(36.0)	32(64.0)		1.00	
11 - 20km	14(24.6)	43(75.4)		0.58 (0.25 - 1.33)	0.199
21 - 30km	6(30.0)	14(70.0)		0.76 (0.25 - 2.33)	0.633
Awareness of community members			<0.001*		
Yes	12(17.1)	58(82.9)		1.00	
No	26(45.6)	31(54.4)		4.05 (1.80 - 9.12)	0.001
Change of attitude of community members			<0.001		
yes	8(13.3)	52(86.7)		1.00	
no	30(44.8)	37(55.2)		5.27 (2.17 - 12.79)	0.000
Stigmatization by community members			<0.001		
yes	11(15.7)	59(84.3)		1.00	
no	27(47.4)	30(52.6)		4.87 (2.11 - 11.04)	0.000
Different treatment to the ones originally given			<0.001		
yes	5(9.1)	50(90.9)		1.00	
no	33(45.8)	39(54.2)		8.46 (3.02 - 23.69)	0.000

82; 95% CI = 1.54 - 15.04; p = 0.007).

For participants who noticed no change in attitude of community members, their odds of adhering to TB treatment was significantly 5.3 times as high compared to those who noticed

changes in attitude towards them from community members (cOR = 5.27; 95% CI = 2.17 – 12.79; $p < 0.001$). Respondents who were not stigmatized by community members had significantly 4.9 times the odds of adhering to TB treatment as compared to those who were stigmatized (cOR = 4.87; 95% CI = 2.11 – 11.04; $p < 0.001$).

4.8 Results from multiple logistic regression on factors associated with Adherence to TB treatment

Table 4.6a below shows the results of simple logistic regression and multiple logistic regression of all variables with p – values ≤ 0.2 . Age, financial assistance, cost of travel to health facility, number of medications, distance travelled to collect TB medicines, awareness of community members, change of attitude of community members, stigmatization by community members, different treatment to the ones originally given were found not to be significantly associated with adherence to TB treatment.

However, the odds of adhering to TB treatment was significantly 3.5 times as high among respondents with primary education as compared to those with no formal education (cOR = 3.46; 95% CI = 1.11 – 10.75; $p = 0.032$). After adjusting for other variables, the odds of adhering to TB treatment was 7.5 times as high among respondents who had primary education as compared to those with no formal education (aOR = 7.52; 95% CI = 1.33 – 42.41; $p = 0.022$) as shown in the Table 4.6a

Table 4.6a Results from multiple logistic regression on factors associated with Adherence to TB treatment

Variables	cOR (95 % CI)	p-value	aOR (95% CI)	p-value
Age in years (M ± SD)	0.96 (0.94 - 0.99)	0.022	0.97 (0.92 - 1.02)	0.183
Educational level				
no formal education	1.00			
primary	3.46 (1.11 - 10.75)	0.032	7.52 (1.33 - 42.41)	0.022
middle school	2.5 (0.74 - 8.50)	0.142	3.41 (0.55 - 21.24)	0.188
technical	1.25 (0.29 - 5.37)	0.764	1.18 (0.15 - 9.09)	0.873
tertiary	2.5 (0.19 - 33.17)	0.487	3.46 (0.14 - 83.85)	0.445
Financial assistance				
no	1.00			
yes	1.88 (0.85 - 4.14)	0.117	0.96 (0.27 - 3.34)	0.946
Cost of travel to health facility				
5 - 10 GH	1.00			
11 - 20 GH	0.39 (0.15 - 1.02)	0.055	0.44 (0.11 - 1.80)	0.256
21 - 30 GH	0.91 (0.25 - 3.29)	0.883	1.43 (0.21 - 9.80)	0.718

*(Statistically significant, $p \leq 0.05$)

The table 4.6b below shows the results of multiple regression of variables with p-values ≤ 0.2 .

The ability of the respondents to understand the instructions given was not found to be statistically significant in the simple logistic regression. However, after adjusting for all other variables, respondents who did not understand the instructions given had a 95% reduction in their odds of adhering to TB treatment as compared to those who understood the instructions given.

Respondents who were provided with further source for clarification, their odds of adhering to TB treatment was significantly 6.9 times as high compared to those who were provided a source

for further clarification after adjusting for all other variables (aOR = 6.99; 95% CI = 1.06 – 46.13; $p = 0.043$).

Respondents who experienced no side effects had significantly 6.3 times the odds of adhering to TB treatment as compared to those who experienced side effects (cOR = 6.32; 95% CI = 2.75 – 14.51; $p < 0.001$). However, after adjusting for other variables the odds of adhering to TB treatment was significantly 4.8 times as high among respondents who experienced no side effects as compared to those who experienced side effects (aOR = 4 as shown in Table 4.6b).

Table 4.6b: Results from multiple logistic regression on factors associated with Adherence to TB treatment

Variables	cOR (95 % CI)	p-value	aOR (95% CI)	p-value
Number of medications				
2	1.00			
3	0.76 (0.14 - 4.10)	0.754	1.93 (0.16 - 22.49)	0.602
4	0.17 (0.03 - 0.99)	0.049	0.76 (0.06 - 9.98)	0.837
Understanding of instructions				
instructions understood	1			
instructions not understood	0.21 (0.03 - 1.73)	0.148	0.05 (0.002 - 0.91)	0.043
Source for further clarification if needed				
source provided	1.00			
no source provided	2.01 (0.82 - 4.91)	0.126	6.99 (1.06 - 46.13)	0.043
Experienced side effects				
side effects present	1.00			
no side effects	6.32 (2.75 - 14.51)	0	4.82 (1.54 - 15.04)	0.007
Distance travelled to collect TB medicines				
1 - 10km	1.00			
11 - 20km	0.58 (0.25 - 1.33)	0.199	0.56 (0.13 - 2.47)	0.447
21 - 30km	0.76 (0.25 - 2.33)	0.633	0.78 (0.12 - 5.16)	0.8
Awareness of community members				
yes	1.00			
no	4.05 (1.80 - 9.12)	0.001	0.82 (0.15 - 4.57)	0.822
Change of attitude of community members				
yes	1.00			
no	5.27 (2.17 - 12.79)	0	0.99 (0.15 - 6.73)	0.994
Stigmatization by community members				
yes	1.00			
no	4.87 (2.11 - 11.04)	0	5.77 (0.85 - 38.98)	0.072
Different treatment to the ones originally given				
yes	1.00			
no	8.46 (3.02 - 23.69)	0	4.57 (0.96 - 21.68)	0.056

CHAPTER FIVE

5.0 DISCUSSION

High drug adherence in TB treatment is a necessary measure to prevent the progression of TB disease to MDR-TB and XDR-TB. In this study, it was found that adherence level to TB treatment among respondents was high amongst 5.5% of respondents. About twenty four percent of respondents had medium adherence and majority of respondents had low adherence. This study show low adherent outcome which is consistent with a similar one undertaken in North Gondar district in Ethiopia of which a total of two hundred and eighty (280) tuberculosis clients were enrolled and interviewed. Among these participants, 55.7% were males and nearly three quarters (72.5%) were city inhabitants. The whole, non-adherence for the last one month and the last four days before the survey were 10% and 13.6% respectively (Adane, Alene, Koye, & Zeleke, 2013).

In contrast, adherence was noticed to be high in a study designed at defining the proportion of adherence to anti-tuberculosis treatment in Equatorial Guinea and its factors, 78.57% of the participants were adherent according to the Morisky-Green-Levine test. A low educational level, lack of family support and lack of proper instructions and counselling about the disease were considerably linked to lower adherence level (Fagundez et al., 2016a).

The adherence rates to TB medication in sub - Saharan Africa ranges between 70.4% - 88.4% which gives reason to be worried by the low adherence rate found in this study. The low adherence proportion of 70.1% found in this study, is very worrying because the likelihood of increased prevalence of Multi-drug resistance TB and X-Drug resistant TB occurring in these

people. This will further increase the already huge burden of a disease and increase the costs of its management. It is therefore necessary to put in place adherence support mechanisms to lower the non-adherence level.

In this study, Age, financial assistance, cost of travel to health facility, number of medications, distance travelled to collect TB medicines, awareness of community members, change of attitude of community members, stigmatization by community members, different treatment to the ones originally given were found not to be significantly associated with adherence to TB treatment. This was in contrast with Danso et al. (2015) who opined in their studies that, financial problems, and long duration of treatment were identified to discouraged patients' compliance to medication.

However some community factors showed some association in bivariate analysis. In that, Persons who lived in communities where members were unaware of their condition had significantly higher the odds of adhering to TB treatment as compared to those who had their community members aware of their condition. This potentially could result from the belief of stigmatization TB patients get when they are outside their community and people do not know they have the disease. In support of this, this study found that the reactions of community members, post diagnosis and during treatment, influenced adherence. For participants who noticed no change in attitude of community members, their odds of adhering to TB treatment was significantly high compared to those who noticed changes in attitude towards them from community members. Similarly, it was found that respondents who were not stigmatized by

community members had significantly higher, the odds of adhering to TB treatment as compared to those who were stigmatized but after adjusting for other variables.

Educational level was a significant predictor of adherence in this study. It was found that the odds of adhering to TB treatment was significantly 3.5 times as high among respondents with primary education as compared to those with no formal education. After adjusting for other variables, the odds of adhering to TB treatment was 7.5 times as high among respondents who had primary education as compared to those with no formal education. This finding is consistent with what Gopi et al., (2007) observed in their study of risk factors to non-adherence to tuberculosis treatment, and what was reported by Liefoghe and Muynck (2001) showed poor adherence rate among illiterate clients who visit the chest clinic for their TB medication.

In other studies, individuals with low education were likely not adhered TB treatment regimens (Furlan et al., 2012). Perhaps those with some formal education are able to comprehend the education given and the need to adhere by health professionals. Krasniqi et al.(2017) in their study in Kosovo opined that there was a correlation between tuberculosis treatment adherence and educational level of patients. Those with lower educational background of 37.4% had understanding about the condition despite the explanation by staff and turn to adhere to the treatment. Another study on social-demographic factors influencing non- adherence in Sudan, the results of the studies identified one of the associated with tuberculosis treatment to be low educational level (Ali & Prins, 2016). Communicating to TB patients about their medication in their local language may improve adherence in the non-educated population.

Understanding of instructions given by health professional on TB treatment may influence adherence. The ability of the respondents to understand the instructions given was not found to be statistically significant in the simple logistic regression.

However, after adjusting for all other variables, respondents who did not understand the instructions given had a significant reduction in their odds of adhering to TB treatment as compared to those who understood the instructions given. According to Krasniqi et al.(2017), although respondents understood their condition from explanations from professionals, they still not adhering to their TB treatment.

Furthermore, this study found that respondents who were provided with further source for clarification, their odds of adhering to TB treatment was significantly higher compared to those who were not provided with a source for further clarification after adjusting for all other variables. This was also consistent with a study by Taitel, Jiang, Rudkin, Ewing, and Duncan, (2012) in their retrospective cohort study evaluated a program that was implemented in 76 national community pharmacies located in the Midwest USA, Patients who take part in brief head-on counselling gatherings which involves instructions from a community pharmacologist as to how to take the medications and provided further sources of clarifications at the commencement of the therapy proved greater treatment adherence and consistency than a comparison group.

Respondents who experienced no side effects had significantly 6.3 times the odds of adhering to TB treatment as compared to those who experienced side effects. However, after adjusting for

other variables the odds of adhering to TB treatment was significantly 4.8 times as high among respondents who experienced no side effects as compared to those who experienced side effects. This substantiated the study conducted by Fagundez et al.(2016) that, Patients with resurgence and treatment failure and those who have experienced drug scarcities were also less adherent as well as side-effects of medication and duration of treatment.

When TB Patients take their medication, some experience nausea, vomiting and other unpleasant symptoms. This has the potential to make them miss doses in order to relieve themselves of such adverse symptoms. This study result suggests that respondent who experience side effects of the treatment were not adherence to their TB treatment hence have lower odds of adherence. Having side effects to TB medication reduced the odds of adherence to TB treatment. This result is consistent with results from other studies. (Gebremariam, Bjune, & Frich, 2010) found that perceived side effects of were frequently cited as reasons for non-adherence. In another study, the commonest reasons given for stopping treatment were side-effects (Wares, Singh, Acharya, & Dangi, 2003). Norgbe, Smith, Cur, Du Toit, and Cur,(2011) discovered that patients' failure to their treatment schedule is a multifaceted behavioural issue comprising multiple causes, comprising a collaboration of personal, social and healthcare factors as well as side-effects of medication and period of treatment.

There is a need for health professionals to stress on the potential side effects that may come with the intake of TB medication and also suggest ways of dealing with these side effects when they occur. Importance of clinical counselling for patients initially who defaulted treatment by clinical pharmacist and the results of the survey confirmed that clinical pharmacist counselling increases

patient results and well-being, results in firmer observance to treatment and modifications in patient behaviour, and backs to better outcomes and faster restoration (Carollo et al., 2013). Patients' adherence to medication mostly depends on the quality of messages presented to them. Pharmacist should spend adequate time in communicating to the patient on the need to take their prescribed medications and the consequences of not taking. This information when done effectively, will increase adherence (Jm et al., 2012).

Conclusion of the chapter

Age, financial assistance, cost of travel to health facility, number of medications, distance travelled to collect TB medicines, awareness of community members, change of attitude of community members, stigmatization by community members, different treatment to the ones originally given were found not to be significantly associated with adherence to TB treatment. Persons who lived in communities where members were unaware of their condition had significantly higher the odds of adhering to TB treatment as compared to those who had their community members aware of their condition. It was found that the odds of adhering to TB treatment was significantly 3.5 times as high among respondents with those had some form education compared to those with no formal education. Understanding of instructions given by health professional on TB treatment may influence adherence

CHAPTER SIX

6.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

From this study the proportion of TB patients who were adherent (medium to high adherence) to TB treatment were 30%. Health service factors such as unclear instructions given by pharmacist or physician was found to be a significant predictor of adherence to TB treatment. Also, for respondents who were not provided with further source for clarification, their odds of adhering to TB treatment was significantly higher compared to those who needed a source for further clarification after adjusting for all other variables. Side effects of TB treatment significantly predicts adherence.

6.1 Conclusion

From this study the proportion of TB patients who were adherent (medium to high adherence) to their TB treatment were 30 per 100 patients.

Age, financial assistance, cost of travel to health facility, number of medications, distance travelled to collect TB medicines, awareness of community members, change of attitude of community members, stigmatization by community members, different treatment to the ones originally given were found not to be significantly associated with adherence to TB treatment.

Individual factor, education, influenced adherence positively. The odds of adhering to TB treatment was higher among respondents who had primary education as compared to those with no formal education

Health service factors such as unclear instructions given by pharmacist or physician was found to be a significant predictor of adherence to TB treatment. Respondents who did not understand the instructions given had a significant reduction in their odds of adhering to TB treatment as compared to those who understood the instructions given.

Also, for respondents who were provided with further source for clarification, their odds of adhering to TB treatment was significantly higher compared to those who not provided with a source for further clarification after adjusting for all other variables.

Side effects of TB treatment significantly predicts adherence. Respondents who experienced no side effects had significantly higher odds of adhering to TB treatment as compared to those who experienced side effects.

Community factors did not predict adherence in the presence of other factors.

6.2 Recommendations

- The health directorates in collaboration with institutional TB coordinators and community health nurses should embark on vigorous health education campaigns on tuberculosis, complications and importance of adherence to anti TB medication. This should be done through multiple media sources like radio and television. Dramas and documentaries on complications of non-adherence to tuberculosis medication should be telecast on electronic media.

- The Birim South Health Directorate should organize regular in-service training for health personnel on how to provide adherence counseling to tuberculosis patients with commitment empathy to improve on their adherence.
- Pharmacists in the facilities should adequately communicate to the clients on the need to take their prescribed medications and the consequences of not taking and continue to counsel the clients from the beginning of the treatment to the end.
- The district and institutional tuberculosis coordinators should team up and embark on regular and periodic monitoring to clients to take feedback and challenges from them and provide immediate appropriate supportive counseling on adherence and its benefits.

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APPENDICES

Appendix I (INFORMED CONSENT FORM)

Title: FACTORS INFLUENCING CLIENTS ADHERENCE TO TUBERCULOSIS TREATMENT IN BIRIM SOUTH.

Principal Investigator: KWAKYE GIDEON

Address: SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF SOCIAL AND BEHAVIOURAL SCIENCES
UNIVERSITY OF GHANA, LEGON

Contact: 0202764131/ kwakye.gideon@yahoo.com

My name is Kwakye Gideon, I am a graduate student of the University Of Ghana School Of Public Health carrying out a study on factors influencing clients' adherence to tuberculosis treatment in Birim South. . Three research assistants will be assisting in the study. The study seeks to find out the various factors that influence how you take your TB medications. Participants are required to share their experiences on anti-TB drugs by responding to questions.

Any information you deem personal that will lead to identifying you as a participants will not be included in the questionnaire. Questionnaire that you will respond to will be anonymous (will not bear names of participants) so you will not be identified. You are free to be part of the study and can decide to leave at any point you want. No one will be upset should you decide not to be part of the study. However, be assured that your privacy and confidentiality will be respected. Be

assured that the research come at no risk and no cost except the precious time that they will used to fill the questionnaire. You can choose a place of convenience to answer the questions.

VOLUNTEER AGREEMENT

The above document describing the benefits, risks and procedures for the research title “**Factors Influencing Clients Adherence to Tuberculosis Treatment in Birim South**” has been explained to me. I have read the information given above, and I understood. I have been given a chance to ask questions concerning this study and questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw at any time without it affecting my current or future use of health care services.

Signature/Thumb print: Date:

Contact detail:

Date

Name and Signature or mark of volunteer

Interpreter's Statement (where applicable)

I interpreted the purpose and contents of the participants information sheet to the aforementioned participant to the best of my ability in the Ghanaian language to his/her proper understanding.

All questions, appropriate clarifications sort by the participants and answers were also duly interpreted to his/her satisfaction.

Name of interpreter:

Signature of interpreter:

Date:

Contact details:

If volunteers cannot read the form themselves, a witness must sign here:

I was present when the nature and purpose of the participants' information sheet was read and explained to the participant in the language he/she understood.

I confirm that he/she was given the opportunity to ask questions/ seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name:

Signature: OR Thumb Print:

Date:

3. Educational level of respondents	No formal education.....1 Primary.....2 Middle School/ JHS.....3 Technical/Vocation/SHS.....4 Tertiary..... 5	
Marital status	Single.....1 Married.....2 Divorced.....3 Widowed.....4	
OCCUPATION		
5. What your employment status?	Self-employed..... 1 Private sector2 Public sector3 Unemployed4 Students/ apprentice5	
INCOME		
6. Income from all sources including salary	
7. Do you get financial assistance from other people in support of your TB care? Example; friends, family members, etc.	
CLIENTS FACTORS		
8. Do you have a primary care giver?	Has caregiver1 Does not have caregiver.....2	
9. Who supervises you when you are taking your TB medicine? (DOT)	1. Nobody 2. Health worker 3. Family member 4. Community member	
10. How much does it cost you to get to the health facility (GHC)	1. 5-10 Ghc 2. 11-20 Ghc 3. 21-30 Ghc 4. 31-40 Ghc	
HEALTH-CARE SYSTEM RELATED		

11. For how long have been on medication for tuberculosis? months	
12. Number of medications	2.....1 3.....2 4.....3	
13. Were you given instructions on how to take medication?	Instructions given.....1 Instructions not given.....2	
14. Did you understand the instructions given?	Understood.....1 Did not understand.....2	
15. Were you provided with a source for further clarification if you needed one?	Source provided.....1 No source provided.....2	
16. How would you rate the attitude of staff who attended you at the health facility?	1. Satisfactory 2. Not satisfactory	
17. Do you experience any side effects from the medication	Side effects.....1 No side effects.....2	
COMMUNITY RELATED FACTORS		
18. How much distance do you travel to collect your TB medicines (estimate)	1. 1-10km 2. 11-20km 3. 21-30km	
19. Do the community members aware of your condition?	1. Yes 2. No	
20. Do you feel community members' attitude towards you has changed when they noticed your condition?	1. Yes 2. NO	
21. Do you feel stigmatized by the community members?	1. Yes 2. No	
22. Are you taking some treatment apart from what has been given to you?	1. Yes 2. No	

Section B:

This section presents 8-items on medication adherence using the Morisky Medication Adherence Scale (MMAS-8) 2008. You indicated that you are taking medication for your condition. Individuals have identified several issues regarding their medication taking behavior and we are interested in your experiences. There is no right or wrong answer. Please answer each question based on your personal experience with your TB medication.

Self-reported 8-item Morisky Medication Adherence Scale (MMAS-8).

Self-reported 8-item Morisky Medication Adherence Scale (MMAS-8)				
1	Do you sometimes forget to take your medications?	Forgot.....1 Did not forget.....0		
2.	How often do you have difficulty remembering to take all your TB medication??	Never..... 1 Sometimes.....0		
3.	Did you take Tb drugs yesterday?	Took yesterday.....1 Did not stop taking....0		
4.	Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	Cut back1 Did not cut back.....0		
5.	When you travel or leave home, do you sometimes forget to bring along your medications?	Forgot.....1 Did not forget.....0		
6.	When you feel like your condition is under control, do	Stopped.....1 Did not stop.....0		

	you sometimes stop taking your medicines?			
7.	Taking medication every day is a real inconvenience for you?	Inconvenient.....1 Not inconvenient.....0		
8.	Do you ever feel hassled about sticking to your treatment plan?	Hassled.....1 Not hassled.....0		
	Score: >2 = low adherence 1 or 2 = medium adherence 0 = high adherence			

Donald E. Morisky, ScD, ScM, MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095-1772, dmorisky@ucla.edu

APPENDIX 3: ETHICAL CLEARANCE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com
20th February, 2019

MyRef. GHS/RDD/ERC/Admin/App 19157
Your Ref. No.

Gideon Kwakye
University of Ghana
School of Public Health

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.


GHS-ERC Number	GHS-ERC033/02/19
Project Title	Factors Influencing Clients Adherence to Tuberculosis Treatment in Birim South
Approval Date	20 th February, 2019
Expiry Date	19 th February, 2020
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED: 
PROFESSOR MOSES AIKINS
(GHS-ERC VICES CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra