"EFFECT OF EDUCATION ON TUBERCULOSIS CONTROL IN THE EASTERN REGION OF GHANA: A CASE OF LOWER MANYA KROBO AND NEW JUABEN MUNICIPALITIES"

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DECLARATION

This is to certify that this thesis is the result of research undertaken by Frank Kofi Mensah towards the award of the Master of Philosophy degree in Economics in the Department of Economics, University of Ghana under the supervision of the under signed lecturers.

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ABSTRACT

Tuberculosis remains a major health problem affecting about a third of the world population despite a number of preventive and control measures taken in the past few decades. Eighty-five percent of all Tuberculosis cases are concentrated in Asia and Africa due to lack of education and health infrastructure.

This study examines the "effect of education on Tuberculosis control in the Eastern Region of Ghana: A case of Lower Manya Krobo and New Juaben Municipalities". To obtain this, the study dealt with two main objectives, the study first examines the role of formal and informal education in the treatment of Tuberculosis by TB patients in Lower Manya Krobo and New Juaben Municipalities. The next objective was to find out the role of education on the prevention of Tuberculosis in Lower Manya Krobo and New Juaben Municipalities. Studies into the effect of education on TB control in Ghana have been limited.

Structured questionnaires were administered to 270 TB patients and their treatment supporters (relatives) to elicit information on patient demographic data, knowledge about TB infection, treatment of TB and access to health care. The Probit regression model and Poisson regression model were employed in the estimation of the probability of TB patient on Orthodox anti-TB drug and the number of household members screened for TB respectively. However, the Negative binomial regression was also employed to account for over dispersion in the Poisson regression.

Results indicate that education was positively associated with the treatment of Tuberculosis. TB patients with secondary/higher education were more likely to use

Orthodox anti-TB drug. In the same way, informal means of education such as interacting with health providers, friends/families and leaflets and magazines also showed a positive effect on Orthodox anti-TB drug usage by TB patients. However, education appeared to be negatively related to its prevention, as measured by TB screening of family members.

It is recommended that much attention should be paid to intensifying TB programmes; especially educating households to screen their family members of the TB disease which has a long- run effect of controlling Tuberculosis in the country. In addition, effort should also be directed at ensuring high basic education enrolment and completion which serves as a foundation for attainment of higher education in Ghana.

DEDICATION

This work is first of all dedicated to the Almighty God for His protection and guidance in my life. Secondly, to my parents who have sacrificed many resources to get me educated and also to my siblings for their encouragement and support throughout my studies.

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TABLE OF CONTENTS

CONTENT **PAGE**

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

LIST OF ABBREVIATIONS

AIDS: Acquired Immune-Deficiency Syndrome

ART: Antiretroviral Therapy

BCG: Bacille Calmette Guerin Vaccine

CHAG: Christian Health Association of Ghana

CHPS: Community Based Health Planning Services

DOTs: Direct Observed Treatment Short-course

DST: Drug Sensitivity Test

EPTB: Extra-Pulmonary Tuberculosis

GHS: Ghana Health Service

HBCs: High Burden Countries

HCWs: Healthcare Workers

HIV: Human Immune –Virus

MDR-TB: Multi-Drug Resistant Tuberculosis

MTB: Mycobacterium Tuberculosis

NACP: National AIDS Control Programme

NGOs: Non-Governmental Organization

NTP: National Tuberculosis Programme

PMTCT: Prevention of Mother to Child Transmission

PTB: Pulmonary Tuberculosis

XDR-TB Extensive Drug-Resistant Tuberculosis

TB: Tuberculosis

WHO: World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION

Tuberculosis (TB) is an ancient disease that has caused more suffering and deaths than any other infectious disease (Addo et al., 2010). The disease remains a major global health problem (Global Tuberculosis Report, 2013). Worldwide, 2 billion people are estimated to be infected with Mycobacterium Tuberculosis (MTB), and a significant proportion of these are at risk of developing TB (USAID, 2013). In 2009, 3.6 million women fell ill with TB and 700,000 women died from TB, including 200,000 women with HIV (WHO, 2009). Tuberculosis is often linked to HIV infection and is among the five leading causes of death in low-income countries, among women of reproductive age and among adult women aged 20-59 (WHO Fact Sheet, 2013). Additionally, women of reproductive age are more susceptible to developing TB disease than men of the same age (WHO, 2009). Over 95 percent of TB deaths occur in low and middle-income countries because of poverty or crowded living conditions in these countries. (WHO Fact sheet, 2014).

Tuberculosis is a contagious bacterial and airborne disease that claims a life every 18 seconds and every hour, more than 200 people die from this curable disease (USAID, 2014). TB is caused by the bacillus Mycobacterium Tuberculosis (MTB) and the main source of infection is untreated smear-positive Pulmonary Tuberculosis (PTB) patients discharging the bacilli into the air. TB can affect any part of the body, such as the spine, skin, brain, bone, kidney, etc. (extra pulmonary TB) but TB typically affects the lung

(Pulmonary Tuberculosis). The disease is spread in the air when people who are sick with pulmonary TB expel bacteria, for example by coughing, yawning, sneezing and spitting. A person needs only to inhale a small number of these bacilli to be infected. A person can have active or inactive TB. Active TB (Tuberculosis disease) means that the bacteria are active in the body and the immune system is unable to stop them from causing illness. People with active TB can pass the bacteria on to anyone they come into contact with through the air and if left untreated, each person with active TB disease will infect an average of between 10 to 15 people every year (WHO, 2003). TB disproportionately affects the vulnerable population, such as people living in poverty or experiencing crowded living conditions with poor ventilation- such as miners and prisoners. HIV and AIDS, diabetes, malnutrition, smoking and other health factors further affect a person's vulnerability to TB. In general, a significant proportion of people infected with Mycobacterium Tuberculosis will develop TB disease; however, the probability of developing TB is much higher among people infected with HIV and is second only to HIV/AIDS as the greatest killer worldwide due to a single infectious agent (World Health Organization Fact Sheet, 2014). Symptoms of TB depend on where in the body the TB bacteria are growing. TB bacteria usually grow in the lungs. The TB in the lungs may cause: a bad cough that last longer than two (2) weeks, pain in the chest, coughing up blood or sputum, weight loss, no appetite, chills, fever and sweating at night.

The most common method for diagnosing TB worldwide is sputum smear microscopy (developed more than 100 years ago), in which bacteria are observed in sputum samples examined under a microscope. Without treatment, TB mortality rates are high. In studies of the natural history of the disease among sputum smear-positive/ HIV-negative cases of pulmonary TB, around 70% died within 10 years; among culture-positive (but smear-negative) cases, 20% died within 10 years (Global Tuberculosis Report, 2013). Effective drug treatments were first developed in the 1940s. The most effective first-line anti-TB drug, Rifampicin, became available in the 1960s. The currently recommended treatment for new cases of drug-susceptible TB is a six-month regimen of four first-line drugs: Isoniazid, Rifampicin, Ethambutol and Pyrazinamide. For the first time in four decades, new TB drugs are starting to emerge from the pipeline and combination regimens that include new compounds are being tested in clinical trials. The disease knows no boundaries, making it a global health emergency that must be addressed with immediate and aggressive action (USAID, 2014). Over 95 percent of Tuberculosis cases and almost 98 percent of deaths from Tuberculosis occur in developing countries (Ristić et al., 2010). Pakistan is among the 22 countries with the greatest burden of Tuberculosis due to the inadequate diagnosis and treatment, increasing migration due to natural and man-made disasters and emerging epidemic of HIV/AIDS (Pilheu, 2000). All these are fuelled by the population explosion, rising number of multi-resistant Tuberculosis, drug abusers and refugees and lack of knowledge and awareness about TB. With the discovery of chemotherapy in the 1940's and adoption of the standardized short courses in the 1980's, it was believed that TB would decline globally.

Although, a declining trend was observed in most developed countries, this was not evident in many developing countries (Chadha, 2009). By 2030, urban areas worldwide will house an additional 1.4 billion people, with the vast majority of this growth occurring in developing and transitioning countries, where 95% of the global burden of TB is concentrated (USAID, 2013). Such urbanization may create an environment conducive to the spread of TB. In developing countries, about 7 percent of all deaths are attributed to TB, which is the most common cause of death from a single infectious agent (Kaye & Frieden, 1996). According to the Global Tuberculosis Control Report, 2013, South-East Asia and Western Pacific Regions collectively accounted for 58 percent of the world's TB cases in 2012. The African Region had approximately one quarter of the world's cases, but the highest rates of cases and deaths relative to population (225 incident cases per 100,000 on average, more than double the global average of 122). India and China had the largest number of cases (26% and 12% of the global total, respectively). South Africa and Swaziland had the highest incidence rate per capita (about 1 new case of every 100 people each year). In South Africa the prevalence of TB infection is the highest in the World; 511 cases/100,000 populations (WHO, 2010). A study conducted by Sandiso (2011) in Cape Town, South Africa, revealed that in every third taxi (a major means of mass transport system in South Africa) there is a TB patient. This is because in South Africa, it is estimated by the World Health Organization that about 270,000 (60%) people have both HIV and TB infection. In Ghana, TB contribute to a significant cause of adult morbidity and mortality (GHS, 2007), loss of workdays and fall in household welfare due to impact of coping strategies. Among children the illness causes irregular school attendance, poor academic performance, loss of self-confidence, embarrassment and fear. An estimated 12,000 of the country's population are infected with Tuberculosis annually. With an estimated 47,632 new TB cases in 2007, Ghana ranks 19th in Africa for the highest estimated number of new cases per year, according to WHO's Global TB Report 2009. Ninety-five percent (95%) of the 7,786 TB patients registered in 2007 died before completing TB treatment (WHO, 2006). In Ghana, more than 15,000 new cases were reported in 2012 (National Tuberculosis Control Programme, 2013).

In 2007, it was estimated globally that there were 9.7 million incident cases of TB, 13.7 million prevalent cases, 1.32 million deaths from TB in HIV-negative and 0.45 million deaths in HIV-positive persons (WHO Report, 2009). Asia and Africa alone constitute 86% of all cases (WHO report, 2012, Geneva). Bangladesh ranked the 6th highest for the burden of TB among 22 high-burden countries in 2007, with 353,000 new cases, 70,000 deaths, and an incidence of 233/100,000 people per year (WHO; Global Tuberculosis Control, 2009). In Sub Saharan Africa, Human Immune-Deficiency Virus (HIV) and TB have combined to fuel a sub epidemic Multi-Drug Resistant TB (MDR-TB) and Extensively Drug-Resistant TB (XDR-TB) outbreak and in South Africa this has been particularly widely covered (Gandhi et al., 2006).

According to the Global Tuberculosis Report (2013), in 2012, an estimated 8.6 million people developed TB and 1.3 million died from the disease (including 320,000 deaths among HIV-positive people and 940,000 deaths among people who were HIV-negative). Among these deaths there were an estimated 170,000 from MDR-TB, a relatively high total compared with 450,000 incident cases of MDR-TB. Although the number of TB cases and deaths remain unnecessarily large for a mostly curable disease, there has been major progress towards global targets for reductions in the burden of disease. The 2015 MDG target of halting and reversing TB incidence has been falling globally for several years (2% per year in 2012).

Globally, the TB mortality rate has fallen by 45 percent since 1990 and 50 percent reduction by 2015 is within reach. Mortality and incidence rate are falling in all six WHO regions and in most of the 22 High Burden Countries (HBCs) that account for over 80 percent of the World's TB cases (WHO, 2013; Global Tuberculosis Report). In Ghana, remarkable progress has been made in the TB treatment success rate and that has increased from 54 percent in 1995 to 86 percent in 2008. Though the HIV sero prevalence in the general population is relatively low (2.9 percent- NACP, 2010), TB mortality remains high at 8 percent (WHO Global TB Report, 2010). The number of TB deaths is unacceptably large, given that most are preventable.

1.2 BRIEF HISTORY OF TUBERCULOSIS CONTROL

Tuberculosis is among the top ten causes of global mortality (World Health Organization, 2000, Murray & Lopez, 1997). It has been estimated that approximately one-third of the world's population is infected with Tuberculosis bacillus and that each year, 8 million people develop Tuberculosis diseases and 1.8 million die of the disease (WHO, 2001). Approximately 80 percent of Tuberculosis cases are found in 23 countries; the highest incidence rates are found in Africa and South-East Asia (Dye et al., 1999, World Health Organization, 2001). The Tuberculosis situation has worsened over the past two decades in Africa owing to the HIV/AIDS epidemic and in Eastern Europe in association with multi-drug resistance, following the deterioration of the health information (Coulibaly et al., 1992, WHO, 2001).

In 2000, the G8 group of countries called for the scaling-up of interventions against HIV, Tuberculosis and Malaria, and set a target for the reduction in Tuberculosis mortality of 50 percent by 2010 (WHO, 2000). This target may be difficult to achieve (Dye, 2000) despite the availability of the World Health Organization (WHO) directly observed treatment, short-course (DOTS) strategy for the treatment of Tuberculosis, which is considered to be a very cost-effective health invention with a larger potential impact (The World Development Report, 1993). Reasons are the slow epidemiology of Tuberculosis and the slowness with which the DOTS strategy is being adopted (Dye, Garnett et al., 1998, Murray & Salomon, 1998). In settings with a high prevalence of HIV infection, HIV prevention will be of major importance for Tuberculosis control.

Most Tuberculosis control programmes provide treatment to smear-negative patients. Unfortunately, the diagnosis of smear-negative Tuberculosis is difficult. Chest X-rays are an important tool, but their interpretation has limited specifying and inter-reader repeatability (Toman, 1979). Moreover, patients with HIV infection may have a normal chest X-ray despite active Tuberculosis (Lobue, Perry et al., 2000). Mycobacterial cultures would be helpful, but are not widely available in high-burden countries. Thus, programmes often employ diagnostic algorithms, which require that Tuberculosis suspects with a negative smear are first treated with antibiotics which are inefficient against Tuberculosis. Only after this treatment failed (or in critically ill patients) is Tuberculosis started (WHO, 1997).

The main components of the WHO DOTS strategy are political commitment, case detection among self-reporting patients with symptoms using sputum smear microscopy, short-course chemotherapy under proper management, including directly observed therapy and strong surveillance and monitoring system (Kochi, 1990, WHO, 2001). The need for directly observed treatment as a universal requirement is controversial, since the success of some Tuberculosis control programmes attributes to other programme elements (Zwarenstein et al., 1998). The DOTS strategy aims at detecting at least 70 percent of new smear-positive cases and successfully treating 85 percent of them (WHO, 2001).

In Ghana, TB control is a mandate of the Ministry of Health but the public sector and the private sector must collaborate to achieve this aim. However, the National Tuberculosis Control Programme is addressing the challenges that have clear solutions, and it is also seeking new approaches to meet challenges whose solutions are not yet apparent.

1.3 PROBLEM STATEMENT

Tuberculosis is currently a national security threat due to its contagious, high infection and airborne nature, affecting mostly young adults in their economic and productive years. The World Health Organization (WHO) in 1993 declared TB a global emergency in recognition of its growing importance as a public health problem. In 2009, WHO revised TB Infection Prevention Control policy, guidelines and implementation strategies. The WHO stipulated guidelines adopted by Ghana were to ensure safe practices among health care workers, patients and families. This was disseminated in all the ten (10) regions of Ghana in 2010 to ensure that TB control strategies are implemented in all health institutions throughout the country, including the ability to control nosocomial infections as part of quality health care service to people (WHO, 2006). TB Infection Prevention Control is one of the major strategies to prevent and control TB disease in patients and healthcare workers (HCWs) in the health care setting (MOH, 2010). However, Tuberculosis transmission among patients, families and Healthcare workers is still a threat, especially to those who have the closest and longest contact with patients (Lopez, 2008).

According to WHO's Global Report (2009), Ghana is not among the World Health Organization's (WHO's) 22 high burden Tuberculosis countries, yet the disease is a major health problem in the country as one untreated TB case can infect several people at a time. With an estimated 47,632 new TB cases in 2007, Ghana ranks 19th in Africa for the highest estimated number of new cases per year (WHO, 2009). Although data on the disease is limited, it is also estimated that Ghana has over 123 smear positive cases per 100,000 population per year. Additionally, four confirmed Multi-Drug Resistant (MDR-TB) cases have been reported in Ghana (WHO, 2010).

Studies have revealed that TB is a worldwide problem because every second a person is infected and every 10 seconds someone dies as a result of TB (Jacob Haasnoot et al.). However, in order to reduce the rate of Tuberculosis transmission among TB people, it is important they have some education or knowledge of TB infection and control practices.

The total number of TB cases reported in 2013 in the Eastern Region was 1,680 (Tuberculosis Annual Report 2013-Eastern Region). Most of the estimated number of cases occurred in the Lower Manya Krobo Municipality, New Juaben Municipality and Denkyembour District. Out of the total number of TB cases reported in 2013, Lower Manya Krobo Municipality recorded the highest number of 264 TB cases representing

16%, followed by New Juaben Municipality, 131 TB cases representing 8% and Denkyembour District, 113 representing 7% (Tuberculosis Annual Report 2013-Eastern Region). Interactions with some TB coordinators in some health facilities in the Region also revealed a number of TB cases among some health care workers in spite of the persistent efforts being made to prevent and control the infection rate (personal communication). Due to myths and misconceptions, people suffer silently and painfully from a condition that is curable. The focus of this study is on lung pulmonary TB. However, the question is what is the effect of education on Tuberculosis control in the Eastern Region of Ghana?

Grossman (2000) argues that an individual with formal education is an efficient producer of health. This means people who are educated are predicted to adopt healthy lifestyles such as jogging, eating a balanced diet, buying medical care, etc. In the same way, the educated people are expected to invest more in preventive measures such as eating nutritious foods to boost up the immune system to fight against the germ, avoid sleeping in an overcrowded room, and also protecting the infant and young children by BCG vaccine. However, TB patients are expected to take their medication so that they can be cured of the disease. Even in terms of illness, the educated are presumed to maximize returns from medical care. To realize positive gains from anti-TB drugs, which have proven to be effective in controlling Tuberculosis, the contribution of formal and informal education in fighting Tuberculosis needs to be investigated.

Formal education in this study is referred to as the highest level of classroom education an individual has attained. Informal education in this study also referred as the acquisition of information from other means beside the formal classroom experience such as newspapers, radio, TV, internet, etc. The question is how has both formal and informal education influenced the use of Orthodox anti-TB drugs by TB patients', stakeholders and policy makers in their quest to adequately control and subsequently eradicate Tuberculosis?

1.4 RESEARCH OBJECTIVES

The general objective of this study is to examine the effect of education on Tuberculosis control in the Eastern Region of Ghana.

1.4.1 Specific Objective

(1) To examine the role of formal and informal education in the treatment of Tuberculosis by TB patients in Lower Manya Krobo and New Juaben Municipalities.

(2) To find out the role of education on the prevention of Tuberculosis in Lower Manya Krobo and New Juaben Municipalities in the Eastern Region.

1.5 SIGNIFICANCE OF THE STUDY

The study attempts to examine the effect of education on Tuberculosis treatment and prevention in Lower Manya Krobo and New Juaben Municipalities, the two Municipalities in the Eastern Region. Although there have been many studies examining the relationship between education and its effect on health outcomes, few studies have been done on Tuberculosis control, particularly on the relationship between education and its impact on Tuberculosis control in Ghana.

Unique to this study is the attention paid to informal education and its role in combating Tuberculosis because formal schooling is assumed to be an important determinant of the stock of human capital than the informal schooling. However, higher educated people are predicted to invest more into their health stock than the lower educated people. Since it is known that education plays an important role in health outcomes of individuals, it is essential therefore to establish the empirical evidence of the relationship between education and Tuberculosis control using household data, hospital data and data from the Regional Diseases Control Unit-Eastern Region.

The study is expected to pioneer research on how education can help in the treatment, prevention and control of TB. It is also relevant to the intellectual community; the facts and information that come out of this study would provide useful knowledge for learning. It will further improve the steps in the practices that will be employed to reduce the transmission of TB and other respiratory infections. The finding of this research will also be useful to the individual and the hospital management in making decisions regarding TB and prevention of respiratory diseases in general.

1.6 OUTLINE OF THE STUDY

The study is divided into six chapters. Chapter one is the introduction to the topic. Chapter two discusses the prevalence of Tuberculosis in Eastern Region, addition to measures to control its spread. A detailed literature review is presented in chapter three. Chapter four presents the methodology and procedures used in this study. Chapter five discussed the results obtained from the study and final chapter six gives a summary, conclusion, recommendation and limitations of this study.

CHAPTER TWO

TUBERCULOSIS SITUATION IN EASTERN REGION

2.0 INTRODUCTION

In 2013, the regional TB control programme identified a total of 1,680 TB cases. This gives a notification rate for all forms of TB of 60/100,000 population. The trend of case notification dropped from 82/100,000 population in 2009 to 60/100,000 population in 2013 (Annual TB Report, 2013- Eastern Region)

The region has a target of detecting 2,401 sputum smear positive cases for the year 2013. That is, individuals demonstrating symptoms of Tuberculosis disease. As at the end of 2013, a total of 884 representing 36.4% sputum smear positive cases were detected. The regional sputum smear positive case detection dropped from 39% in 2012 to 36.4% in 2013. Four districts namely; Lower Manya Krobo, Nsawam Adoagyiri, Denkyembour and Yilo Krobo districts were the only districts which achieved a case detection of more than the regional average of 39%. The diagnosis of TB in children is the major challenge for the regional TB control programme. During the period under review, a total of 68 cases of all forms of TB were reported in children under the age of 15 years, representing 4% of the total cases identified. Of the total cases registered, 8 (12%) were smear positive, 21 (31%) were smear negative, 21 (31%) extra pulmonary TB and 18 (25%) were not diagnosed using sputum smear test (Tuberculosis Annual Report 2012).

A total of 889 smear positive TB cases were evaluated for treatment outcomes. Of the number, 633 representing 71.2% were cured and 111 representing 12.5% completed treatment giving a treatment success rate of 83.7%. Adverse TB treatment outcome (death, defaulter failure and transfer out) recorded for the period was 16.3%. Out of the 21 districts evaluated for treatment outcomes, Atiwa recorded the highest treatment success rate of 100%, followed by the Birim South with 94%, Suhum 93% and West Akim 91% respectively. The lowest treatment success rate of 67% was recorded by Upper Manya of Krobo Municipality.

HIV Sero-Positive among TB patients has remained stable since 2011. The rate recorded for the year was 29.2%. However, districts such as Lower Manya Krobo, Upper Manya Krobo and East Akim recorded rates above the regional average rate of 60%, 44% and 40% respectively. Out of the total HIV positive cases recorded, 78% were put on Cotrimoxazole Prophylaxis. Cotrimoxazole Prophylaxis for HIV patients ranges from 100% in the Akwapim North district to 16% in the Yilo Krobo District. Five percent (5%) of the HIV positive cases was put on ART (Annual TB Report, 2012).

The overall regional performance in TB microscopy was 77%, an improvement of 12% over the 2011 performance. Generally, there was an improvement in all six parameters ranging 6.3% improvement in sputum quality to 19% in thickness of smears. On the individual performance of diagnostic centres, 11 facilities attained the national performance target of 85% as compared to other facilities which attained zero targets in the second quarter.

2.1 BRIEF BACKGROUND OF EASTERN REGION

Eastern Region of Ghana has a projected population of 2,420,927 with a growth rate of 1.4%. It is the sixth largest region with a land area of 19,323 sq. km, thus representing about 8% of the total land area of the country and 11.5% in terms of population. The region is bounded on the East by the Volta Region, South by Greater Accra Region, West by Central Region and on the North by Ashanti Region. The region has 26 administrative districts and 136 sub-districts with Koforidua as the regional capital.

The region's population is very young with 41.7% aged less than 15 years and 5.8% older than 64 years. Females constitute 50.8% and males 49.2% of the total population, giving a sex ratio of 96.8 males to 100 females. On a broad sector basis, 58.4% of the employed population work in agriculture, including hunting, forestry and its related work and fishing. 13.5% in wholesale and retail trade and 9.1% in manufacturing. Nearly four-fifth (77.7%) of the population, aged 15 years and older are self-employed workers without employees, followed by employees (11.5%) and self-employed with employees (4.3%). The remaining 6.5% of workers are made up of unpaid family workers (2.7%), apprentices (2.9%), domestic employees (0.4%) and others (0.5%). The population distribution pattern shows that 34.6% of the region's population live in 56 urban settlements (towns with population above 5,000) while a greater percentage of about 65.4% live in the rural communities.

The Eastern Region's economy is divided into three sectors, namely the Agricultural, Industrial and Service sectors. The main occupations in the region are Agriculture and its related work (54.8%), Sales (14.3%), Production, Transport and Equipment work (14.0%) and Professional and Technical work (6.9%) with Services accounting for (5.0%) of the economically active population. The principal occupations for males are Agriculture and its related work (56.9%), Production, Transport and Equipment (16.6%), Professional and Technical work (8.6%), Sale's work (6.5%) and Clerical work (6.2%). The pattern is almost the same for the females, except in Sales where females (21.8%) feature more prominently than males (6.5%). The other major occupations for females are Agriculture and its related work (52.7%), Production, Transport and Equipment work (11.5%), Professional and Technical (5.2%) and Service (6.7%) (Modern Ghana Fact Sheet, 2014).

There are a total of 549 health facilities. Currently the region has a total of 360 public facilities and 6 private facilities providing DOT (Direct Observed Treatment) services. There are 30 public health facilities and 4 private facilities providing TB microscopy. The regional hospital laboratory is the only laboratory in the region, providing culture and DST (Drug Sensitivity Test) services. On TB/HIV collaborative services, the region has a total of 351 HIV testing and counselling site, 274 PMTCT (Patient-Mother-To-Child Treatment) sites and 28 ART (Antiretroviral Therapy) sites. TB control in the region is integrated into the existing health service structure in the community (CHPS), sub district (Health Centre/ Clinics), district and regional level. There are a total of 130 medical doctors, 2495 nurses and 82 medical assistants that provide clinical care management in the region.

Fig. 2.1 Eastern Regional Map Showing Districts

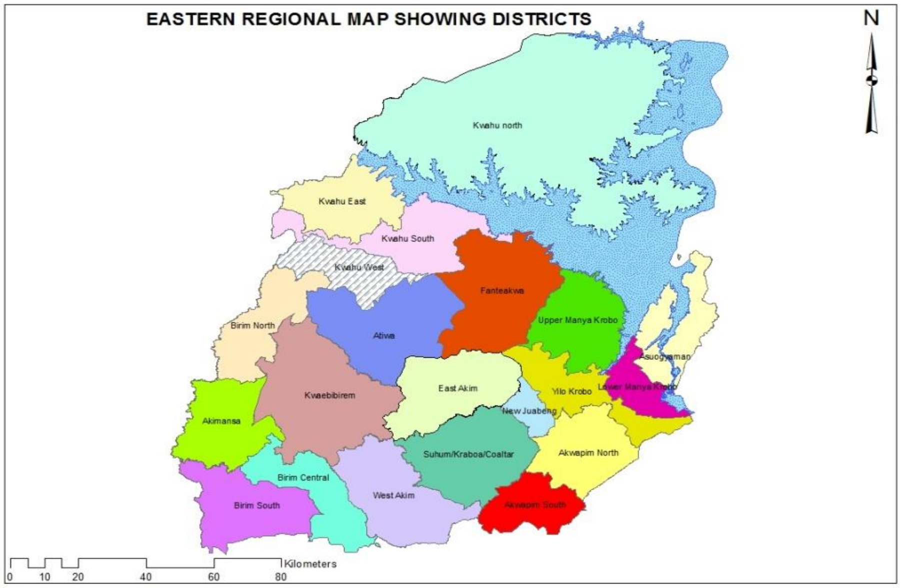


Table 2.1: Type of Health Facility in the Region

TYPE OF HEALTH FACILITY	NUMBER
Regional Hospital	1
Government Hospital`	15
Polyclinics	1
Health Centre	95
Clinic/ Maternity Homes	51
Functional CHPS	299
CHAG	22
Private	47
Other	18
Total	549

Source: TB Annual Report 2012- Eastern Region

***CHAG: Christian Health Association of Ghana (Mission Hospitals)**
***CHPS: Community Based Health Planning Services**

The GSS (2008) also provided information on the educational level attained by households in the survey conducted. In the Eastern Region, 7.1% of women had attained primary education which was the fourth highest among the regions of Ghana and 6.1% and 2.7% had completed secondary and tertiary education respectively in the same region. 21.8% and 9.46% of women in the Greater Accra Region had also completed secondary and tertiary education respectively, the highest among the ten regions. 7.6% of men in the Eastern Region had attained primary education which was the third highest among the ten regions and 11.2% and 6.7% had completed secondary and tertiary respectively. Again, 10.7% of women and 2.5% of men in the region have no level of education respectively. This is shown in the tables below.

Table 2.2 Highest Level of Schooling for Women in the Eastern Region

Highest level of Schooling for Women (%)						
Background characteristics	**No Education`**	**Some Primary**	**Completed Primary**	**Some Secondary**	**Completed Secondary**	**More than Secondary**
Residence						
Urban	**30.8**	**18.1**	**6.3**	**39.4**	**4.1**	**1.2**
Rural	**10.9**	**10.8**	**4.8**	**50.3**	**16.4**	**6.7**
Region						
Western	**13.9**	**17.7**	**6.7**	**47.7**	**10.1**	**3.4**
Central	**16.2**	**19.0**	**7.9**	**47.1**	**7.4**	**2.5**
Greater Accra	**7.7**	**9.3**	**5.4**	**46.5**	**21.8**	**9.4**
Volta	**22.9**	**16.8**	**7.8**	**40.7**	**9.4**	**2.2**
Eastern	**10.7**	**16.9**	**7.1**	**56.5**	**6.1**	**2.7**
Ashanti	**9.9**	**15.7**	**3.5**	**58.3**	**9.4**	**3.2**
Brong Ahafo	**24.9**	**11.6**	**8.2**	**47.2**	**6.6**	**1.5**
Northern	**65.7**	**8.0**	**2.7**	**16.3**	**5.1**	**2.1**

Upper East	49.0	20.0	3.7	17.7	4.5	4.8
Upper West	48.1	21.2	2.2	22.4	4.7	1.3

Source: GSS (2008)

Table 2.3 Highest Level of Secondary Schooling for Men in the Eastern Region

	Highest level of Schooling for Men (%)					
Background characteristics	**No Education`**	**Some Primary**	**Completed Primary**	**Some Secondary**	**Completed Secondary**	**More than Secondary**
Residence						
Urban	19.9	13.7	6.6	46.5	8.8	4.3
Rural	5.6	6.1	3.3	48.7	23.1	12.9
Region						
Western	6.1	7.1	5.2	59.3	13.8	8.2
Central	6.6	11.9	5.8	54.5	11.0	9.9
Greater Accra	3.5	5.5	3.5	46.3	24.9	15.8
Volta	8.4	12.3	8.0	53.2	12.6	5.6
Eastern	2.5	6.6	7.6	65.4	11.2	6.7
Ashanti	6.6	9.4	3.2	56.7	19.0	5.4
Brong Ahafo	17.1	13.9	6.9	39.7	12.9	8.4
Northern	48.4	10.9	2.3	19.6	12.4	6.4
Upper East	34.4	21.5	7.8	22.0	7.6	6.4
Upper West	30.2	19.4	5.1	28.4	11.3	5.4

Source: GSS (2008)

The information provided on the educational level in the Eastern region shows that men have a higher level of education than women. However, there are more men who have completed Primary, Secondary and Tertiary education than women. This information would help the researcher to find out whether the men who have a higher level of education have positive health behaviours and that they are less infected with Tuberculosis disease than the women. However, the better educated people are more able to invest into their health stock than the poor educated because it is assumed that the better educated people have more information about their health.

2.2 THE NATIONAL TUBERCULOSIS CONTROL PROGRAMME

The National Tuberculosis Control Programme was launched in 1994 and according to the World Health Organization; Ghana achieved 100% DOTS coverage in 2005. The number of identified TB cases has increased from 7,425 in 1996 to 15,286 in 2009. However, this has not significantly increased TB case detection rate currently estimated at 31%, which is way below the 50% African average and 70% Global target. Though the Ghanaian population comprises more females (51%) than males, however, males TB cases notified to the NTP are more than that of females at the ration of 2:1. As low as 4% of notifying TB cases are children under age 15 years (UASID, 2013).

The mandate of the National Tuberculosis Control Programme (NTP) is to provide leadership in the health sector response to fight Tuberculosis in Ghana. The NTP aims at reducing the transmission of the disease to a level where it is no longer a major public health problem (National Tuberculosis Programme, 2014). Specifically, it aims to achieve a case detection rate of 55% and a cure rate of 85% by the year 2001. However, the NTP shares in the mission of Global Stop TB partnerships. The mission includes the following;

- Ensure that every TB patient has access to TB treatment and care

- Stop transmission of TB
- Protect vulnerable population from TB
- Reduce the social and economic toll that TB exerts on individuals, families, communities, and the nations.

Presently, the NTP has an ambitious goal to provide universal access to care for all TB patients and to achieve 100% case detection. These are implemented through the six Stop TB strategies;

- Pursue high quality DOTS Expansion and Enhancement
- Address TB/HIV, Multi Drug Resistant (MDR) -TB and other challenges
- Contribute to health system strengthening
- Engage all care providers
- Empower people with TB, and communities
- Enable and promote research

From 4% in 2002, the NTP has trained 7% of 42,000 public service providers in at least one TB component by 2008. Among those trained to ensure quality care and programme implementation, there is high staff turnover due to transfers and attrition thereby creating training gaps for new personnel (NTP Training Manual, 2012). This can be shown in the Table 2.4 below.

Table 2.4: PHC Staff available and needed for TB Control Countrywide, 2011

	Needed	Available	Trained
Total Staff	30,000	42,000	3,147
Laboratory technicians	1,200	800	60
Programme Management staff (National)	24	15	10
Regional M&E focal points	10	0	-

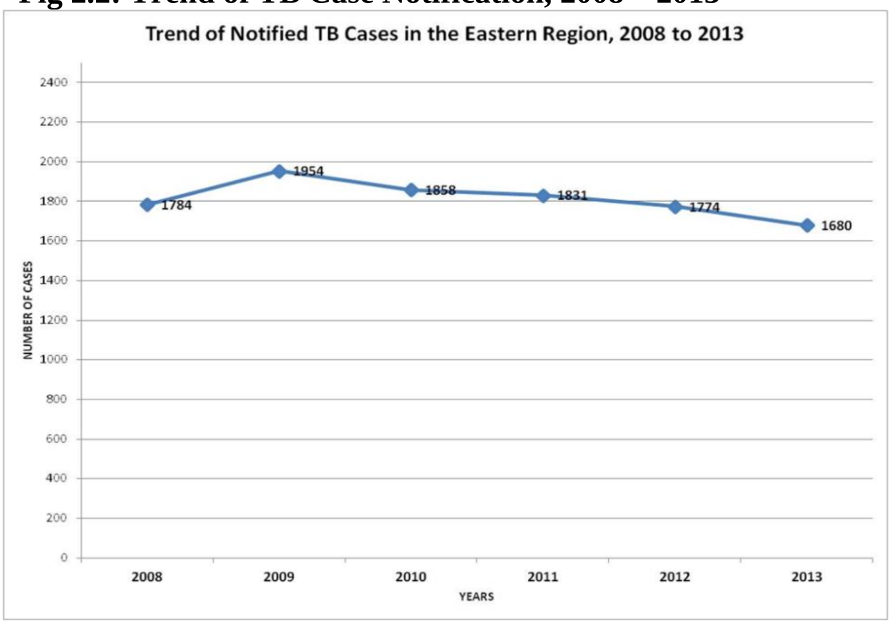
Source: National Tuberculosis Control Programme; Training Manual, January, 2012.

2.3 TUBERCULOSIS SITUATION IN EASTERN REGION

2.3.1 TB Case Notification

In 2013, the region reported 1,680 cases of TB, which is equivalent to 60 cases per 100,000 population. The trend of cases per 100,000 population dropped from 82 cases per 100,000 population in 2009 to 60 cases per 100,000 population in 2013. The region has witnessed a constant decrease in total cases notification from 2010 to 2013. In 2010, the region reported 1,892 cases of TB, which is equivalent to 78 cases per 100,000 population, compared to 1,833 cases of TB, equivalent to 75 cases per 100,000 population and 1,774 cases of TB, equivalent to 65 cases per 100,000 population in the year 2011 and 2012 respectively. This shows that the absolute number of incident cases over the years has been falling. The result may be a fall in case detection rate in the region due to the fact that TB patients do not report to the hospital for treatment or the fact that the prevalence rate of TB cases in the region has fallen because of preventive measures put in place by the region and effective treatment outcome of TB patients. However, the number of notifying TB cases in the country has increased from 7,425 in 1996 to 15,286 in 2009 (USAID, 2012). This has not significantly increased TB case detection rate currently estimated at 31% below the 50% African average and 70% Global target. The total TB cases notified in Ghana as at 2012 were 14,377. Though Ghana population comprises more females (51%) than males, there are more males TB cases notified to the National Tuberculosis Control Programme than females. As low as 4% of notifying TB cases are children age below 15years. Figure 2.2 below shows the trend of TB cases notified in Eastern Region from 2008-2013.

Fig 2.2: Trend of TB Case Notification, 2008 – 2013



Source: TB Annual Report 2013-Eastern Region

However, the number of patients reported to be infected with TB in the Eastern Region has also witnessed a constant decrease from 2010 to 2013. Case detection of smear positive cases from 2010 in the region was 43.9% compared to 40.5% in 2011. This shows a regional decline in smear positive case by 3.4% from 2010-2011. Case detection of smear positive cases for 2012 and 2013 remained the same at 37%. The results may be a fall in case detection or a decline in the TB prevalence rate due to preventive measures put in place to check TB transmission and infection in the region.

In 2010, the region targeted detecting 2,178 smear sputum positive cases and out of which 1,045 cases were detected at the end of 2010 representing 48%. In 2011, the targeted detecting smear sputum positive cases were 2,209 and only 894 cases were detected at the end of 2011 representing 40.5%. This shows a decline in the sputum smear positive case detection in 2011.The results were due to high unreported cases of TB in the health facilities. Again, in 2012, the region targeted detecting 2,361 smear sputum positive cases. As at the end of 2012, a total of 918 representing 38.9% smear sputum positive cases were detected. In 2013, a total of 884 sputum smear positive cases were detected representing 39%. This shows another fall in the number of sputum smear positive cases detected in the region.

2.3.2 Tuberculosis Case Detection by District

Tuberculosis case detection rate is the ratio of newly notified TB cases to estimate incident case. In Ghana Tuberculosis case detection rate has been increasing from 2011-2013. In 2011, Tuberculosis case detection rate in Ghana was measured at 79% whilst in 2012, according to the World Bank Development Indicators, it increased to 81%. In 2013, Tuberculosis case detection rate in Ghana stood at 88% (World Bank, 2014).

In Ghana, the Eastern Region has a target of detecting 2,401 Sputum Smear Positive cases for the year 2013. A total of 884 (36.8%) Smear Positive was detected with about 1,680 cases recorded in the region. Four districts namely; Lower Manya Krobo, Nsawam

Adoagyiri, Denkyembour and Yilo Krobo districts were the only districts which achieved a case detection of more than regional average. The incidence of Tuberculosis in Ghana was last measured in 2013 at 66 per 100,000 population (World Bank, 2013) compared to the incidence of TB which was measured at 60 per 100,000 population in the Eastern Region. In Ghana, Eastern Region is the sixth region with the highest Tuberculosis incidence with most of the estimated number of cases found in Lower Manya Krobo (16%), New Juaben (8%) and Denkyembour (7%). A smaller proportion of cases occurred in Kwahu Afram Plains North, Kwahu Afram Plains, South and Kwahu East with 1% respectively (Annual Tuberculosis Report, 2013). In 2011, a total number of 889 smear positive TB cases were evaluated for treatment outcomes. Out of this number, 633 representing (71%) was cured, and 111 representing (12.5%) completed treatment giving a treatment success rate 83.7%. The major challenge with treatment outcomes is a high death rate due to TB/HIV co-infection. Analysis of 2010 cohort year TB deaths audit indicated that 27% of deaths were due to TB/HIV co-infection. The region recorded a death rate of 8.9% 2011 cohort year. Even though there is a decrease, it still remains a major challenge in the achievement of high TB treatment success rate. The region instituted TB audit system in order to review all deaths related to Tuberculosis and to put in measures at all levels to prevent all preventable deaths. For the year 2011, a total of 65 deaths have been audited. Audit report submitted ranged from 15 deaths in the Kwaebibirim district to 2 deaths in Asuogyaman district. In 2000, Ghana's TB deaths among HIV-negative people was 27%, but later decreased to 6.9% in 2012 (World Health Statistics, 2014). Adverse TB treatment outcome recorded (16.3%). These comprise of treatment failure 1.7%, those who died 8.9%, defaulters 3.4% and transfer out 2.4%. The treatment success rate for all new HIV positive TB patients was 72% compared with 85% among HIV negative TB patients. It is assumed that HIV positive TB patients who defaulted from treatment would have died from TB. The death rate recorded for HIV positive patients was 17% compared with 6% among HIV positive patients. The table below shows the targets for the district and the number of cases detected in 2013.

Table 2.5: TB case detection by Districts, 2013-Eastern Region

	Smear Positive Case Detection			Case Notification		
DISTRICTS	TARGET (Smear Positive) 86/100,000	Smear Positive Detected	% Case Detected	District	Total cases seen 2012	TB Case Notification by Districts per 100,000 population
AKWAPIM NORTH	122	49	40.0	142,275	97	68.2
AKWAPIM SOUTH	111	81	73.2	128,743	125	97.1
AKYEMANSA	87	21	24.1	101,507	30	26.9
ASUGYAMAN	88	19	21.6	102,207	24	23.5
ATIWA	99	20	20.2	115,317	30	26.0
BIRIM CENTRAL	130	40	30.8	151,107	59	39.1
BIRIM NORTH	71	29	41.0	82,256	56	68.1
BIRIM SOUTH	107	36	33.5	124,850	49	39.2
EAST AKIM	151	34	22.6	175,022	94	53.7
FANTEAKWA	97	22	22.6	113,224	50	44.2
KWAEBIBIRIM	173	90	52.1	200,735	159	79.2
KWAHU EAST	69	24	34.7	80,398	39	48.5
KWAHU NORTH	196	15	7.7	227,497	44	19.3
KWAHU SOUTH	63	22	35.2	72,718	43	59.1
KWAHU WEST	84	36	42.9	97,556	54	55.4
LOWER MANYA KROBO	80	36	42.9	97,556	54	55.4
NEW JUABEN	165	73	44.3	191,525	157	82.0
SUHUM KRABOA COALTAR	150	73	48.6	174,662	147	84.2
UPPER MANYA KROBO	65	27	41.8	75,152	66	87.8
WEST AKIM	175	59	33.7	203,640	117	57.5
YILO KROBO	79	48	60.9	91,575	100	109.2
REGIONAL	2,361	918	38.9	2,744,908	1,774	64.6

Source: TB Annual Report 2013-Eastern Region

2.3.3 TB/HIV Collaboration

Tuberculosis disease and HIV have some linkage because of the breakdown in the immune system when someone is infested with the Human Immune Virus (HIV). Ghana started implementing TB-HIV collaborative activities in 2005. In 2009, out of the 15,286 notified TB cases, 9,870 (65%) were tested for HIV and 2,218 (22%) were HIV positive. 1,601 (72%) were subsequently offered Cotrimoxazole Preventive Therapy and as low as 531 (24%) received ART. Over the period 2000 to 2010, the country's HIV and AIDS sero-prevalence rate initially increased steadily from 2.3% in 2000 to 3.6% by 2003. By 2008, the rate declined to 2.2% before increasing again to 2.9% in 2009 (National AIDS/STI Control Programme, 2010). In 2000, Tuberculosis among HIV-negative people in Ghana was 27%, but further decreased to 6.9% in 2012.

In Eastern Region, a total of 1774 case of TB were recorded in 2012 and out of which, 1,347 (75.9%) were tested for HIV (Annual Tuberculosis Report, 2013-Eastern Region). HIV Sero-Positivity rate among TB patients remained stable since 2011. The rate recorded for the year was (29.2%). However, Districts such as Lower Manya Krobo, Upper Manya Krobo and East Akim recorded rate above the regional average of 60%, 44% and 40% respectively. Out of the total HIV positive cases recorded, (78.1%) was put on Cotrimoxazole prophylaxis which is the first treatment drug given to TB patients who have tested HIV- positive. Cotrimoxazole prophylaxis to HIV patient's ranges from (100%) in the Akwapim North District to (16%) in the Yilo Krobo District. Five percent (5%) of the HIV positive cases was put on ART (Antiretroviral Therapy).

New Juaben Municipality recorded a total of 141 TB cases in 2012. The number of TB patients tested for HIV was 131 (92.9%). Out of which 35 (26.7%) were HIV positive and they were all put on Cotrimoxazole prophylaxis and three on ART.

The Lower Manya Krobo District recorded a total of 234 TB cases in 2012. The number of TB patients tested for HIV was 97 (84.2%). Out of which 119 (60.4%) were HIV positive and they were all on Cotrimoxazole prophylaxis and 55 on ART.

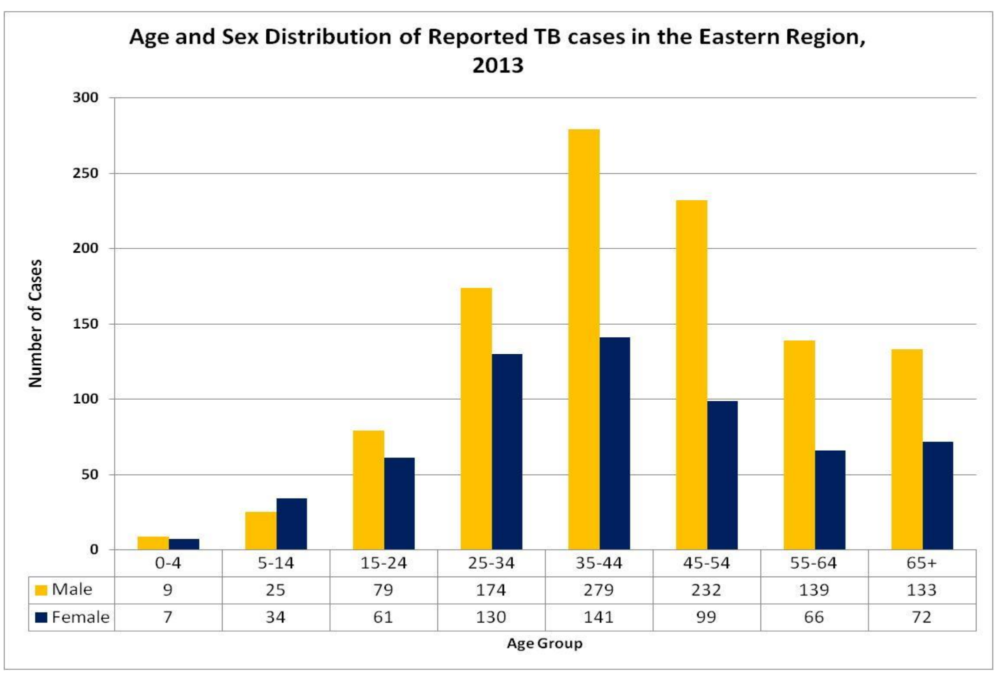
2.3.4 Age and Sex Distribution of TB Cases

Though Ghana's population comprises more females (51%) than males, there are more males TB cases notified to National Tuberculosis Control Programme than females. However, as low as 4% of notifying TB cases are children age below 15 years. According to the Technical Policy and Guidelines for HIV/TB collaborative report on Ghana, 60-70% of TB cases occur among persons in the reproductive age groups of 15-49 years. Persons in this age group engage in risky sexual behaviours (Awumbila et al., 2008) with higher likelihood of contracting HIV and also developing active TB (Christopher et al., 2010). Majority of TB cases seen in 2010 were in the age group of 15-44 years. This represents 52.8% of the total smear positive cases seen in the country. 3% of the total smear positive cases were under 15 years and 681 (64.9%) of smear positive cases were males because of their lifestyle such as smoking, drinking of alcoholic beverage, risky jobs and risky sexual behaviours.

The situation in the Eastern Region suggests that the most affected age group was people between the ages of 35-44 years representing 25% of the total cases recorded in 2013. Out of 1,680 TB cases registered in the Eastern Region, 1,070 (64%) were males and the remaining 610 (36%) were females. Out of the 25% total cases recorded in 2013, 279 were males and 141 were females. The next affected age group was people between the ages of 45-54 years which constitute about 20% and out of which, 232 were males and 99 were females.

The males are mostly affected because of their lifestyle such as smoking, drinking, etc. Most of them also engaged in risky jobs such as mining works, construction works etc. which exposes them to Mycobacterium TB. The graphs below show the breakdown of the TB cases as reported in the various age groups in the Eastern Region.

Fig 2.3: Age and Sex Distribution of TB Cases, Jan – December 2013, ER



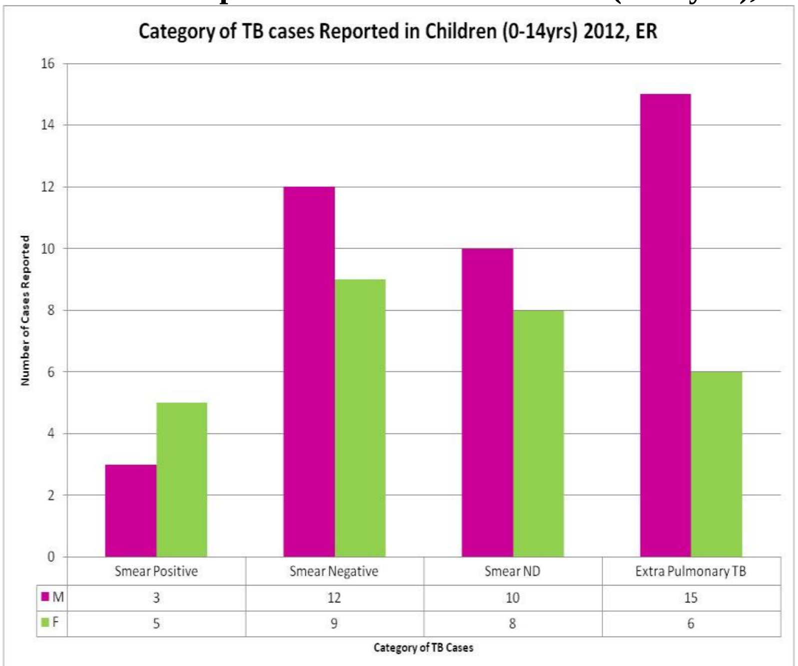
Source: TB Annual Report 2013- Eastern Region

2.3.5 TB in Children - Eastern Region Situation

Children between the ages of 0-14 years account for one-third of all Tuberculosis cases worldwide. However, the most common age of TB infection in children is between the ages of 1-4 years. Most cases of TB in children less than 15 years are Pulmonary TB (PTB) however, extra pulmonary TB (EPTB) is also common but presentation varies with age. Case notifications of childhood TB depend on the intensity of the epidemic, the age structure of the population, the available diagnostic tools, and the extent of routine contact tracing. A total of 68 cases of all forms of TB were reported in children less than 15 years, representing 4% of the total cases identified in the Eastern Region. This can be compared to the overall case notification of Tuberculosis in the country in 2011 where a total of 15,849 cases were reported and out of which, 876 were children less than 15 years representing 5.5% of total identified cases (Guidelines for Diagnosis and Management of TB in children, 2012). In 2013, Ghana again recorded a total of 783 cases of all forms of TB among children from the ages of 0-14 years representing 5.2% of the total cases notified (Global TB Report, 2014).

Out of the total cases registered in the Eastern Region, 8 (12%) was smeared positive, 21 (31%), smear negative, 21 (31%) extra pulmonary TB and 18 (26%) smear-sputum test not performed. Out of the smear positive cases registered, three (3) were males and five (5) were females. With the smear negative cases registered, twelve (12) were males and nine (9) were females. Smear sputum cases not performed, ten (10) were males and eight (8) were females. Lastly, the extra-pulmonary cases registered were made of fifteen (15) males and six (6) females.

Fig 2.4: Trend of Reported TB cases in Children (0-14 yrs.), 2012, E/R



Source: TB Annual Report 2012- Eastern Region

2.4 THE FIGHT AGAINST TUBERCULOSIS IN GHANA

Malaria, HIV/AIDS and Tuberculosis (TB) have been identified as a hindrance to development (Global Fund Africa, 2010) and thus resources have been committed in their management in the quest to reduce their impact on human development (Global Fund, 2011). Ghana has received over US$296 million since 2002 (Global Fund, 2011) but some public health policy interest groups have criticised the international community for the massive flow of resources into the management of these three diseases (CSIS, 2009). The need for some empirical justification for these resources has necessitated studies into these ill-health and their economic impacts on households and the economy in general. The country is not among the World Health Organization's (WHO) 22 high-burden tuberculosis (TB) countries, yet the disease is a major public health problem (USAID, 2003).

Studies have found that TB is gender sensitive: the burden of the disease is greater in women due to stigma and societal settings than on men, even though more men suffer TB worldwide than women (Somma et al, 2008, Meulemans et al, 2002, Hoa et al, 2004, Equi-TB, 2005)

An estimated 12,000 of the country's population are infected with Tuberculosis annually with an estimated 47.632 new TB cases in 2007, Ghana ranks 19th in Africa for the highest estimated number of new cases per year (WHO's Global TB Report, 2009).

WHO statistics indicate that progress in TB detection, treatment and management in the country lags behind the world average irrespective of the attainment of full coverage of TB treatment (DOTs) in major health facilities ten years ago and effective collaboration between donor agencies (WHO, USAID, Global Fund for TB and others), Government of Ghana (Ghana Health Service, National TB control Programme) and other NGOs. However, the quality of DOTs in public health facilities is still below expectations (USAID, 2009).

In Ghana TB contributes to a significant cause of adult morbidity and mortality (GHS, 2007), loss of workdays, and fall in household welfare due to impact of coping strategies. Among children, the illness causes irregular school attendance, poor academic performance, utility loss and stigma, loss of self-confidence, embarrassment and fear. The disease burden is more devastating on rural households where incomes are generally low. The number of TB affecting children and adult increased in 2009 (GNA, 2010).

Although significant progress has been made in reversing the TB epidemic, the global burden of TB remains large- in 2011, there were an estimated 8.7 million new cases and 1.4 million deaths associated with TB (WHO, 2012). Indonesian remains one of the countries with the highest number of TB deaths due partly to its large population of over 230 million. The country has made great strides in expanding TB control over the last few years, with significant assistance from donor, such as the Global Fund. The incidence rate of TB in the country has been falling slowly but has been almost completely offset by the increase population. The case detection rate has increased significantly from 56% in 2005 to 66% in 2010 and 70% in 2011 (USAID, 2013). The disease burden is more devastating mostly in the remote areas and among the urban poor. Multi-Drug Resistant (MDR-TB) prevalence varies significantly within Indonesian with the lowest rate in Jakarta Province (29) and the highest in Papua (2,738) (Riono &Farid, 2012). People who are infected are unable to work and the productivity of other members who look after them is also affected. Women are infected at least as much as men with 10 million Children been orphaned as a result of parental TB deaths (USAID, 2013).

2.5 CONCLUSION

This chapter looked at the Tuberculosis situation in the Eastern Region and the effort being made to combat the disease. The chapter was divided into four sections. The first section gave a brief background of the Eastern region. The second section focused on the National Tuberculosis Control Programme and the effort being made to fight Tuberculosis in Ghana. The next section also discussed the Tuberculosis situation in the Eastern region and the last section focused on the fight against Tuberculosis in Ghana.

CHAPTER THREE

LITERATURE REVIEW

3.0 INTRODUCTION

This chapter reviews the relevant literature on the topic under investigation. For the purpose of clarity, the chapter is divided into two sections. The first section takes a look at the theoretical literature in the area of demand for health care by the individual. This includes a presentation of the Grossman's Human Capital Model (Grossman, 2000) as well as Wagstaff's "Demand for Health: Theory and Applications" Wagstaff (1979).

The second section provides an empirical review of Tuberculosis (TB) studies which is presented systematically under a number of themes: effect of education on health, knowledge of Tuberculosis infection and control and Tuberculosis control inputs. Summary and conclusion of the study are also presented.

3.1 THEORETICAL LITERATURE

3.1.1 Demand for Medical Health Care

The theoretical literature on Demand for Medical Health care was borrowed extensively from the works of Wagstaff's "Demand for Health: Theory and Applications" Wagstaff (1979) and Grossman's Human Capital Model (Grossman, 2000).

According to Wagstaff demand for health theory, the individual is viewed as "demanding" a commodity "health". Health (or good health) is assumed to be desirable; it is assumed not to be the only desirable thing in life, nor valued above all else. There are various reasons why good health might be thought to be desirable; for it is in itself pleasant. Being in good health also permits one to engage in one's normal activities such as social activities, work and so on.

Every individual desires good health, but since one cannot acquire good health, he/ she demands health care to improve upon his/ her health. From this study every individual desire to be free from Tuberculosis but since the individual cannot acquire good health, he/she must demand TB treatment in order to improve upon his/her health. Thus, demand for health care is a derived demand from the demand for health. Every individual is born into this world with an initial level of health capital stock. But as time goes on, this health capital depreciates until this stock reaches a minimum level beyond which one dies. On the other hand, an individual can demand health care to build on the initial level of health capital, he is born with to live long (Grossman, 2000).

An individual is said to derive satisfaction just from the fact that he/she is healthy and health time period can be translated into labour hours which an individual can earn wages (Grossman, 2000). The study assumes that people free from TB would have enough time to work in the labour market and therefore translate their healthy time period into labour hours which can earn wages. Health care is then seen as a production function. The production function consists of inputs such as medical care, lifestyle, genetic factors, time for medication, education of the individual etc. (Grossman, 2000).

Early works specifying the relationship between education and health can be traced to Michael Grossman (1972) when he published the article "on the concept of Health Capital and the Demand for Health" and the book "The Demand for Health: A Theoretical Empirical Investigation".

In Wagstaff's demand for health theory, the health production function shows how much health can be obtained from a given quantity of health input for a given state of technical knowledge. However, technical knowledge is not constant over time, but changes in response to breakthroughs in medical science. As medical science progresses, our understanding of the health production process increases, which means more health ought to be produced per unit of health input than formerly. He further argues that one may presume therefore that the position of an individual's health production function will depend on his education since the better educated are in a better position to assimilate information about health matters from the mass media and their physician than the poorly educated. However, the better educated are better equipped to produce a healthy diet from a given outlay for food and also to digest information about possible health hazards in their workplace. The study presumes that better educated people are in a better position to be free from TB. However, if they are infected with the TB disease, they are in a better position to demand Orthodox anti-TB treatment drug since they are able to assimilate health information from the media and their physician than the poorly educated.

Grossman (2000), specified the relationship between stock of knowledge capital and health in a pure consumption model and then in a pure investment model. In the pure investment model, health becomes a commodity that is not valued per se, but only for its impact on health. However, the better educated people are more able to invest into their health stock than the poor educated because it is assumed that the better educated people have more information about their health. This enables them to convert health inputs easily into health output. Hence, the reduction of sick time has an immediate impact on wealth through the wage rate. He continued to argue that an increase in the stock of knowledge capital raises the efficiency of the health production process in the household sector. An increase in the stock of knowledge raises the marginal products of the health inputs used in the production of health in a given amount of gross investment.

The average cost of gross investment will fall as a result of the influence of the stock of human knowledge. Thus, an increase in this stock of knowledge raises the marginal product of the use of Orthodox anti-TB drugs in the fight against Tuberculosis.

Grossman (2000), uses years of formal schooling as a determinant of the stock of knowledge capital. Thus, the level of education is used as a proxy for stock of knowledge capital in this study. People who are educated are the efficient producers of health. The educated are also predicted to adopt healthy lifestyles such as eating a balanced diet, jogging, avoid smoking, living in a ventilated room etc. that will prevent them from getting sick. Even in times of illness, the educated will be predicted to get the best of medical care, i.e. they can combine medication effectively compared to the uneducated.

Wagstaff (1979) suggested that individual differences in levels of education may be associated with differences in the efficiency with which health inputs can be transformed into health. He argued that an increase in the state of technical knowledge results in a reduction in the utilization of health inputs but an increase in the demand for health. He argued that formal education and health education have a role to play, especially in preventive health policies. He further argued that the better educated are more efficient producers of health. People who are more educated will demand more health than the poorly educated, but the demand for health care decreases.

3.2 REVIEW OF EMPIRICAL LITERATURE

3.2.1 Effect of Education on Health

Education could improve health through at least the following channels: raising efficiency in health production (Production efficiency) Grossman (1972), changing inputs in health production (allocative efficiency) Grossman (2000), changing time preference (Fuchs, 1982), changing behavioural patterns e.g. smoking, obesity, preventive care (Huisman et al, 2005, Mackenback, et al. 2008); and finally, gaining more resources e.g. higher income, occupational status, better housing, better food, better quality of care, and living environment (i.e. Case and Deaton, 2005; Cutler, et al 2008).Grossman (1972) explores the productive efficiency role of education in a model where individuals produce health using health care and time as inputs in the production process. Therefore, in the production efficiency, an increase in education can lead to better health through the enhancement of an individual's skill to produce health. For example, individuals with higher levels of education tend to have a better understanding of their symptoms and have a better way of assimilating health information than individuals with lower levels of education. In this study it is assumed that higher level educated individuals are more likely to be efficient producers of health as they have increased knowledge about TB regarding its causes, spread, symptoms and prevention than the low educated people who are more to acquire TB infection. However, it is assumed further that individual TB patients with higher levels of education are more likely to seek medical care because they have better information access about TB compared to the low educated TB patients.

Models of allocative efficiency also consider multiple inputs to produce health and these inputs may also have an impact on individual well-being (utility). Individuals with higher levels of education will select a more efficient mix of inputs to produce a given output than an individual with lower levels of education. According to Pichu (2004), illiterates TB patients are more likely to delay medical treatment compared to patients with college and above educational status. This could be due to the fact that patients with college and above educational level have better information access about TB and are more likely to seek medical care from health facilities at an early stage of the disease. Also, studies by Wandwalo et al., (2000), in Tanzania have found that, in some communities, patients with low knowledge are more likely to visit traditional healers and Pharmacists rather than DOTS providers thereby delaying diagnosis. This is not a matter of the technology of production as in the notion of productive efficiency, but the mix of inputs selected, i.e. choices about how resources of time and money are used in the lives of individuals and families. Grossman (2005) points out that the model of allocative efficiency assumes that individuals with higher levels of education have more information about the true nature of the production of health. Deaton (2002) and Rosenzweig and Schultz (1982) argue that unless education affects the choice of inputs used in the production of health, it is not clear how education would reduce the marginal cost of producing health.

The production of health is also influenced by income, prices, and initial health endowments, among other factors that enter into the budget constraint. An important consideration is that the level of resources available to the household in all of its activities is affected by the stock of health. Studies have demonstrated a robust association between external constraints and patient delay for seeking TB treatment. Transportation costs (which are associated with distance between residence and DOTS clinics) account for variations in timing of diagnosis in Zambia. A study in China also found that financial difficulties more broadly account for delay in treatment. Patients are more likely to delay diagnosis when they need to borrow money to get health care services, not a member of a National Health Insurance Scheme or may lose daily income from work to attend DOTS clinics. Healthier people can work longer hours in a given week or more weeks in a year leading to higher earnings. Individuals who are free from Tuberculosis disease can work for longer hours in a given week or weeks in a year to earn higher incomes. Therefore, health is entered into the model as an outcome with feedbacks to income. The evident link between education and occupation is the increased access to work that does not compromise physical and mental health. However, higher levels of education lead to non-manual labour occupations where dangers to physical health through exposure to injury or dangerous chemicals are reduced since jobs that require much education and training are found in modern offices or clean environment free from injury or dangerous chemicals that can easily affect the health of the individual working in such an environment. An example of such dangerous occupation are miners who work in the mining industries where they are early exposed to dust and toxic chemicals that can affect their respiratory system to cause them developed the TB disease.

From the previous argument, it is established that higher education (or more years of formal schooling) is widely associated with better health, but the underlying causes of this association are unclear since in reality, mental capability and quality of school one attends also determine the amount of human capital one acquires as Grossman raises this issue. Formal education fosters intellectual ability, which in turn provides individuals with enduring competencies to support better health-related behaviours. Peters et al. (2010) conducted a study in Ghana, explaining the effect of education on health using data from a field study on formal education among 181 adults in rural Ghana. The authors found a relation between a health-protective behaviour and HIV/AIDS infection, a critical health issue in Ghana. Results showed that individuals with more education practiced more protective health behaviours. Brunello et al., (2011) investigated the contribution of health related behaviours to the education gradient, using an empirical approach that addresses the endogeneity of both education and behaviours in the health production function. The authors considered a multi country data set, which included twelve (12) European countries and has information on education, health and health behaviours for a sample of individual aged 50 and above. They focused on self-reported poor health as their health outcome and found that education has a protective role both for males and females. An additional year of education reduces self-reported poor health by 7.1% for females and by 3.1% for males. The study focused only on twelve (12) European countries and the results cannot be generalized to other countries.

Using nationwide compulsory schooling law changes as instruments for education, Oreopoulos (2006) found a statistically significant relationship between education and self-reported health in the UK and negative effect of education on physical and mental disability in the US. Using UK data, Silles (2009) found increased schooling cause more self-reported good health, lower probability of long-term illness, activity-limiting experience and work- preventing experience. It is assumed that individual with formal education is more likely to be efficient producers of health as he/she can take precautionary measure to prevent health problems. However, TB patients with a high level of education have better information access about TB and they are more likely to seek medical care from health facilities at an early stage of the disease.

Further, the effect of education on self-reported health was positively significant only among the cohorts of older women, whereas it was negative among cohorts' younger women and insignificant among men regardless of age. This because the older women demand more medical care due to the depreciation in their health stock compared to the younger women who demand less medical care because they have not advanced in age to experience that deterioration in their health stock. However, men postpone care-seeking because of fear of the individual costs of diagnosis and treatment and also they are more likely to neglect symptoms longer until it becomes serious. Clark and Roger (2010) found little evidence that additional schooling, improved health outcomes or changed health behaviours.

3.2.2 Knowledge of Tuberculosis (TB) Infection and Control

Lönnroth and Raviglione (2008) and WHO (2008) argued that Tuberculosis is a worldwide problem because every second a person is infected and every 10 seconds someone dies as a result of TB. However, in order to reduce the rate of transmission of TB among people, it is important they have knowledge of TB infection and control practices. Most studies about Tuberculosis knowledge, infection and control are found in the developing countries because of the prevalence of the disease and the fact that poverty situations are so high in these countries. In this direction, education regarding the epidemiology and specific precautions pertaining to the prevention of infectious diseases (example TB) are needed to eradicate or reduce the burden of the disease. Thus written policies for infection control and prevention should be available, updated and enforced policies on TB prevention.

Some studies identified the lack of TB knowledge as an important barrier to TB diagnosis and treatment of TB (Mushtaq et al, 2011, Malhotra et al, 2002). Varied misconceptions about the mode of transmission of TB abounds whereas the sources of TB information also vary depending on the geographical location and level of education among different settings (Buregyeya et al., 2010). A study found that the knowledge of the mode of TB transmission is smoking and alcohol consumption (Ganapathy et al, 2008), sharing eating and drinking utensils and sleeping with a TB patient (Mushtaq et al, 2011). However, Hatoluf Melkamu et al., (2013), conducted a study in Western Ethiopia assesses the determinants of Tuberculosis infection among adult HIV positives attending clinical care of two public health facilities in Nekemte, Western Ethiopia. In this study, being divorced or widowed, not attending formal education, being underweight, having a history of diabetes mellitus and being in advanced WHO clinical stage of HIV were factors associated with TB infection. Results showed that individuals who attend formal education are more likely to be efficient producers of health as they have higher awareness and can take precautionary measures to prevent health problems. They concluded that individuals who have no formal education were more likely to acquire TB infection than those who attend formal education. These findings confirm earlier studies by Donkor et al., (2006) and Taha et al., (2009). In a population-based survey among individuals with a cough for more than three weeks, limited knowledge of the causes, transmission modes, symptoms, and cured of TB were noted. This study also found higher level of education to be significantly related to seeking health care and hospital care for a cough (Hoa et al, 2003).

Studies have identified several factors that account for patient delay and health care service delay. There is no conclusive evidence on whether the quality or under-utilization of services accounts for a larger proportion of delay, but rather, numerous studies has found an association between patient delay and knowledge, awareness, stigma, external constraints and gender differences. The propensity to seek care depends on knowledge about and perceived risk of TB within reference groups (families, neighbourhood) and community at large. A number of studies have found a correlation between knowledge and delayed diagnosis. Knowledge was used as a proxy for education and includes the ability to recognize symptoms, identify causes and transmission routes and familiarity with the availability of the cure. Alvarez Gordillo et al., (2001), conducted a study in Chipas, Mexico to analyse the process of seeking Tuberculosis care. They argued that patients delay in seeking treatment due to problems the patients themselves had and the shortcomings in the care they received from the formal health care system. Results showed that patients with low knowledge about, symptoms are more likely to postpone care seeking and get tested. Similar studies in Nepal, India also found poor knowledge among older and marginalized groups with limited media access in Vietnam (Hoa N.P. et al.) Conversely, patients with higher educational levels are more likely to know the symptoms and seek care earlier. A study in India, however, suggested that knowledge was not sufficient to prompt people to seek care and that motivation was necessary, too.

Wandwalo and Morkve (2000), in their studies to investigate the delay Tuberculosis case finding and treatment in Mwana, Tanzania, found that, in some communities, patients with low knowledge are more likely to visit traditional healers and Pharmacists rather than DOTS providers, thereby delaying diagnosis. Although the literature does not analyse the reasons, preference for non-DOTS providers cannot be assumed to be the result of low knowledge; rather, it seems to be a common care-seeking practices based on familiarity and trust with non-DOTS health care providers.

Endalew Gebeyehu et al, (2014), also investigated the factors associated with delay in patients initiating treatment of Tuberculosis. A cross-sectional study was employed in Bahir Dar, Ethiopia where a semi-structured questionnaire was used to collect data from 360 patients. Multivariate logistic regression analysis was used to identify factors associated with patient delay in seeking TB treatment. In this study, patient delay was measured by considering the time from initial onset of sign and symptoms of the disease to first consultation of health care facility by the patient. According to WHO recommendations, TB patient must seek for medical care within 21 days of initial onset of signs and symptoms. The study, therefore, classified patients into two groups. Those who delayed treatment less than 21 days and those who delayed more than 21 days. A binary classification was used to identify factors related to patients delay.

Results showed that the most frequent reasons mentioned by those who sought treatment after 21 days were; thinking that the symptoms will disappear, financial problem, work overload, transport problems, health facility being too far, being afraid of a long process at a health facility, being severely ill and unable to reach the health facility, on traditional treatment and others. Analysis results of bivariate regression indicated that place of residence, educational status and occupation (Farmer and student) was statistically associated with patient delay. But only educational status remained statistically significant ($P < 0.05$) after controlling confounding effect with multivariate regression. In this study, illiterates' patients and patients with eight to twelve educational statuses are 3.73 times and 2.74 times more likely, delay when compared to patients with college and above educational status, respectively. This could be due to the fact that those patients with college and above educational level have better information access about TB and are more likely to seek medical care from health facilities at an early stage of the disease. They concluded that more than sixty percent of TB patients sought treatment after WHO recommended periods (21 days) and educational status was the predictor of patient delay. Therefore, provision of health education on TB should be strengthened to reduce patient delay.

Solliman et al., (2012) conducted a study from February 2009 to July 2009, in order to assess the knowledge towards Tuberculosis among people in North East Libya. A cross-sectional survey using a validated, self-administered questionnaires were designed for the study. The sampling frame was general public living in five cities (Benghazi, Almarj, Albayda, Darna and Tobruk) of North East Libya. It was found that mean knowledge scores were significantly higher for Libyans when compared with non-Libyans. Similarly, knowledge score was directly proportional to the level of education among study participants. Several other studies also showed a similar relationship between level of education and TB knowledge (Liam, 1999; Portero et al 2002; Abebe et al, 2010). Similar findings were reported from Iraq (Yousif et al, 2011) and North Ethiopia, where 89.3% and 86% of the study participants were aware of TB (Abebe et al, 2010), respectively.

The most problematic finding was the lack of knowledge about TB transmission among the study participants who were of the opinion that TB can be transmitted by sexual relation and cannot be transmitted by kissing the infected person or drinking raw milk. The extent of this misconception was higher in male study participants and those with lower levels of education and monthly income. They concluded that knowledge about TB within the population was not adequate. There were a number of gaps in the area of transmission, risk factors, diagnosis and prevention of Tuberculosis. Furthermore, these gaps were predominated in non-Libyans, and those with lower education and monthly income. The study reveals that the respondents get their information from the electronic media. The results are in contrast to that of Merkve (2000) who found no connection between knowledge about TB and completion of treatment. Numerous studies have proven that lack of knowledge is likely to prevent appropriate positive health care seeking behaviours. Like other chronic illness, appropriate knowledge towards Tuberculosis was significantly associated with positive health care seeking action (Hoa et al, 2003).

3.2.3 Tuberculosis control inputs

Tuberculosis (TB) is the most important cause of adult death after HIV/AIDS because of the single infectious agent (WHO Fact Sheet, 2014).According to World Health Organization (2014), it is estimated that 9 million people fell ill with TB in 2013 and 1.5

million died from the disease. Over 95% of TB deaths occur in low and middle-income countries (WHO Fact Sheet, 2014). TB control inputs include; treatment regime, Direct Observed Therapy, monitoring of TB patients during treatment, screening of TB patients, management of treatment interruption, the use of anti-TB drugs, education, TB programmes etc.

National TB treatment guidelines in 2007 and 2008 recommended six months TB treatment regimen for new smear-positive cases. Regimen-2 month intensive phase and regimen-4 months continuation phase with anti-TB drugs such as Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), and streptomycin (S) followed by 4 months of Rifampicin and Isoniazid (2SHRZ/4RH). TB care is provided free of charge by the Ministry of Health. Regional TB programs are divided into sectors, and each sector has a public health centre staffed by a specialist in TB care to offer treatment to TB patients via DOTs.

Ahorlu et al, (2013), conducted a descriptive study on the factors affecting Tuberculosis detection and treatment of the Sissala East District of Ghana where a semi-structured questionnaire was administered to 61 respondents. They argued that TB locally known as Kesibine was identified as a major problem in the District with most reported TB related distress as cough and chest pains. They concluded that case detection and treatment was hampered by lack of communication between sub-district facilities and district hospitals to aid laboratory diagnosis and therefore there is the need for vigorous health education to inform the people about the biomedical causes of TB and the availability of appropriate treatment for the disease at health facilities. They suggested that education should not aim at changing the “wrong belief” but focus on making people aware of the biomedical causes and see TB as treatable infection, which could be controlled. Similar findings were reported in previous studies by Zhou et al, (2012) and Hussein et al, (2012). The current study would want to consider the role of formal and informal education in Tuberculosis control.

Pichu (2004) investigated the effect of DOTS strategy and health education on knowledge of TB patients, a comparative study between pre and post phases of the DOTS programme with and without health education booklet. The study was conducted for newly diagnosed pulmonary TB patients admitted to a Military TB hospital in Birhar, Indian is using a random sampling to select two groups of 30 patients each of pulmonary TB taking DOTS therapy, i.e. control group consisting of patients taking DOTS only, while the intervention group consisted of pulmonary TB patients taking DOTS along with the use of the health education booklet. Results showed that patients in the control group (taking DOTS therapy only) had shown a marked increase in the knowledge about TB regarding its causes, spread and prevention, location and clinical features, side effects of drugs and complications. There was a significant improvement in the overall knowledge about the disease. Patients in the intervention group (taking DOTS therapy with use of the health education booklet) also showed a significant overall increase in the knowledge about TB, especially regarding causes, spread and prevention, side effects of drugs and complications of TB. There was no significant improvement in this group regarding predisposing factors, location and clinical features as well as early detection and screening of pulmonary TB.

However, the intervention group did not show any significant difference in increase in the knowledge about TB in the post-test knowledge when compared to the control group. Pichu (2004) concluded that though there was a significant improvement in post-test mean knowledge score in both groups, but health education material was not found to have any additional significant improvement in self-knowledge and awareness about TB.

Other researchers have also emphasized that, infection control practices of TB in health facilities are very low. A group of dental workers and nurses at the Jordanian University Teaching Centre were sampled and their views solicited. A questionnaire was used to gather data in this study. The data showed that, nurses and health workers in the Jordanian University Teaching Centre were knowledgeable about TB infection control. Results showed that all nurses and health workers reported higher frequency of washing hands after removing gloves than wearing them, but only 30% said they routinely use the mask (Qudeimat, Farrar&Owais, 2006). The outcome of this study was limited to the Jordanian University Teaching Centre and therefore cannot be generalized to other settings. Also, the sampled was not broad as it did not include medical doctors and laboratory staff who usually handle sputum of smear of patients. Findings showed that some healthcare workers do not use practice control measures of TB infection such as the use of masks.

A similar study by Steinberg et al, (2014) was conducted in the Berea District of Lesotho to assess the knowledge, attitudes and practices of healthcare workers regarding healthcare-associated TB infection and infection-controls. A cross-sectional study was performed and it involved health care workers at Maluti Adventist Hospital in Lesotho who were involved with patients and /or sputum. There were 337 workers at the Maluti Adventist Hospital, of whom 225 were directly involved with patients and /or sputum at the time of the study. A stratified sampling method was used to select 140 participants, of whom 129 took part. A self-administered, a semi - structured questionnaire was used. Results showed that 89.2% of the respondents had the appropriate knowledge of transmission, diagnosis and prevention of TB. However, only 22% of the respondents knew the appropriate method of sputum collection. A significant proportion of participants 36.4% reported poor infection control practices, with the majority of inappropriate practices being the administrative infection control. Only 38.8% of the participants reported to be using the appropriate N-95 respirator. In conclusion, poor infection control practices regarding occupational TB exposure were demonstrated, the worst being the first-line administrative infection controls. Critical knowledge gaps were identified; however, there was encouraging willingness of health care workers to adapt to recommended infection control measures. Healthcare workers are inevitably exposed to TB, due to frequent interaction with patients with undiagnosed and potentially contagious TB. Implementation of infection prevention and control practices is critical whenever there is a possibility of exposure. The researchers did not consider the role of education and practices of healthcare workers regarding occupational exposure of Pulmonary TB.

Other studies have explored the connection between qualification and experience of healthcare workers and knowledge of infection control measures. In a study involving nurses in the Super Speciality Teaching Institute in India, it was found that, the majority of nurses (73.1%) had adequate knowledge of TB infection control measures. However, nurses with higher professional qualification were found to have more knowledge of infection control measures than those with lower professional qualifications. But the number of years one had worked as a nurse (that is experienced) was not associated significantly with the level of knowledge of infection control measures. Specifically, nurses with over 10 years' experience demonstrated low knowledge of infection control measures than newly recruited nurse (Aarti et al, 2001). A probable reason was the fact that they considered themselves to have gained more experience and therefore feel reluctant to adopt TB infection control measures. This study also demonstrated the knowledge gap among staff in hospitals, despite their increasing exposure to TB patients in hospitals. Though the majority of nurses showed increased knowledge, about 30 percent (30%) did not have knowledge of TB infection control measures. Like other studies, this study sampled the views of nurses without considering other health professionals such as doctors, laboratory staff among others. The present study would consider the role of education in TB infection control.

Codjoe (2012) investigated the knowledge and practices of Tuberculosis Infection Prevention and Control among health workers in Tema General Hospital. A sample of Two hundred and twenty nine (229) health workers was randomly selected by the use of a questionnaire. Results showed that health workers had fairly good knowledge of Tuberculosis infection prevention and control. This was significantly influenced by participants' sex, current ward of work and job title, but not age and number of years of work. Practices used by the health workers were generally good and appropriate, especially regular hand washing hygiene, education of tuberculosis patients and use of information, education and communication materials. What was lacking was wearing of non-oil close filter efficiency that protects from inhaling infectious droplet nuclei and an oil aerosol mask or respirator with 94 percent filter efficiency that protects from inhaling infectious droplet nuclei when working in high risk tuberculosis areas, offering of surgical mask to tuberculosis suspects or cases when they are in the hospital and the separation of a group suspected to have tuberculosis from other patients.

It was concluded that health workers need to improve their knowledge on Tuberculosis infection prevention and control whilst stakeholders institute measures geared towards improvement of facility and logistic deficit. The study did not account for the role of formal and informal education in tuberculosis infection prevention control. The current study would consider the role of education in the prevention and control of Tuberculosis.

A study conducted by the Ghana Medical Journal in Shama Ahanta East Metropolitan District in the Western Region of Ghana to determine how the activities and attitudes of health professional exposes TB patients to stigmatization in the Community revealed that the stigmatization attached to TB disease prevents TB patients to seek medical care when suffering from TB as well as adhering to the prescribed treatment regimen. This paper concluded that there is the need for intensification of education on TB and regular organization of refresher courses and possibly retraining of health professionals in TB control and management. The current study would therefore consider the role of formal and informal education in TB control.

3.3 CONCLUSION

From the literature reviewed, many studies, both qualitative and quantitative have explored how Tuberculosis has become a major health problem worldwide and the need for education in TB control. This situation has prompted research into the area. However, a review of literature shows very few studies in the area of education on Tuberculosis control as most studies were using knowledge as a proxy for education. However, despite the increasing cases of TB in Africa and Ghana in particular, the majority of the studies were conducted in the Western countries, Asia and some part of Africa and therefore generalizing the findings might not help uncover the situation in Ghana.

Also, most of the studies were limited to TB infection and prevention knowledge, attitude and practice of healthcare workers regarding healthcare-associated TB infection and infection control. The effect of education on Tuberculosis control has not been covered in these studies.

The present study will fill the gap identified in the literature with emphasis on informal education. Because studies have shown that individual with formal education are more likely to be efficient producers of health as they have higher awareness and can take precautionary measures to prevent a health problem compared to those with informal education.

CHAPTER FOUR

METHODOLOGY

4.0 INTRODUCTION

This chapter deals with the methods that were adopted for the study. It covers the characteristics of the study areas, target population, sample size, data collected, sampling technique, data gathering tool, ethical consideration, theoretical framework, empirical methods of analysis using the Probit regression to examine the role of education on the use of Orthodox anti-TB drugs and the Poisson regression for examining the effect of education on the number of people in an infected TB household screened for Tuberculosis disease. The final section then enumerates some limitations of data collection.

4.1 OVERVIEW OF THE STUDY AREA

The Lower Manya Krobo Municipality is one of the twenty-six (26) Municipality and Districts of the Eastern Region of southern Ghana. The Municipality was carved out from the former Manya Krobo District in 2008 with its capital being Odumase Krobo. The Municipality covers an area of 1,476km, constituting about 8.1% of the total land area within the region (18,310 km). The major towns in the Municipality include Odumase township (which incorporates Atua, Agormanya and Nuaso), Akuse and Kpong in the Lower Manya area. The Municipality shares boundaries with the Upper Manya Krobo District to the north, to the south with Dangme West, to the West is Yilo Krobo Municipality and to the East with Asuogyaman District. There are twenty (20) health facilities in the Lower Manya Krobo Municipality. This is made up of two (2) Public Hospitals, one (1) Private Hospital, three (3) Health Centres, ten (10) CHPS, three (3)

Reproductive Health Care and one (1) Maternity Home (Modern Ghana Fact Sheet, 2014).

The New Juaben Municipality also falls within the Eastern Region of Ghana. The Municipality covers an area of 110 square kilometres constituting 0.57% of the total land area in the region. The Municipality shares boundary with the East Akim District on the North-East, Akwapim North on the East, Suhum Kraboa Coaltar on the West and South-East with Yilo Krobo District and Koforidua serves as the Regional Capital of the Eastern Region. The area has the highest concentration of health delivery facilities and services in the region. Apart from the Koforidua Regional Hospital, which is a regional referral hospital, the Municipality has two private hospitals, many CHPS Zones, Private Clinics and Maternity Homes (Modern Ghana Fact Sheet, 2014). These two Municipalities were selected based on the fact that, they are the leading areas in the Eastern region with the highest prevalence rate in Tuberculosis and HIV/AIDS because of the correlation that exit between HIV/AIDS and Tuberculosis disease. However, people with HIV/AIDS are more likely to be diagnosed of Tuberculosis because of the breakdown in their immune system. The study, therefore wants to ascertain whether the situation is so in the Lower Manya Krobo Municipality and New Juaben Municipality and the effect of education in the control of Tuberculosis in the two Municipalities.

4.2 TARGET POPULATION

The target population is the complete totality of all subjects (Polit & Hungler, 2003). The study target population involved Tuberculosis patients in the two case areas, namely; Lower Manya Krobo and New Juaben Municipalities comprising those who are seeking for clinical / traditional treatment and those who have completed their treatment course. This population provides a rich and broad data for analysis. It also helped the researcher to identify which category of TB patients lack knowledge of TB treatment and also challenges as a way of assessing the implementation of TB prevention and control strategies in the Eastern Region.

4.3 SAMPLE

Sample is the subset of the population under study. The sample in this study constituted TB patients in Lower Manya Krobo and New Juaben Municipalities. Yamane's (Israel, 2006) sample size calculation formula was used to determine the participants of the study. In addition, the study participants were selected based on the set criteria below;

- should have been diagnosed with TB or should have completed their treatment course at least one month at the time of the study and at most one year. Data on patient diagnosed and completed Tuberculosis treatment would be obtained from the health facilities in New Juaben and Lower Manya Krobo Municipalities.

- should demonstrate that they were willing to participate.

4.3.1 Sample Size Determination

Yamane's (Israel, 2006) formula was used to determine the sample size in this study. Determination of sample size was based on the estimated population size (N_1= 225, N_2=183). Where N_1 and N_2 represent the population of TB patients in the Lower Manya Krobo Municipality and New Juaben Municipality respectively who have registered with the health facilities. The formula is obtained below

$$n = \left(\frac{N}{1 + N(e)^2} \right)$$

n= The sample size

N= The population size

e= The desired level of precision or level of acceptable error = 0.05

Sample size (n_1) = [225/ 1+225 $(0.05)^2$]

= [225/1+0.5625]

= [225/1.5625]

= 144

Sample size (n_2) = [183/1+183 $(0.05)^2$]

= [183/ 1+0.4575]

= [183/1.4575]

= 126

Total sample size (n_1+n_2) = 144+ 126 = 270

Based on the above, the appropriate sample size for the study is 270. However, 126 questionnaires would be administered to TB patients in the New Juaben Municipality and 144 questionnaires to TB patients in the Lower Manya Krobo Municipality. To deal with uncompleted questionnaires and non-return of questionnaires, additional 10% (n=270) sample was added. Thus, the expected total sample size was 297.

4.4 SAMPLING TECHNIQUE

Purposive sampling technique was used. The Municipalities were chosen based on the disease prevalence, HIV/AIDS prevalence, accessibility, socioeconomic conditions, financial and time constraint with the help of the Regional TB coordinator. The Lower Manya Krobo Municipality has the highest Tuberculosis prevalence rate compared to the New Juaben Municipality because of the high incidence of HIV/AIDS in the Municipality. A total of 234 TB cases were recorded in Lower Manya Krobo Municipality in 2012 as compared to 141 cases in the New Juaben Municipality in the same year. The number of TB patients tested for HIV in Lower Manya Krobo was 97 (84.2%) as against 131 (92.9%) in the New Juaben Municipality. Out of 131 TB patients tested for HIV in the New Juaben Municipality, about 35 (26.7%) were HIV positive and they were all put on Cotrimoxazole Prophylaxis and 3 on ART.

However, out of 97 TB patients tested for HIV in the Lower Manya Krobo Municipality, about 119 (60.4%) were HIV positive and they were all put on Cotrimoxazole Prophylaxis and 55 on ART. HIV Sero-Positivity rate among TB patients in Eastern region remained stable since 2011. The rate recorded for the year was 29.2%. However, districts such as Upper Manya Krobo and East Akim recorded rate above the regional average of 44% and 40% respectively. Out of the total HIV positive cases recorded, 78.1% were put on Cotrimoxazole Prophylaxis which is the first treatment drug given to TB patients who have tested HIV-positive.

Socio-economic conditions were considered to help bring out clearly, the disease prevalence peculiar to different settings based on geographical location, education, occupation, religion, income, population and availability of health facilities. Persons diagnosed with TB were the unit of analysis because it was considered an important socioeconomic unit. After the TB patients have been identified through medical records, purposive sampling was applied to interview the respondents. Questionnaires were administered to patients as they report to health facilities / DOT centres for their monthly drugs rations. Some contact tracing were done to identify households for interviewing in both case areas.

4.5 DATA COLLECTION

Consistent with the objectives of the study by examining the effects of education on Tuberculosis treatment, facilities that managed TB in the Lower Manya Krobo and New Juaben Municipalities were visited to identify smear positive and smear negative TB patients who are self-identified and have been on treatment for at least one month or might have completed their treatment course at least one month and at most one year. Demographic characteristics, employment data, patient knowledge about Tuberculosis infection, information on TB treatment and health seeking behaviour of TB patients were collected for analysis. Information on the number of people in an infected TB household that have been screened and the educational level of the household head including other household characteristics was collected to aid in the estimation of the number of a TB patient screened within a household as a preventive measure.

4.6 DATA GATHERING TOOL

Questionnaires and interviewing were the major tools for data collection. Structured questionnaires were administered face-to-face to TB patients and their treatment supporters (relatives) to elicit information on patient demographic data, knowledge about Tuberculosis infection, treatment of Tuberculosis and access to health care. Facility administrators, the regional TB coordinator and TB coordinators in participating facilities were interviewed and information on the treatment and prevention of TB to the health facilities extracted.

4.7 ETHICAL CONSIDERATION

Ethical clearance was obtained from the Institute of Statistical, Social and Economic Research (ISSER) with the code number (ECH 034/14-15). Written informed consent was also sought from participants prior to administration of the questionnaire. Tuberculosis patients were ensured of confidentiality of the nature of data that was collected, right to withdraw from the study at any time and the fact that refusal to participate and withdrawal would not affect the individual in any way. Anonymity was assured by not requesting the names of participants, but rather the use of codes (numbers). The participants were assured of their protection and the information received was not exposed to others with the exception of the principal investigator and supervisors of the study.

4.8 THEORETICAL FRAMEWORK

The theoretical framework was extensively borrowed from the works of Michael Grossman (2000). According to Grossman (2000), every individual desire good health, but since one cannot acquire good health; he demands health care to improve upon his health because of the depreciation in health stock. Health can be regarded as consumption good and or a capital good. Health as a consumption good implies that one derives utility from the fact that he/she is in good health. An individual in good health is very happy implying that there is no depression, which reduces one's level of utility. Health as a capital good implies that health is an input in producing other goods. A healthy individual can involve himself in a productive activity in the labour market and earn a salary.

In this study, being in good health implies that one is free from Tuberculosis. Being free from TB implies that a worker can spend more days at work and increase productivity. Thus, health can be expressed as a production function. Health can be expressed as a function of variable inputs such as medical care, balanced diet, education, income etc.

A modified version of Grossman's (2000) Human Capital Model is applied in this study to help model the demand for Tuberculosis treatment.

The following presents Grossman's Model;

Let the inter-temporal utility function of a typical consumer be

$U = U(\Theta_t, H_t, Z_t)$.................... (1) $t = 0,1,2.........., n$

Where

H_t = the stock of health at age t,

Θ_t = the service flow per unit stock,

$\Theta_t H_t$ = total consumption of health services

Z_t = consumption of other commodities

According to Grossman (2000), an individual derives utility from consumption of health services and other goods. An individual always has an initial stock of health (Ho as he/she arrives into this world, but the stock of health at any other age is endogenous). The stock of health at any age is endogenous since it depends on how young or old an individual is. It is assumed that older people invest more into their health stock than the younger people because of the depreciation in their health stock. The length of life of any individual is also endogenous because it depends on how an individual invest into his/her health stock. Death takes place only when $Ht \leq Hmin$ where Ht is the current health stock of the individual and Hmm is the initial health stock. Therefore, the length of life is determined by the quantities of health capital that maximize utility subject to production and resource constraints.

Net Investment in Health = Gross Investment - Depreciation

$H_{t+1} - Ht = I_t - \delta t H_t$ ………………… (2)

Where;

$H_{t+1} - H_t$ = net investment in health

I_t = gross investment

δt = rate of depreciation (exogenous)

Thus, consumer's investment in TB treatment is a function of the following;

$I_t = I_t (M_t, T_{Ht,} E)$.......................... (3)

$Z_t = Z_t (Xt, T_t, E)$........................... (4)

Where: M_t = vector of inputs purchased in the market that contribute to gross investment in health.

I_t = household health investment function

Z_t = household production function for the other goods

X_t = vector of inputs that contribute to the production of good Zt

E = consumer's stock of knowledge or human capital exclusion of health capital

T_{Ht} = time inputs in the investment of health by the individual

T_t = time inputs in the production of other goods by the individual

The inclusion of a time constraint in the model requires that Ω, the total amount of time available in any period must be exhausted in any possible uses, thus;

$T_{Wt} + T_{Ht} + T_t + T_{Lt} = \Omega$.............................. (5)

Where Ω= total time available to the individual

T_{Wt} = hours of work

T_{Lt} = time lost due to sickness

T_t = time inputs in the production of other goods by the individual

T_{Ht} = time inputs in the production of health by the individual

The budget constraint for the individual must equate his/her discounted lifetime expenditure on medical and other good inputs (M_t and X_t) and the individual's lifetime income plus the initial wealth assets. Grossman (2000) combines the expenditure and income flows of the individual and his/her time constraint to formulate the budget constraint. The individual's healthy time is the total amount of time available to the individual (Ω) (i.e. $T_{Lt} = 0$) to engage in the labour market and buy other goods.

Thus, the individual's budget constraint can be stated as;

$$\sum_{t=0}^{n} \frac{P_t M_t + Q_t X_t}{(1+r)^t} = \sum_{t=0}^{n} \frac{W_t \Omega}{(1+r)^t} + A_0 \qquad (6)$$

Where P_t = Price of medical inputs

X_t= other goods

Q_t = prices of other inputs

W_t = hourly wage rate

M_t = medical goods

r = the market interest rate

A_0 =initial assets

The left hand side of the equation (6) represents the individual's discounted lifetime expenditure whilst the right hand side represents the individual's discounted lifetime income plus his/her initial wealth. The individuals discounted lifetime expenditure is the sum of health goods (Tuberculosis treatment inputs) and other goods demanded. This implies that as the individual demand more health good (Tuberculosis treatment inputs), the demand for other goods inputs falls and vice versa. On the other hand, the discounted life time income implies that, as the individual demand more health inputs because of ill-health (sick of Tuberculosis); the person's participation in the labour market will fall. This means that he/she will spend few days at work and decrease productivity hence leading to a fall in wage. But being free from TB implies that the individual can involve in a productive activity in the labour market and earn a salary. There is therefore a positive relationship between being in good health and participation in the labour market.

Equilibrium Conditions

First –order optimality conditions for gross investment in period t=1 are;

$$\frac{\Pi_{t=1}}{(1+r)^{t=1}} = \frac{W_t G_t}{(1+r)^t} + \frac{(1-\delta t)\, W_{t+1}\, G_{t+1}}{(1+r)^{t+1}} + \ldots\ldots + \frac{(1-\delta t)\ldots\ldots (1-\delta_{n-1}) W_n\, G_n}{(1+r)^n} + \frac{Uh_t\, Gt}{\lambda} + \ldots$$

$$(1-\delta t)\ldots\ldots\ldots\ldots (1-\delta n\text{-}1)\frac{Uhn\ Gn}{\lambda} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

$$\Pi_t\text{-}1 = \frac{P_{t-1}}{\eth I_{t-1} / \eth M_{t-1}} = \frac{W_{t-1}}{\eth I_{t-1} / T_{Ht-1}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

The new symbols in these equations are; Uht = ðu/ ðht, the marginal utility of healthy time; λ, the marginal utility of wealth; Gt = $\eth h_t / \eth H_t = -\,(\eth TL_t \;/\; \eth H_t)$, the marginal product of the stock of health in the production of health time, and Πt_{-1}, the marginal cost of gross investment in health in period t-1. Equation (9) states that the present value of the marginal cost of gross investment in health in period t=1 must be equal to the present value of marginal benefits. Discounted marginal benefit at age t

$$Gt\left[\frac{W_t}{(1+r)^t} + \frac{Uh_t}{\lambda}\right]$$

Where Gt is the marginal product of health capital

Some assumption of this model includes;

* Stock of knowledge is assumed to be exogenous

*Increase in knowledge capital raises the efficiency of the production process in the non-market or household sector.

*All production functions are assumed to be linearly homogeneous in the endogenous market goods and own time inputs.

*It is further assumed that the marginal utility of healthy time is zero, which implies that utility of time does not enter directly into the utility function of the individual hence health becomes a purely investment good.

The individual focuses on investing in health care such that his marginal monetary rate of returns from the investment is equal to the opportunity cost of the investment. The individual's main objective is to maximize utility subject to the constraint specified in equation (3) and (). Thus, demand for health care is a derived demand.

4.9 EMPIRICAL METHODS OF ANALYSIS

The study adopted the Probit Model to examine the role of education on the use of Orthodox anti- TB drugs by TB patients and the Poisson regression to examine the effect of education on the number of people in an infected TB household screened for Tuberculosis disease.

4.9.1 Tuberculosis Treatment by Household

In determining the Tuberculosis treatment by household, the Probit Model was used to ascertain whether patients are using the Orthodox anti-TB drugs or otherwise. However, there are some TB patients who are on other treatment methods. This model is based on the assumption that the occurrence of y, the binary outcome (also known as the response probability) depends on a latent y*; which is determined by some explanatory variables. In this study, the treatment of Tuberculosis is regarded as a form of medical care.

Grossman (2000) uses the following demand curve for his empirical analysis of the demand for health care. This demand curve is adopted with some modification in this study to model the demand for TB treatment.

Specification of the Probit Regression Model

The probit model assumes that while we only observe the values of 0 and 1 for the variable Y, there is a latent,, unobserved continuous variable Y* that determines the value of Y. We assume that Y* can be specified as follows:

$$Y_i^* = \beta 0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki} + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Therefore,

$$M_i^* = \beta 0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki} + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

and that:

$M_i = 1$ if $M.^* > 0$

$M_i = 0$ otherwise

Where M_i= TB medical care, x_1, $x_{2,}\ldots$ x_k represent vectors of random variables, and u represents a random disturbance term.

Grossman argues that since years of formal schooling is the most important determinant of the stock of human capital, it is therefore employed as a proxy for the stock of human capital. In reality, mental capability and quality of school one attends is also a factor in determining the amount of human capital one acquires as Grossman raises this issue. These factors are assumed to be holding constant to prevent any sophistication of the model. Grossman (2000) estimating equation can be modified by introducing some variables and assuming that the dependent variable has a binary outcome. Thus, equation (1) is assumed to have a cumulative density function yielding a probit model.

The dependent variable now becomes a probability of seeking medical care or not. Now from equation (7) the estimating equation now becomes

$$Pr\ (M=1) = \beta_0 + \beta_1 Reli + \beta_2 Nd + \beta_3 Hh + \beta_4 Hinfo + \beta_5 X + \beta_6 Nhis + \beta_7 Loc + U \ldots\ldots\ldots\ldots (8)$$

M=1 if the consumer uses medical care in the form of Orthodox anti-TB drugs and M=0 if otherwise, "Reli" refers to religious affiliation of the individual, "Nd" refers to number of dependents on a TB patient in a household, "Hh" is a dummy variable which refers to whether the individual is the household head, "Hinfo" is dummy variable showing whether the individual has heard about any message regarding TB prevention and treatment from informal sources, "Nhis" is a dummy variable which refer to whether the individual is a member of the National Health Insurance Scheme, "Loc" refers to the location of TB patients and "X" is a vector of individual characteristics including; age, sex, and education. Where X_1= age, X_2= sex, X_3= education.

The following variables Hh, Nhis, and X_2 are dummies and they are defined as follows; Hh =1 if yes, 0 if otherwise, Nhis = 1 if yes, 0 if otherwise and X_2 = 1 if female, 0 if otherwise. The variables in the equation (6) are excluded from this model since they are unavailable in the dataset to be used in the estimation.

In this study, the dependent variable is a binary and the outcome depends on a latent y*; which is determined by some explanatory variables. Thus, if y* is positive, then the observed binary outcome is y = 1. On the other hand, if y* is negative, then it implies the observed binary outcome y = 0 (Jones, 2005). In this study, the observed binary outcome is the use of Orthodox anti- TB drugs by TB patients (1 if TB patients use the Orthodox anti- TB drugs and 0 otherwise). It will be inappropriate to use a linear probability model in this instance. Applying OLS to such models will yield negative conditional probabilities which cannot be used for any meaningful economic analysis. According to Wooldridge (2000) linear probability models are difficult to interpret. Linear probability models also give rise to non- normality of the disturbance term. Also, the variance of the error term in a linear probability model is heteroscedastic. These features render the linear probability model unfit to model the use of Orthodox anti-TB drugs by TB patients.

The latent variable y* is modelled as a linear regression function of the explanatory variables and is assumed to satisfy the classical linear model assumptions (Wooldridge, 2000). The estimation of the probit model is usually done using, maximum likelihood estimation because it produces efficient estimator which is consistent and normally distributed in large samples. Mathematically, let

$y^{*}= \beta_0+ XB+ e$........................(9)

Thus $y=1$ if $y^{*}>1$ and $y=0$ if $y^{*}\leq 0$

Where X is a vector of individual TB patients characteristics such as age of the TB patient in a household, educational level of the TB patient in a household, knowledge about TB, sex of the TB patient in a household, number of household members, number of household members screened for TB, household head, marital status, occupational status, residence, religion of the individuals in a household, e is the disturbance term which satisfies the normality assumption and β is a set of parameters.

From equation (9), the response probability for y according to Wooldridge (2000) can be derived as follows;

$P(y=1/X) = P(y^*>0/X) = P\ [e> - (\beta_0 + XB/X] = 1 - G\ [-\beta_0 + XB)] = G\ (\beta_0 + XB)$.......... (10)

Where G is a cumulative distribution function. The Probit Model helps to explain the effect of the explanatory variables on the responses probability P (y=1/X). The partial effect of a continuous explanatory variable on the dependent variable, holding all other variables constant, has the same sign as the estimated parameter β using calculus (Wooldridge, 2000). The partial effect of a binary explanatory variable when X_i change from zero to one holding all others constant, is found by estimating the function below to obtain the magnitude of change (Wooldridge, 2000) .

$G\ (\beta 0+\beta_1 X_1+\beta_2 X_2+............+ \beta_k X_t) - G\ (\beta 0+\beta_2 X_2+...........+\beta_k X_t)$..................... (11)

In practice, marginal effects are computed to investigate the effects of the explanatory variables on the dependent variable. Because it produces efficient (minimum) variance estimators in regression with binary dependent variable.

4.9.2 Prevention of Tuberculosis

The next estimating equation examines the role of education on the number of household members screened for the TB disease as a way of preventing Tuberculosis. A count model will be used to model the relationship between the number of household members screened and the educational level of the household heads including other households characteristics. This method is preferred to determine the number of household members screened since the outcome may be skewed towards many households not screened. Thus, the use of a probit model may not be appropriate, because it requires an equal distribution between the two binary outcomes.

$Pr (N= 0, 1, 2....., n) = \beta_0+\beta_1 Hhedu+\beta_2 Hinfo+ \beta_3 Hs+ \beta_4 Sexhh$
$+\beta_5 Numhis+\beta_6 Loc+U$........... (12)

Where “N” refers to the number of household members screened of TB disease, Hheduc refers to the educational level of household head; “Hinfo” is a dummy variables showing whether the individual has heard about any message regarding TB prevention and treatment from informal sources, “Hs” refers to the household size, “Sexhh” is a dummy variable showing the sex of the household head,” Numhis” refers to the number of household members covered by NHIS and “Loc” refers to the location of TB patient.

Equation (12) helps us to know the role education plays in determining the number of household members screened. Effective control of the disease will require that every infected household member screened.

Wooldridge (2000) argues that a linear model might not provide the best fit overall values of the explanatory variables. The Poisson regression model is used for the estimation. This model deals with cases where y takes on relative few values, including zero. Examples include the number of children, ever born to a woman, the number of times someone is arrested in a year (Wooldridge, 2000). The main aim is to explain the distribution of y_i or the expected value of y_i, given a set of characteristics, x_i. Thus “N” is regarded as a count variable, meaning it can take on non-negative values; 0, 1, 2, etc.

Since "N" can take on the value of 0 meaning members in a household not screened for TB, we cannot take the logarithm of "N". Thus, Wooldridge (2000) argues that a beneficial approach is to model the expected value of "N" as an exponential function thereby adopting a Poisson regression model.

Specification of the Poisson Regression Model

Let us assume the expected value of y_i given x_i is shown by

$$E\,(y_i / x_i) = \exp\,(X'\beta)$$

$$E(y/X_1, X_2........X_k) = \exp\,(\beta_0 + \beta_1 Hhedu + \beta_2 + Hinfo + \beta_3 Hs + \beta_4 Sexhh + \beta_5 Numhis$$

$$+ \beta_6 Loc + U \text{ .... } (13)$$

Where β is a set of unknown parameters. Since y_i is non-negative, we have to choose a functional form that produces non-negative conditional expectations. The above assumption relates the expected outcome of y_i to the individual characteristics in x_k, but does not fully describe the distribution. Since equation (13) is non-linear in its parameters, we rely on a maximum likelihood regression technique known as the quasi-maximum likelihood estimation.

Since count variables do not have a normal distribution and it takes on very few values, an assumption can be made that given x_i, y_i has a Poisson distribution with expectation λ_i=exp $(X_i\beta)$. We are interested in the effect of explanatory variables on y_i, thus we examine the Poisson distribution conditional on x. This implies that the probability mass function of y_i being equal to the value h (as in equation 14) conditional upon X_i is given by

$$P(y_i = h / x_i) = \frac{e^{-\lambda} \lambda_i^{y}}{h!} \quad h = 0, 1, 2 \ldots\ldots\ldots\ldots\ldots \ldots\ldots\ldots (14)$$

Where h! denotes factorial. This distribution is the basis for the Poisson regression model and it allows us to find the conditional probability for any values of the explanatory variables (Wooldridge, 2000). Substituting the appropriate functional form for the λ_i produces expressions for the probabilities that can be used to construct the log likelihood function for this model. Assuming that observations on different individuals are mutually independent, estimation of β can be done through the maximization of the log likelihood function. This function is the sum of the appropriate log probabilities, interpreted as a function of β. The log likelihood function is stated below.

$$L(\beta) = \sum_{i=1}^{n} (y_i x_i\beta - e^{x_i\beta})$$

If the Poisson distribution is correct, and assuming we have a random sample of y_i and x_i maximizing the log-likelihood function produces a consistent, asymptotically efficient and asymptotically normal estimation for β (Wooldridge, 2000). The standard errors of the Poisson estimates β_j are easy to obtain after the log likelihood function has been maximized. An important drawback of the Poisson distribution is that it automatically implies that the conditional variance of y_i is also equal to λ_i. Additionally, we assume that

$$Var(y_i / x_i) = e^{(xi\beta)}$$

This condition is referred to as equidispersion and it illustrates the restrictive nature of the Poisson distribution. In many applications, the equality of the conditional mean and variance of the distribution has been shown to be restrictive (Wooldridge, 2000). Most count distributions do not make this assumption. It is possible to estimate the conditional mean in equation (12) consistently without specifying the conditional distribution as in equation (13). In fact, the Poisson regression model is able to do so even if the Poisson distribution is invalid. This is because the first order conditions of the maximum likelihood estimation are valid more generally, so that we can obtain a consistent estimator without assuming the Poisson distribution to be correct, the analysis is known as Quasi-Maximum Likelihood Estimator (QMLE). However, unless the Poisson variance-expected value equality holds, the standard errors need to be adjusted. A sample adjustment to the standard error is available when we assume the variance is proportional to the mean (Wooldridge, 2000).

$\mathrm{Var}\,(y_i / x_i) = \delta^2 e^{(xi\beta)}$,

where $\delta^2>0$ is an unknown parameter. When $\delta^2=1$, we obtain the Poisson variance assumption. When $\delta^2>1$, the variance is greater than the mean for all x_i this is called over dispersion because the variance is larger than in the Poisson case, and it is observed in many applications of count regression (Wooldridge,2000). The situation where $\delta^2<1$ is called under dispersion. Despite its robustness, a disadvantage of the quasi-maximum likelihood approach is that it does not allow us to compute conditional probabilities as in equation (13) above. All we impose and estimate is equation (12). Thus, it is not possible to determine the probability that $y_i = h$ conditional upon x_i, unless we are willing to make additional assumptions.

One alternative is the application of a full maximum likelihood analysis of the widely used Negative Binomial distribution (NegBin) I model of Cameron and Trivedi (2005) especially in cases of over dispersion. NegBin I is a special case of the negative binomial distribution. It is imposed that

$Var (yi / xi) = (1+\delta^2)\, e^{(xi\beta)}$

for some $\delta^2 > 0$ to be estimated. As a result, the NegBin I models allow for over dispersion. The NegBin I maximum likelihood estimators are consistent only if the assumption above holds. Also, the estimators do not have the robustness property of the quasi-maximum likelihood estimators of the Poisson model. If the assumption above holds, the NegBin I estimates are more efficient than the Poisson estimates. In Statistical Packages, NegBin I model is a special case of a generalized Linear Model. Another variant of the negative binomial distribution is the NegBin II model. This model also imposes

$Var (yi / xi) = (1+\alpha^2 e^{(xi\beta)})\, e^{(xi\beta)}$

for some $\alpha^2 > 0$, where the amount of over dispersion is increasing with the conditional mean

E (yi / xi) =exp(x'β). In many software packages, the NegBin II model is generally referred to as 'negative binomial model'. The NegBin II model allows the variance to exceed the mean.

For this study, the NegBin II model was used. This model is most widely used in applied work. The maximum likelihood estimator for the NegBin II model is robust to conditional misspecification. The NegBin II maximum likelihood estimators are consistent for β if the conditional mean is correctly specified. The associated maximum likelihood standard errors, however, will only be correct if the distribution is also correctly specified (Cameron and Trivedi, 1997). According to Cameron and Trivedi (1997), it has the flexibility necessary for providing a good fit to many types of count data in empirical situation. Even though the negative binomial model will be used, a test of the Poisson distribution will be carried out by testing $\delta^2=0$ or $\alpha^2=0$ using a Wald or the likelihood ratio test. Rejection is an indication of over dispersion.

4.9.3 Interpretation of Count Data Models

The easiest way to interpret the coefficients in count data models is through the conditional expectation in equation (7). Assuming X_{ik} is a continuous explanatory variable, the impact of a marginal change in X_{ik} upon the expected value of yi (keeping all other variables constant) is given by;

$$\frac{\partial E(yi / xi)}{\partial Xi_k} = e(x'_i\beta)\,\beta_k,$$

which has the same sign as the coefficient βk? The exact response depends upon the values of xi through the conditional expectation of yi. A more attractive approach is to convert this response into semi-elasticity (Wooldridge, 2000).

$$\text{Computing } \beta k = \frac{\partial E(yi / xi)}{\partial X_{it}} \frac{1}{E(y_i / x_i)}$$

Provides the relative change in the conditional mean, if the k-the regressor changes by one unit all things being equal. For a discrete variable, the above methods may not be appropriate. For a binary variable X_{ik} that only take the values 0 and 1, we can compare the conditional means of yi, given $X_{ik} = 0$ given $X_{ik} = 1$, keeping the other variables in x_i fixed. We can easily verify that

$$\frac{E(y_i / x_i^*)}{E(y_i / x_{ik} = 0\ x_i^*)} = e^{\beta_k},$$

Where X_i^* denotes the vector x_i of independent variables. Thus, the conditional mean is e^{β_k} times larger if the binary indicator is equal to one rather than zero, irrespective of the values of the other explanatory variables (Wooldridge, 2000). For small values of β_k, we have $e^{\beta_k} \approx 1+\beta_k$. For example, a value of $\beta_k = 0.09$ indicates that the expected value of y_i increases by approximately 9% if the independent variable changes from 0 to 1. For negative binomial models, we can compute the incidence rate ratio (IRR) which shows the rate of occurrence of the dependent variables given the occurrence of one explanatory variable holding all other factors constant. Thus, the IRR will be employed in this study.

►Description of variables

This section describes both the dependent and independent variables used in the two estimations. The dependent variables are as follows:

Mode 1:

The dependent variable as stated already is whether the individual uses Orthodox anti-TB drug or not in a household as a form of medical care. This is a dummy variable with a value of 1 meaning the individual is on Orthodox anti-TB drug treatment and 0 otherwise.

Model 2

The dependent variable in the second model is the number of household members screened for TB. This is a continuous variable.

The independent variables used in the models are explained below:

Educational Attainment of TB patient in a Household:

This refers to the level of education completed by an individual in a household. It is a series of dummy variables describing whether the individual has no education, completed primary education or has attained secondary/higher education. This variable is expected to have a positive effect on the use of Orthodox anti-TB drug by households. The variable was chosen in order to ascertain the effect of education on the use of Orthodox anti-TB drugs.

Household Head

This is also a binary variable indicating whether the individual is the household head or not. The value of 1 implies yes and 0 implies otherwise. It is expected to have a positive or negative effect on the use of Orthodox anti-TB drug in a household. The variable was chosen to determine whether household heads with the TB disease or otherwise use Orthodox anti-TB drugs or not.

Household knowledge about TB:

This is a number of dummy variables showing whether the household has heard any information regarding TB from informal sources such as radio, TV, internet, community-based education, health provider, newspapers, etc. These variables are also expected to have a positive or negative influence on the use of Orthodox anti-TB drug by a TB patient or the number of household members screened. The inclusion of the variable was to ascertain the link between informal sources of education and the use of Orthodox anti-TB drugs by a TB patient or household members screened for the TB disease.

The number of TB patient in a Household covered by Health Insurance

This is also a binary variable indicating the number of TB patients in a household covered by the National Health Insurance Scheme (NHIS) in Ghana. The variable is expected to have a positive influence on the use of Orthodox anti-TB drug in a household. The variable was chosen to determine how the screening of household members is influenced by the number of TB patients covered by NHIS.

Religious Affiliation of TB patient in a Household

This is also a number of dummy variables showing whether the individual in the household is a Catholic, Anglican/Methodist/Presbyterian, Pentecostal/Charismatic, Traditional/Spiritual, Muslim and others and how it can influence the use of Orthodox anti-TB drugs. These variables are expected to have a positive or negative influence on the use of Orthodox anti-TB drug in a household.

Residence / Location of a Household

This is also a binary variable indicating whether the household is located in an urban or rural area. This variable with the value of 1 implies household in an urban area and 0 implies household in a rural area. It is hypothesized that household in the urban would tend to care more about their health since they may have access to information than those in the rural area. The variable was chosen to identify how residence of a TB patient influences his or her decision to demand for Orthodox anti-TB drugs.

Household size

This is also a number of categorical dummies showing the number of people living in a household. The variable was chosen to ascertain whether a TB patient in a larger or smaller household influences the screening of household members for Tuberculosis. The sign is expected to be positive or negative.

Number of dependents

This is also a number of categorical dummies showing the number of people depending on other members in a household. The variable was chosen to find out how the number of dependents on a TB patient can influence his or her decision to seek medical treatment in the form of Orthodox anti-TB drug. The sign is expected to be positive.

Age of TB patient in a Household

This refers to a continuous variable measuring the number of years attained by the individual in a household. Grossman (2000) argues that as one ages, his rate of depreciation increases, thus it may inform his decision to seek medical care. In relation to this study, the influence of the household head's age on another individual cannot be determined prior. It is expected to have a positive or negative influence on the use of Orthodox anti-TB drug as a form of medical care by households.

Sex of TB patient in a Household

This is a binary variable indicating whether the individual in the household is a male or female. The variable was included in order to ascertain which category of TB patients seeks medical care in the form of using the Orthodox anti-TB drugs. This variable with the value of 1 implies male and 0 implies female.

4.10 LIMITATION

Data for this study was gathered with a self-report questionnaire which has its own weakness such as proneness to social desirability and issues of participant dishonesty. Furthermore, the study concentrated on Tuberculosis patients in Lower Manya Krobo and New Juaben Municipality, which resulted in a small sample population. The researcher has to employ fifteen (15) DOTs nurses from the Lower Manya Krobo Municipality to assist and facilitate the data collection process because the TB patients do not come to the DOTs centre everyday but they only come when their drugs are finished. Therefore, there was the need for contact tracing of the TB patients. These resulted in some cost because the researcher has to give the field attendants (DOTs nurses) some money for transport and airtime to call the TB patients of their coming. It was a big limitation of the study because the researcher was faced with some financial difficulties. The same challenged was also experienced in the New Juaben Municipality. Consequently findings cannot be generalized to TB patients in other Districts and Municipality in the Eastern Region.

CHAPTER FIVE

RESULTS AND DISCUSSION OF DATA/ ANALYSIS

5.0 INTRODUCTION

This chapter presents the results and analysis of data pertaining to the objectives of the study. Descriptive statistics of both the dependent and independent variables are presented in the chapter. The chapter is divided into six sections; the first section looks at the patient and household characteristics of respondents. The second section discusses patient knowledge about Tuberculosis infection. The third section delves into the health seeking behaviours of Tuberculosis patients. The fourth section discusses the empirical findings from examining the role of education on the use of TB drugs using a Probit Model. The results from examining the effect of education on the number of households screened for the Tuberculosis diseases as a preventive measure using a Poisson regression would also be discussed. The next section briefly discusses the important role education plays in TB control. The final section presents a summary of the empirical findings of the study.

5.1 PATIENT AND HOUSEHOLD CHARACTERISTICS

A total of 270 valid questionnaires were processed for analysis representing 93.1%. Tuberculosis patients who were on Orthodox anti-TB drug treatment and those who were not on Orthodox anti-TB drug treatment were identified through medical records and interviewed over a period of two months; 126 in the New Juaben Municipality and 144 at the Lower Manya Krobo Municipality. These Municipalities were chosen purposively to enable the apt depiction of the prevalence of TB in the two Municipalities respectively.

5.1.1 Sex of Respondents

A total of 270 respondents were interviewed during the study period. Out of the 270 respondents 158 were males representing 58.5 percent (58.5%) and 112 were females representing 41.5% as indicated in Table 5.1 below. 127 respondents representing 47.0% were not on the Orthodox anti-TB treatment drugs, but on other forms of treatment like herbal treatment and 143 respondents representing 53.0 percent (53.0%) were on Orthodox anti-TB treatment drugs. The sex distribution of TB patients in the Eastern Region was not different from the sex distribution in the study. Out of 1,680 TB cases registered in the Eastern Region, 1,070 were males representing 63% and the remaining 610 were females representing 36%. The disease is mostly seen in males than females, because of their lifestyle such as smoking, drinking, etc. Most of them also engaged in risky jobs such as mining works, construction works etc. which exposes them to the Mycobacterium TB.

Table 5.1: Sex of Respondent

Sex	Frequency	Valid percent
Male	158	58.5
Females	112	41.5
Total	270	100.0

Source: Author's Field Survey Data, 2015

5.1.2 Age, Location and Sex Distribution of Patients

The age classification used by the National Tuberculosis Control Programme (NTCP) was adopted for this study to aid data interpretation. Overall, TB is markedly common in most economically active population between the ages of 15-55 years and above as presented in Table 5.2 below. The incidence of the disease is pronounced within the 35-54 years and 15-34 year age groups in the urban and rural areas of both Municipalities respectively. There are 95 respondents from the rural-Lower Manya Krobo Municipality, representing about 66% of respondents in this area. Out of these rural dwellers, the highest proportion of people (i.e. 43%) is in the 35-54 year age bracket, while the lowest proportion (i.e. 4.2%) is in the 0-14 year age bracket. The situation for urban dwellers of the Lower Manya Krobo Municipality is however different. The urban sample is smaller, and has only 49 respondents (i.e. 44.9%) belong to the 15-34 year age group, while the lowest proportion (i.e. 2%) belongs to the 0-14 year age group.

However, there are 46 respondents from the rural New Juaben Municipality, representing about 37% of the respondents in this area. Out of these rural dwellers, the highest proportion of people (47.8%) is in the 35-54 year age bracket, while the lowest proportion (i.e. 0.0%) is in the 0-14 year age bracket. The situation for urban dwellers of the New Juaben Municipality is however different. The urban sample is larger and has 80 respondents (i.e. 42.5%) belongs to the 15-43 year age group, while the lowest proportion belongs to 0-14 year age group.

In both Municipalities, there are 130 respondents in rural areas, representing 48% of respondents in the study. Out of these rural dwellers, the highest proportion of people (i.e. 50.8%) is in the 35-54 year age bracket, while the lowest proportion (i.e. 0.8%) is in the 0-14 year age bracket. The situation for urban dwellers in both Municipalities is however different. The urban sample is larger, and has 140 respondents (i.e. 37.1%) belonging to the 15-34 year age group, while the lowest proportion belongs to the 0-14 year age group.

158 of the respondents in the study were males constituting the majority, representing 58.5% of respondents in both Municipalities. Out of these 158 respondents, 44.3% and 55.7% lived in rural and urban areas respectively, with the highest proportion of the people (i.e. 48.1%) in the 35-54 year age bracket, while the lowest proportion (4.4%) in the 0-14 year age bracket. The situation was different for female dwellers in both Municipalities. 112 of the respondents in the study were females, representing 41.5% in both Municipalities. Out of these 112 respondents, 53.6% and 46.4% lived in rural and urban areas respectively, with the highest proportion of the people (i.e. 41.1%) in the 35-54 year age bracket, while the lowest proportion (i.e. 3.6%) in the 0-14 year age bracket. This difference is partly due to the fact that women have less access to diagnostic facilities in some settings, but the broader pattern also reflects the real epidemiological difference between men and women, both in exposure to infection and in susceptibility to disease (Borgdorff 2000). Lönnroth et al (2008) attributes this trend to alcohol and substance abuse among men. The Table below gives information on respondents' age, location and sex distribution.

Table 5.2: Age, Location, and Sex Distribution of patients

	Both Municipal Percentage (%)		New Juaben Percentage (%)		Lower Manya Krobo Percentage (%)		Percentage (%)	
Age in years	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Male**	**Female**
0-14	1(0.8)	10(7.1)	0(0.0)	4(5.0)	4(4.2)	1(2.0)	7(4.4)	4(3.6)
15-34	38(29.2)	52(37.1)	14(30.4)	34(42.5)	33(34.7)	22(44.9)	45(28.5%)	45(40.2)
35-54	66(50.8)	56(40.0)	22(47.8)	31(38.8)	41(43.2)	19(38.8)	76(48.1)	46(41.1)
55and above	25(19.2)	22(15.7)	10(21.7)	11(13.8)	17(21.7)	7(13.8)	30(19.0)	17(15.2)
Total	130	140	46	80	95	49	158	112

Source: Author's Survey Data, 2015

Findings from the age and sex distribution of the study were quite similar to that of the National and Regional distributions. According to the Technical Policy and Guidelines for HIV/TB collaborative report on Ghana, TB cases occur among persons in the reproductive age groups of 15-49 years. In 2010, major of TB cases was seen in the age group between 15-44 years. The situation in Eastern Region was not different. In the Eastern Region, the most affected age group was people between the ages of 35-44 years representing 25% of the total cases recorded in 2013. Out of 1680 TB cases registered in the Region, 1,070 were males and the remaining 610 were females.

5.1.3 Educational Level, Location, and Sex

Table 5.3 gives some information on the level of education, location and sex of respondents. Out of 270 respondents in the study, 118 respondents (both males and females), representing 43.7% have had primary education, 78 respondents representing 28.9% had secondary or higher education and 74 respondents representing 27.4% had never been to school. In urban areas, 45.0% have primary education compared to 42.3% in the rural areas. 40.7% of respondents in urban areas also have a secondary or higher education compared to 16.2% in the rural areas, while 14.3% of respondents in urban areas have never been to school compared to 41.5% in rural areas. Out of 46 respondents in rural-New Juaben Municipality, 34.8% have primary education, 54.3% have never been to school and 10.9% have a secondary or higher level of education. In rural-Lower Manya Krobo Municipality, out of 95 respondents, 44.2% have primary education, 29.5% have never been to school and 26.3% have a secondary or higher level of education. The level of education of TB patients appears to be higher in rural-Lower Manya Krobo Municipality, compared to rural-New Juaben Municipality, indicating that fewer educated people in rural-New Juaben Municipality are infected with TB.

In urban-New Juaben Municipality, out of 80 respondents, 45.0% have primary education, 37.5% have secondary education and 17.5% have never been to school compared to urban-Lower Manya Krobo Municipality where out of 49 respondents, 36.7% have primary education, 32.7% have a secondary or higher level of education and 30.6% have never been to school. The above explanations show that, there are more TB patients in urban-New Juaben Municipality compared to urban-Lower Manya Krobo Municipality. However, there are also more TB patients in rural-Lower Manya Krobo Municipality than rural-New Juaben Municipality. This is due to the fact that the New

Juaben Municipality has less rural areas as compared to the Lower Manya Krobo Municipality.

In addition, comparing the rural/urban localities in each individual Municipality, out of 126 respondents in the New Juaben Municipality, 46 respondents reside in rural areas, while 80 respondents also reside in urban areas. Majority of urban dwellers (i.e. 45.0%) had primary education compared to rural dwellers (i.e. 34.8%), followed by 37.5% of urban dwellers with secondary or higher education compared to 10.9% of rural dwellers. A larger proportion of rural dwellers in New Juaben Municipality (54.3%) have never been to school, while a smaller proportion of urban dwellers in New Juaben Municipality (17.5%) have never been to school. On the other hand, out of 144 respondents in Lower Manya Krobo Municipality, 95 respondents reside in rural areas, while 49 respondents reside in urban areas. The majority of rural dwellers (44.2%) had primary education compared to urban dwellers (36.7%), followed by 32.7% of the urban dwellers with secondary or higher education compared to 26.3% of rural dwellers. A larger proportion of urban dwellers in Lower Manya Krobo Municipality (30.6%) have never been to school compared to 29.5% of rural dwellers in the Lower Manya Krobo Municipality.

Table 5.3: Education, Location, and Sex Distribution of Patients

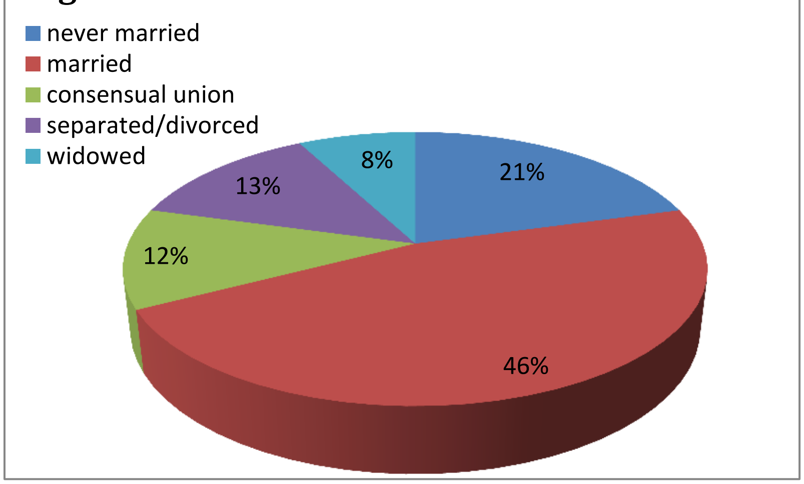
	Both Municipal Percentage (%)		New Juaben Percentage (%)		Lower Manya Krobo Percentage (%)		Percentage (%)	
Educational level	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**	**Male**	**Female**
Never been to school	54 (41.5)	20(14.3)	25(54.3)	14(17.5)	28(29.5)	15(30.6)	40(25.3)	34(30.4)
Primary	55(42.3)	63(45.0)	16(34.8)	36(45.0)	42(44.2)	18(36.7)	64(40.5)	54(48.2)
Secondary or higher	21(16.2)	57(40.7)	5(10.9)	30(37.5)	25(26.3)	16(32.7)	54(34.2)	24(21.4)
Total	130	140	46	80	95	49	158	112

Source: Author's Survey Data, 2015

5.1.4 Marital Status of Respondents

The study also considered the marital status of the respondents. From the data collected, out of 270 respondents, 46.0% of the respondents were married (both male and female), 21.0% have never married before, 13.0% have separated/divorced, 12.0% have consensual union and 8.0% were widowed. 69.9% of the respondents who were married were the head of the household compared to 34.1% who were not the head of the household. 23.2% of the respondents who have never married were heads of the household compared to 76.8% respondents who were not the heads of the household. 51.4% of the respondents who have separated/divorced were not heads of the household whiles 48.6% were heads of the household. 38.1% of the respondents who are widowed were not heads of the households compared to 61.9% who were heads of the households. Data indicate that overall 52.6% of the respondents were heads of household out of which 25.4% have never been to school, 45.8% have primary education and 28.9% have secondary or higher education. However, out of the 47.4% who were not household heads, 29.7% have never been to school, 41.4% have primary education and 28.8% have a secondary or higher level of education. The dominant educational level of TB patients in the sample is primary education. This is an indication that the two Municipalities are dominated by TB patients with low level of education. The Majority of the household heads were males, 104 respondents representing 65.8% compared to 33.9% who were females. Figure 5.1 shows the marital status of the respondents.

Figure 5.1:Marital Status



Author's Field Survey Data, 2015

5.1.5 Main Occupation and Location of TB Patients

Another area of importance is to know the occupation of the respondents and their location. The link between the main occupation and location of TB patients was found to be significant using the Chi-Square test ($\chi^2(15) = 30.056$, P = .012). Results indicate that out of 270 respondents who were interviewed (both male and female), 27.8% were farmers, 8.1% were students, 10.7% were salaried workers, 13.7% were unemployed, 35.9% were self-employed and 3.7% were on retirement. Unemployment in the urban areas is 15.0% with 11.2% found in urban-New Juaben and 10.2% in urban-Lower Manya Krobo. The agricultural sector was the largest source of employment in rural areas of both Municipalities (i.e. New Juaben and Lower Manya Krobo). Out of 130 respondents who reside in rural areas, 53.8% of the respondents were farmers with 0.8% as salaried workers. Comparably, out of 140 respondents in the urban areas, 46.4% were self-employed with the least occupation being farming activities (i.e. 3.6%).

However, there are 46 respondents from the New Juaben Municipality, representing 36.5% of respondents in this area. Out of these rural dwellers, the highest proportion of people (i.e. 52.2%) was farmers, while the lowest proportion (4.3%) was retired workers with none of the rural dwellers as a salaried worker. The situation was different for the urban dwellers of the New Juaben Municipality. The urban sample is larger, and has 80 respondents, making up about 63.5% of the total New Juaben Municipality. The highest proportion of respondents (i.e. 60%) was self-employed, while the lowest proportion (i.e. 1.2%) was retired workers.

In rural-Lower Manya Krobo Municipality, there are 95 respondents, representing 66% of respondents in this area. Out of these rural dwellers, the highest proportion of people (i.e. 27.4%) was farmers, while the lowest proportion (i.e. 2.1%) was retired workers. The situation for urban-Lower Manya Krobo is however different. The urban sample is smaller, and has only 49 respondents, making up about 34% of respondents in this area. The highest proportion of respondents (i.e. 44.9%) was self-employment, while the lowest proportion of respondents (4.1%) were salaried and retired workers respectively.

The Majority of the TB patients in the urban areas are self-employed. About 60.0% of the self-employed TB patients are found in urban-New Juaben compared to 44.9% in urban-Lower Manya Krobo. The results imply that Tuberculosis affect individuals irrespective of sex, age, educational level, employment status and location. Tuberculosis afflicts all sectors of the economy, but is more concentrated in the agricultural and informal sub-sectors which could be due to high mobility and greater interactions among players. The Table 5.4 gives information on respondents' main occupation and location.

Table 5.4 Main Occupation and Location of TB Patients

	Both Municipal Percentage (%)		New Juaben Percentage (%)		Lower Manya Krobo Percentage (%)	
Main occupation	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Farmer	70(53.8)	5(3.6)	24(52.2)	8(10.0)	26(27.4)	13(26.5)
Student	9(6.9)	13(9.3)	3(6.5)	6(7.5)	8(8.4)	5(10.2)
Salaried Worker	1(0.8)	28(20.0)	0(0.0)	8(10.0)	7(7.4)	2(4.1)
Unemployed	16(12.3)	21(15.0)	8(17.4)	9(11.2)	13(13.7)	5(10.2)
Self-employed	32(24.6)	65(46.4)	9(19.6)	48(60.0)	39(41.1)	22(44.9)
Retired	2(1.5)	8(5.7)	2(4.3)	1(1.2)	2(2.1)	2(4.1)
Total	130	140	46	80	95	49

Source: Author's Survey Data, 2015

5.1.6 Religious Affiliation of Patients and the use of Orthodox anti-TB drug

The study considered the religious affiliation of TB patients and the use of Orthodox anti-TB drug or otherwise. Out of 270 respondents interviewed, 127 of the respondents representing 47% don't use Orthodox anti-TB drug while 143 of the respondents, representing 53% are on Orthodox anti-TB drug treatment. Overall, 43.3% of the respondents were identified as Pentecostal/Charismatic, 30.4% were identified as members of Anglican/Methodist/Presbyterian, 12.2% of the respondents were identified as catholic members, 8.5% as Muslims, 3.3% as traditionalist, 1.9% as other Christians and 0.4% were neither Christians or traditionalist or Muslim.

However, the majority of the respondents interviewed who were identified as members of the Pentecostal / Charismatic constituted 117 of the total respondents. Out of which 42.7% don't use the Orthodox anti-TB drug compared to 57.3% of the respondents who were on the Orthodox anti-TB drug treatment. This was followed by respondents who were identified as members of the Anglican / Methodist / Presbyterian Church. Out of 82 of the total respondents, 47.6% don't use the Orthodox anti-TB drug compared to 52.4% of the respondents who are on the Orthodox anti-TB drug treatment. A total of 33 respondents were identified as members of the Catholic Church. Out of which 57.6% don't use the Orthodox anti-TB drug compared to 42.4% of the respondents who are on the Orthodox anti-TB drug treatment.

In addition, 23 of the respondents were identified as Muslims. Out of which 43.5% don't use the Orthodox anti-TB drug compared to 56.5% of the respondents who are on the Orthodox anti-TB drug treatment. A total of 9 respondents were identified as members of the traditional / Spiritual group. Out of which 66.7% of the respondents are not using the Orthodox anti-TB drug compared to 42.4% of the respondents who are on the Orthodox anti-TB drug treatment. Other Christians also constituted about 5 respondents. Out of which 60% of the total respondents don't use the Orthodox anti-TB drug compared to 40% who are on the Orthodox anti-TB drug.

From the study, it is revealed that majority of the TB patients identified as members of the Pentecostal / Charismatic, Anglican / Methodist / Presbyterian and Muslim used the Orthodox anti-TB drug compared to TB patients who belong to the Catholic, traditional / spiritual group and other Christians. This is presented in the Table 5.5 below

Table 5.5 Religious Affiliation of TB patients and the use of Orthodox anti-TB drug

	Are you on Orthodox anti-TB drug treatment?	
Religious Affiliation	**No (Percentage %)**	**Yes (Percentage %)**
Catholic	19(57.6)	14(42.4)
Anglican/Methodist/Presbyterian	39(47.6)	43(52.4)
Pentecostal/ Charismatic	50(42.7)	67(57.3)
Muslim	10(43.5)	13(56.5)
Traditional/Spiritual	6(66.7)	3(33.3)
Other Christians	3(60)	2(40)
No religion	0(0.0)	1(100)
Total	127	143

Source: Author's Field Survey Data, 2015

5.2 PATIENT KNOWLEDGE ABOUT TUBERCULOSIS INFECTION

This section describes the results of patients' knowledge of Tuberculosis disease in the study areas. The sections below discuss respondents' responses on the main reasons for the causes and symptoms of Tuberculosis.

5.2.1 The Main Causes of Tuberculosis

Out of 270 respondents (both male and female), 113 respondents representing 41.9% have no information on TB compared to 157 respondents representing 58.1% who have some knowledge about TB. 14.4% of the respondents did not consider TB to be a serious disease while 85.6% considered TB as a serious disease. The overall 14.4% of respondents who did not consider TB to be a serious disease had no information on TB disease compared to those with information. 44.4% of the total respondents in the study attributed the causes of TB disease to bacterial infection, 44.1% attributed to drinking of alcoholic beverages and smoking, 4.8% attributed to the virus, 4.4% said it is caused by Satan and witchcraft, 1.5% also attributed to the evil eye and 0.7% said it is caused by germs.

There are 80 respondents in urban-New Juaben Municipality, representing 63.5% in this area. Out of these, 48.8% attributed the causes of TB disease to bacterial infection, 36.2% attributed to drinking alcoholic beverages and smoking, 7.5% attributed to the virus, 5.0% said it is caused by Satan / witchcraft and 2.5% also attributed to the evil eye. In rural-New Juaben Municipality, out of 46 respondents representing 36.5% in this area, 50.0% attributed the causes of TB disease to drinking of alcoholic beverages and smoking, 23.9% attributed to bacterial infection, 10.9% said it is caused by Satan/ witchcraft, 8.7% attributed to virus infection, 4.3% attributed to the evil eye and 2.2%

said it is caused by germs. A larger proportion of TB patients in the New Juaben Municipality (both rural and urban) said that TB disease is caused by drinking alcoholic beverages/ smoking and bacterial infection (i.e. 50.0% and 48.8%) respectively.

The situation was different from the Lower Manya Krobo Municipality. Out of 49 respondents representing 34% of the respondents, 46.9% attributed the causes of TB disease to bacterial infection, 36.7% attributed to drinking of alcoholic beverages/ smoking, 8.2% attributed to virus infection while 4.1% said it is caused by Satan or witchcraft and evil eye respectively. In rural-Lower Manya Krobo Municipality, out of 95 respondents representing 66%, 42.1% attributed the causes of TB disease to drinking of alcoholic beverages and smoking, 35.8% attributed to bacterial infection, 10.5% attributed to Satan or witchcraft, 8.4% attributed to virus infection, 2.1% said it is caused by an evil eye and 1.1% attributed to germs. A larger proportion of TB patients in the Lower Manya Krobo Municipality (both rural and urban) attributed the causes of TB disease to drinking of alcoholic beverages / smoking and bacterial infection (i.e. 42.1% and 46.9%) respectively.

However, a smaller proportion of both urban and rural dwellers in the Lower Manya Krobo Municipality attributed the causes of TB disease to germ. Bacterial infection and drinking of alcoholic beverages and smoking recorded the highest responses in both Municipalities and they are some of the main causes of TB disease. This is presented in Table 5.6 below.

Table 5.6: Main causes of Tuberculosis and Location of Patients

	New Juaben Percentage (%)		Lower Manya Krobo Percentages (%)	
Causes of TB	**Urban**	**Rural**	**Urban**	**Rural**
Bacterial	39 (48.8)	11(23.9)	23 (46.9)	34 (35.8)
Virus	6 (7.5)	4 (8.7)	4 (8.2)	8 (8.4)
Evil eye	2 (2.5)	2 (4.3)	2 (4.1)	2 (2.1)
Satan / witchcraft	4 (5.0)	5 (10.9)	2 (4.1)	10 (10.5)
Drinking alcoholic beverages and smoking	29 (36.2)	23 (50.0)	18 (36.7)	40 (42.1)
Germ	0 (0.0)	1 (2.2)	0 (0.0)	1 (1.1)
Total	80	46	49	95

Source: Author's Field Survey Data, 2015

As presented in Table 5.7, the results showed that the respondents receive their health information from different sources. The link between informal sources of health information of and the location of TB patients was significant (p = .000) using the Chi-Square test. Out of 80 respondents in urban-New Juaben Municipality, representing 63.5% in this area, 30% of the respondents receive their health information from health providers, 23.8% is through the radio, 18.8% also receive their health information from community-based educational programmes organized by Ghana Health Service to educate people on health issues, 13.8% through leaflets and magazines, 10% through the television and 3.8 is from friends and families. In rural-New Juaben Municipality, out of 46 respondents, representing 36.5% in this area, 32.6% receive their health information from health providers, 19.6% is through the radio and reading of leaflets and magazines respectively, 21.7% also receive their health information from community-based educational programme organized by the Ghana Health Service to educate people on health issues and 2.2% of the respondents also receive their health information from friends and families. A larger proportion of TB patients in the New Juaben Municipality (both rural and urban) receive their health information from health providers. However, a smaller proportion of rural dwellers in New Juaben Municipality receive their health information from friends and families (i.e. 2.2%) compared to urban dwellers (3.8%).

The situation was different from the Lower Manya Krobo Municipality. Out of 49 respondents in urban-Lower Manya Krobo Municipality, representing 34% of the respondents, 32.7% receive their health information from health providers, 24.5% from community-based educational programmes organized by the Ghana Health Service to educate people on health issues, 20.4% is through the radio, 14.3% through leaflets and magazines, 4.1% through friends / families and television respectively.

In the rural-Lower Manya Krobo Municipality, out of 95 respondents representing 66% in this area, 27.4% receive their health information from health providers, 24.2% is through the radio, 23.2 also receive their health information from community-based educational programmes organized by Ghana Health service to educate people on health issues, 13.7% through leaflets and magazines, 8.4% through the television set and 3.2% from friends and families. In conclusion, majority of the respondents in both New Juaben and Lower Manya Krobo Municipalities have various mediums through which they receive their health information but a greater proportion of the TB patients received their health information from health providers with a smaller proportion from friends and families. On the contrary, a study in North-East Libya in assessing the knowledge of people on TB revealed that, majority of the people receive their health information from television (44.7%), family members (24.2%), health professionals (18.9%), radio (9%), magazines (8.1%), internet (5.5%), newspapers (5.2%) and others (14.6%).

Table 5.7: Informal sources of Health Information

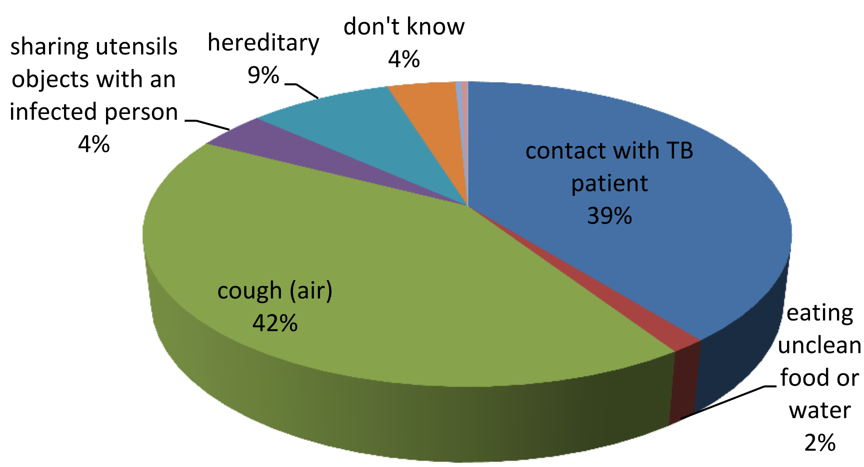
	New Juaben Percentage (%)		Lower Manya Krobo Percentages (%)		df	χ^2	Sig
Sources of health information	**Urban**	**Rural**	**Urban**	**Rural**			
Television	8 (10.0)	2 (4.3)	2 (4.1)	8 (8.4)			
Radio	19 (23.8)	9 (19.6)	10 (20.4)	23 (24.2)			
Health provider	24 (30.0)	15 (32.6)	16 (32.7)	26 (27.4)			
Community-based education	15 (18.8)	10 (21.7)	12 (24.5)	22 (23.2)			
Friends and families	3 (3.8)	1 (2.2)	2 (4.1)	3 (3.2)			
Leaflets and magazine	11(13.8)	9 (19.6)	7 (14.3)	13 (13.7)			
Total	80	46	49	95	5	30.943	.000

Source: Author's Field Survey Data, 2015

5.2.2 Transmission, Symptoms and Prevention of Tuberculosis

In the study, respondents were asked of the mode of transmission of the Tuberculosis disease. 39% of the respondents said TB is transmitted by contact with a TB patient, 2% of the respondents attributed it to eating unclean food or water, 42% of the respondents also attributed to coughing, 4% of the respondents reported that it could be transmitted through sharing of utensils objects with an infected person, 9% by hereditary. 4% of the respondents didn't know the mode of Tuberculosis transmission. The results show that majority of the respondents are aware of the mode of contracting the TB disease since the researcher recorded a higher responses for contact with TB patient (39%) and coughing (42%) which are the most commonest mode of transmission because of the main source of infection which is by inhaling a small number of bacilli expel into the air through coughing, sneezing etc. or by an infected TB patient. This is presented in Figure 5.2 below.

Figure 5.2: Transmission mode of TB



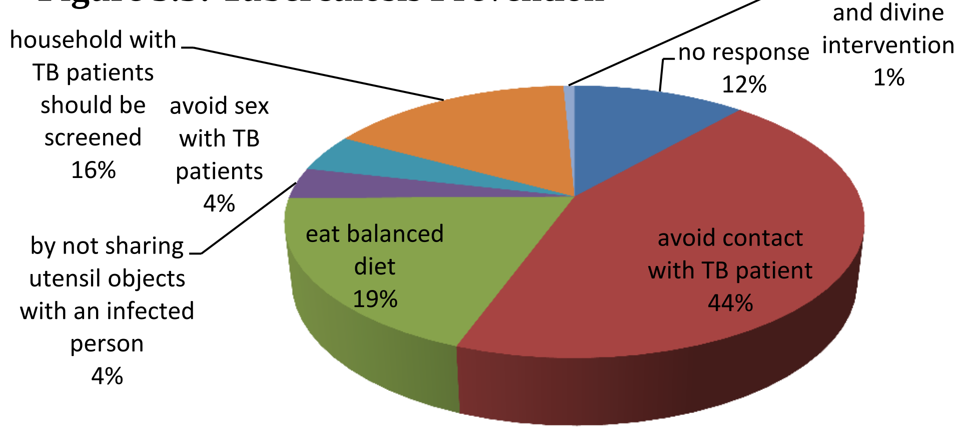
Source: Author's Field Survey Data, 2015

The respondents were also asked about some symptoms of someone infected with TB. A greater proportion of the TB patients have a higher knowledge on some of the symptoms of TB. However, coughing for than 3 weeks, which recorded higher responses (40.0%) followed by weight loss (18.9%), sputum with blood (13.7%), no appetite (10.4%), fever

(7.4%), night sweat (7.0%) and those with no knowledge about the symptoms of TB recorded a low responses of (2.6%).

Another critical area for the study was to access the knowledge of the respondents on the prevention of TB. Out of 270 respondents, 44% were of the view that TB can be prevented by avoiding contact with TB patient, 19% of the respondents also said by eating a balanced diet since it help boost the immune system to fight against the bacterial and 16% of the respondents were also of the view that households with TB patients should be screened to prevent other members of the household from contracting the disease. This results shows that the respondents have a higher knowledge on how TB can be prevented since these three responses are key measures to prevent TB infection. This is presented in the Figure below.

Figure 5.3: Tuberculosis Prevention



Source: Author's Field Survey Data, 2015

5.3 HEALTH SEEKING BEHAVIOUR (PATIENTS WITH TB)

This section discusses the results of patients' health seeking behaviours in the study areas. The result covers respondents' main reasons for seeking treatment.

5.3.1 Patients' First Place of Seeking Treatment

In the study, respondents were asked of their first place of seeking treatment when they became infected with the Tuberculosis disease. Out of 270 respondents, 14.4% engaged in self-treatment, 12.6% sought traditional medicinal services, 5.6% and 46.3% of the respondents visited the private and public facilities, respectively. 21.1% also visited chemist shops for treatment. This is presented in Table 5.8 below.

Table 5.8: Patients' First Place of Seeking Treatment

Patients' first place of seeking treatment	Frequency	Valid Percent
Self-treatment	39	14.4
Traditional healer	34	12.6
Private facility	15	5.6
Chemist shop	57	21.1
Public facility	125	46.3
Total	270	100

Source: Author's Field Survey Data, 2015

There are 46 respondents in rural-New Juaben Municipality, representing 36.5% in this area. Out of these, 14.4% engaged in self-treatment, 15.2% sought traditional medicinal services, 8.7% and 47.8% of the respondents visited the private and public facility respectively, while 10.9% visited chemist shops for treatment. In urban-New Juaben Municipality, out of 80 respondents representing 63.5% in this area, 13.8% engaged in self-treatment, 10% sought traditional medicinal services, 5% and 62.5% visited the private and public facility respectively, while 8.8% visited chemist shops for treatment. A larger proportion of TB patients in the New Juaben Municipality (rural and urban) used the public facilities (i.e. 47.8% and 62.5%) respectively, compared to the private facilities (i.e. 8.7% and 5.0%) respectively. However, a smaller proportion of urban dwellers in New Juaben Municipality sought traditional medicinal services (i.e. 10%) compared to rural dwellers (i.e. 15.2%). It must be emphasized that TB treatment is more effective in the public facilities than the private facilities because of Government and donor countries support in TB treatment.

The situation was different from the Lower Manya Krobo Municipality. Out of 95 respondents in rural-Lower Manya Krobo Municipality, representing 66% of the respondents,12.6% engaged in self-treatment, 13.7% sought traditional medicinal services, 4.2% and 57.9% of respondents visited the private and public facilities respectively, while 11.6% also visited chemist shops for treatment. In urban-Lower Manya Krobo Municipality, out of 49 respondents, representing 34% in this area, 14.3% engaged in self-treatment, 6.1% sought traditional medicinal services, 10.2% and 57.1% visited the private and public facilities respectively, while 12.2% visited chemist shops for treatment. A larger proportion of TB patients in the Lower Manya Krobo Municipality (rural and urban) used the public facilities (i.e. 57.9% and 57.1%) respectively, compared to the private facilities (i.e. 4.2% and 10.2%) respectively. However, a smaller proportion of urban dwellers in Lower Manya Krobo Municipality sought traditional medicinal services (i.e. 6.1%) compared to rural dwellers (i.e. 13.7%).

In addition, a larger proportion of rural dwellers in New Juaben and Lower Manya Krobo Municipalities (15.2% and 13.7%) respectively sought traditional medicinal services compared to urban dwellers in the two Municipalities. This is presented in table 5.9 below.

Table 5.9: Patients' Location and First Place of Seeking Treatment

	Both Municipal Percentages (%)		**New Juaben Percentages (%)**		**Lower Manya Krobo Percentage (%)**	
Patients' first place of seeking treatment	**Rural**	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Self-treatment	18(13.8)	21(15.0)	8(17.4)	11(13.8)	12(12.6)	7(14.3)
Traditional healer	20(15.4)	14(10.0)	7(15.2)	8(10.0)	13(13.7)	3(6.1)
Private facility	6(4.6)	9(6.4)	4(8.7)	4(5.0)	4(4.2)	5(10.2)
Chemist shop	30(23.1)	27(47.4)	5(10.9)	7(8.8)	11(11.6)	6(12.2)
Public facility	56(43.1)	69(49.3)	22(47.8)	50(62.5)	55(57.9)	28(57.1)
Total	130	140	46	80	95	49

Source: Author's Field Survey Data, 2015

5.3.2 Patient's First Place and Reasons for Seeking Treatment

Out of the 14.4% respondents who were on self-treatment, 71.8% were of the view that self-treatment was cheaper compared to other forms of treatment, 12.8% of respondents did not know it was TB and thought self-treatment gives a more convenient schedule respectively. They however reported that self-treatment reduces longer waiting time in health facilities.

Out of the 12.6% respondents who sought for traditional medicinal services, 2.9% said traditional treatment was cheaper compared to other forms of treatment and that traditional medicinal service was closer to them respectively. 94.1% of respondents also trusted the traditional treatment than the Orthodox treatment because of the negative side effects that comes along with the use of Orthodox anti-TB drug. Overall, 5.6% respondents who visited the private facility, 40% were of the view that the facility was closer to them, 26.7% said they wanted to receive better health care, 13.3% were of the view that the facility provide a more convenient schedule and the health workers have a better attitude respectively and 2.9% also trusted the private facility more than the public facility. The probable reason may be due to the fact that there are more specialized health workers in the private facilities than in the public facilities.

However, 46.8% of the respondents visited the public facilities. The main reasons are: was cheaper (2.4%), we're closer (22.4%), more convenient schedule (64.8%), and a better attitude from a health worker (7.2%) and trusted more (0.8%). 21.1% of the respondents also visited the chemist shops for treatment. The main reasons include; was cheaper (22.8%), was closer (64.9%), more convenient schedule (10.5%), and didn't know it was TB (1.8%). The Table 5.10 below shows the reasons for seeking treatment at first place of contact.

Table 5.10: Patient's First Place and Reasons for Seeking Treatment

	Was cheaper (%)	Was closer (%)	More convenient schedule (%)	Better care receive (%)	Better attitude of health workers (%)	Trusted more (%)	Didn't know it was TB (%)
Self-treatment	28(71.8)	1(2.6)	5(12.8)	0(0.0)	0(0.0)	0(0.0)	5(12.8)
Traditional healer	1(2.9)	1(2.9)	0(0.0)	0(0.0)	0(0.0)	32(94.1)	0(0.0)
Private facility	0(0.0)	6(40.0)	2(13.3)	4(26.7)	2(13.3)	1(6.7)	0.(0.0)
Chemist shop	13(22.8)	37(64.9)	6(10.5)	0(0.0)	0(0.0)	0(0.0)	1(1.8)
Public facility	3(2.4)	28(22.4)	3(2.4)	81(64.8)	9(7.2)	1(0.8)	0(0.0)
Total	45	73	16	85	11	34	6

Source: Author's Field Survey Data, 2015

In the study, it was realized that the majority of the respondents delayed in seeking Tuberculosis treatment in private and public health facilities.47% of the respondents delayed for some weeks before seeking treatment, 39.3% also delayed for some months and 13.7% delayed for some days before seeking for TB treatment. The main reasons are: financial problem (19.6%), lack of knowledge on TB (53%), longer waiting time in health facility (7.8%), stigmatization (8.9%), longer travelling time to the health facility (10%) and seeking for herbal treatment (0.7%). This show that the majority of the respondents delayed in seeking treatment because of their lack of knowledge in

Tuberculosis disease and there is therefore the need to educate the public on the prevention, treatment and control of Tuberculosis in the country.

5.3.3 Patients on Orthodox Anti- Tuberculosis Drugs Treatment

Out of 270 respondents, 53% were using the orthodox anti-TB drugs compared to 47% of the respondents who were not using the orthodox anti-TB drugs but were receiving traditional treatment. From the study, it was realized that out of 143 respondents who were using the orthodox anti-TB drugs, 99.3% saw an improvement in their health condition, though they have not recovered fully from the TB disease whiles 0.7% of the respondents saw no improvement in their health condition. Overall, 58% of the respondents who were using orthodox anti-TB drugs were still on treatment, 40.6% have completed their treatment course and 1.4% didn't know whether they have completed their treatment or not.

The link between educational level of TB patients and the use of orthodox anti-TB drug or otherwise was significant ($\chi^2(2) = 13.286$, P = 0.001). A total of 127 respondents were not on the Orthodox anti-TB drug treatment representing 47% of the respondents. Out of which, 34.6% had never been to school, 46.5% had primary education and 18.8% also had secondary education.

The situation was different for TB patients who were using the Orthodox anti-TB drug. A total of 143 respondents used the Orthodox anti-TB drug representing 53%. Out of which, 21.0% of the respondents had never been to school, 41.3% had primary education and 37.8% had secondary education. The results show that a greater proportion of TB patients on Orthodox anti-TB drugs have primary education followed by those with secondary education. This is presented in the Table 5.11 below.

Table 5.11 Patients on Orthodox Anti-TB drug and Educational level

		Educational level		df	χ^2	sig
Are you on orthodox anti-TB drug	**Never been to school Percentages (%)**	**Primary Percentages (%)**	**Secondary Percentages (%)**			
No	44(34.6)	59(46.5)	24(18.8)			
Yes	30(21.0)	59(41.3)	54(37.8)			
Total	74(27.4)	118(43.7)	78(28.9)	2	13.286	.001***

Source: Author's Field Survey Data, 2015, *-significant at 1%**

However, the study also considered the link between the location of TB patients and the use of Orthodox anti-TB drug or otherwise. And out of 127 TB patients interviewed, representing 47% of the respondents, who were not on the Orthodox anti-TB drug treatment, 26.8% were found in the Urban-New Juaben Municipality compared to 13.4% of the respondents in the rural-New Juaben Municipality. However, 36.2% of the respondents in urban-Lower Manya krobo Municipality were also not using the orthodox anti-TB drug compared to 23.6% in the rural-Lower Manya krobo Municipality.

The situation was different for TB patients who were on the Orthodox anti-TB drug treatment. A total of 143 TB patients representing 53% were found to be using the orthodox anti-TB drug. Out of which, 29.4% of the respondents were found in urban-New Juaben Municipality compared to 16.1% in the rural-New Juaben Municipality. However, 22.4% of the respondents were also found in urban-Lower Manya Krobo

Municipality, while 28.1% of the respondents were in rural-Lower Manya Krobo Municipality. The link between the location of TB patients and the use of orthodox anti-TB drug using a Chi-Square test was found to be insignificant. This is presented in Table 5.12 below.

Table 5.12 Patients on Orthodox Anti-TB drug and their Location

	Location of TB Patients			
Are you on orthodox anti-TB drug	**Urban-New Juaben Percentages (%)**	**Rural-New Juaben Percentages (%)**	**Urban-Lower Manya Krobo Percentages (%)**	**Rural-Lower Manya Krobo**
No	34(26.8)	17(13.4)	46(36.2)	30(23.6)
Yes	42(29.4)	23(16.1)	32(22.4)	46(32.2)
Total	76(28.1)	40(14.8)	78(28.9)	76(28.1)

Source: Author's Field Survey Data, 2015

The link between educational level of TB patients and their membership with the National Health Insurance Scheme using the chi-square test was significant ($\chi^2(2)$ = 8.326, P = 0.016). A total of 62 respondents representing 23% were not registered members of the NHIS. Out of which, 58.1% were male and 41.9% were also females. However, about 38.7% of the respondents had never been to school, 45.2% had primary education and 16.1% had secondary education.

The situation was different for TB patients who were registered members of the NHIS. A total of 208 respondents representing 77% were registered members of the NHIS. Out of which, 24.0% had never been to school, 43.3% had primary education and 32.7% also had secondary education. However, about 58.7% of the respondents were males compared to 41.3% females. This is presented in Table 5.13 below

Table 5.13 Educational level of TB Patients and their Membership with the NHIS

		Educational level		Sex of Respondents		df	X^2	sig
Are you a member of NHIS?	**Never been to school Percentages (%)**	**Primary Percentages (%)**	**Secondary Percentages (%)**	**Male**	**Female**			
No	24(38.7)	28(45.2)	10(16.1)	58.1	41.9			
Yes	50(24.0)	90(43.3)	68(32.7)	58.7	41.3			
Total	74(27.4)	118(43.7)	78(28.9)			2	8.326	.016**

Source: Author's Field Survey Data, 2015, *-significant at 5%**

Another area of the study, considered the correlation between TB patients in the New Juaben and Lower Manya Krobo Municipalities and their membership with the NHIS. Out of the 270 respondents in the study, 62 respondents representing 23.0% were not registered members of NHIS and out of which, 19.4% were found in urban-New Juaben Municipality, 24.2% were in the rural-New Juaben Municipality, 21.0% also in urban-Lower Manya Municipality and 35.5% in the rural-Lower Manya Krobo Municipality.

The situation was different for TB patients who were registered members of the NHIS. 208 respondents, representing 77% constituted members of the NHIS. Out of which, 30.8% were found in the urban-New Juaben Municipality, 12.0% were in rural-New Juaben Municipality, 31.2% in urban-Lower Manya Krobo and 26.0% also in the rural-

Lower Manya Krobo Municipality. The link between the location of TB patients and their membership with NHIS using the chi-square test was found to be significant ($\chi^2(3)$ = 10.276, P = 0.016). The results show that, majority of TB patients who were members of the NHIS were found in urban-Lower Manya Krobo and urban-New Juaben Municipalities respectively (i.e. 31.2% and 30.8%). This is presented in Table 5.14 below.

Table 5.14 Location of TB Patients and their Membership with the NHIS

	Location of TB Patients				df	χ^2	sig
Are you a member of NHIS?	**Urban-New Juaben Percentages (%)**	**Rural-New Juaben Percentages (%)**	**Urban-Lower Manya Krobo Percentage (%)**	**Rural-Lower Manya Krobo Percentages (%)**			
No	12(19.4)	15(24.2)	13(21.0)	22(35.5)			
Yes	64(30.8)	25(12.0)	65(31.2)	54(26.0)			
Total	76	40	78	76	3	10.276	.016**

Source: Author's Field Survey Data, 2015, *-significant at 5%**

5.4 ANALYSIS OF EMPIRICAL RESULTS

5.4.1 Presentation of Results and Discussion of the Probit Model: Dependent Variable: Use of Orthodox Anti-TB Drug by Tuberculosis Patients

This section discusses the results from the Probit Model. The model examined the role of formal and informal education in the use of Orthodox anti-TB drug. The model proved to be a good fit for the relationship between the use of Orthodox anti-TB drugs by Tuberculosis patients and the explanatory variables (Prob > chi^{2} = 0.0000).

With respect to formal education, the education variable of TB patients was found to be positively related to the use of Orthodox anti-TB drug. An individual TB patient with no education was used as reference to interpret the marginal effects of those educated. However, a TB patient with secondary or higher education played a positive role in the use of Orthodox anti-TB drug and was found to be significant at 5% (Refer to Table 5.15) and was 19.7 percentage points more likely to use Orthodox anti-TB drug compared to a TB patient with no education. Thus; one can conclude that the higher the educational attainment of a TB patient, the higher the probability that he/she would use an Orthodox anti-TB drug.

Results are similar to that of Gebeyehu et. al., (2014), in their study where they investigated the factors associated with delay in patients initiating treatment of Tuberculosis. They concluded that TB patients with college and above educational level have better information access about TB and are more likely to seek medical care from health facilities at an early stage of the disease.

Similarly, Hoa et al., (2004) in their study concluded that higher level of education was positively related to the demand for healthcare and hospital care for a cough which is one of the symptoms of Tuberculosis.

Table 5.15 Results from the Probit Model. Dependent Variable: Use of Orthodox Anti-TB Drug

Probit Model			
Variables	**Marginal Effects (Standard Errors)**	**z-values**	**P > z**
Sex			
Male	-.067861 (.0587304)	-1.16	0.248
Female	(Reference cat.)	**N/A**	**N/A**
Age			
0-14	.2543963 (.1441559)	1.76	0.078
15-34	.1877396 (.0895088)	2.10	0.036**
35-54	-.0224047 (.0821251)	-0.27	0.785
55 and above	(Reference cat.)	**N/A**	**N/A**
No. of dependents			
1-2	.0479925 (.0694788)	0.69	0.490
3-5	.069119 (.1144244)	0.61	0.542
6-8	.3221878 (.0732664)	4.40	0.0000***
8 and above	.102899 (.1656224)	0.62	0.534
None	(Reference cat.)	N/A	N/A
Education			
Primary	.0592906 (.0730769)	0.81	0.417
Secondary/ Higher	.1968518 (.0842265)	2.34	0.019**
Never been to school	(Reference cat.)	**N/A**	**N/A**

Tabel 5.15 Continued

Variables	Probit Model Marginal Effects (Standard Errors)	z-values	P > z
Household head			
No	.1452812 (.0673399)	2.16	0.031**
Yes	(Refernce cat.)	**N/A**	N/A
Member of NHIS			
No	-.2674487 (.068591)	-3.90	0.0000***
Yes	(Reference cat.)	**N/A**	**N/A**
Health info.			
Radio	-.594601 (.093126)	-0.64	0.523
Hlthprovider	.0191033 (.0920693)	0.21	0.836
Community-based Education	-.0565518 (.1008067)	-0.56	0.575
Friends/families	.016987 (.1342829)	0.13	0.899
Llft&Mag	.0002079 (.1248309)	0.00	0.999
Television	(Reference cat.)	**N/A**	**N/A**
Religion			
Christians	-.007994 (.0883194)	-0.09	0.928
Other religion	(Refernce cat.)	**N/A**	**N/A**
Location			
Rural new juaben	.1726178 (.0855313)	2.02	0.044**
Urban lower manya Krobo	-.0377748 (.0735391)	-0.51	0.607
Rural lower manya krobo	.1280773 (.074745)	1.71	0.087
Urban new juaben	(Refernce cat.)	**N/A**	**N/A**
Cons.	-.6074178	-1.22	0.221

Prob > chi2 = 0.0000
Pseudo R^2 = .2055
Number of observation = 270

Source : Author's computation using STATA 13, * - significant at 1%, **- significant at 5%, N/A- Not Applicable**

In terms of informal education regarding Tuberculosis control, the study also revealed that personal interactions proved to be effective. Variables such as health provider, friends /families and leaflets and magazines played a positive role in the use of Orthodox anti-TB drug by Tuberculosis patients but were not significant. Findings from the current study revealed that majority of TB patients obtained TB related information from health providers followed by friends / families and the reading of leaflets and magazines. A probable reason may be the fact that informal sources of promulgating health messages of TB and other related diseases have not been effective with the electronic media. The National Tuberculosis Control Programme in Ghana and the Ghana Health services should intensify the promotion of TB messages on radio, television, community-based education and most especially personal interactions with health providers.. The detailed results have been summarized in Table 5.15. These findings confirm earlier works by Pichu (2004) who concluded that health education material was not found to have any additional significant improvement in self-knowledge and awareness about TB. Similarly, the findings were contrary to what was reported in earlier studies (Solliman et al., 2012) among the people in North East Libya. They concluded that the majority of the people receive their health information from the television, followed by health care workers and family members. Similar findings by Hadi et al., (2006) and Mushtaq et al., (2011) have been reported in earlier studies, but this current study has revealed that the majority of respondents obtained TB related information from their health providers. Thus, it must be strongly emphasized that the electronic media is also an important avenue to spread TB related knowledge in the general public and therefore suggest that it is used.

The study also showed that the higher the number of dependents on a TB patient in a household, the greater the probability of that TB patient using Orthodox anti-TB drug as a treatment measure against Tuberculosis disease. The results show that a TB patient with 6-8 dependents was significant. In addition, the variable for whether the individual TB patient is the household head and/or a member of the National Health Insurance Scheme was found to be significant. TB patients who are not household heads were used as reference related to the use of Orthodox anti-TB drug to interpret the marginal effect (Refer to Table 5.15 for estimated coefficients). A household where a TB patient was not the head is 14.5 percentage points more likely to use Orthodox anti-TB drug compared to household to a TB patient as a head of the household. The probable reason attributed to this relationship is based on the fact that as the head of the household, he or she is more likely to positively influence the health decisions in the household, but when the head of the household is the one suffering from TB disease, it is hardly for a member of that household to influence that particularly household head. The variable for not being a household head was found to be significant at 5%.

In addition, TB patient with no NHIS membership card was used as reference to interpret the marginal effect of those who are members of the NHIS. However, an individual TB patient who is not a member of the NHIS is 26.7 percentage points less likely to seek for Orthodox anti-TB treatment compared to those with the NHIS membership card. The probable reason attributed to this relationship is based on the fact that they may not be aware that treatment for Tuberculosis is free in the hospitals. But it must be emphasized that TB treatment drugs and the sputum examination for the TB patients are free for both

NHIS and non-NHIS card members, but other health inputs such as X-ray and other drugs apart from the TB drugs are only free for TB patients with the NHIS card. This might prevent some non-NHIS card barriers from seeking medical treatment in the hospitals.

The study again showed the probability of a TB patient residing in an urban or rural locality and using Orthodox anti-TB drug or otherwise. A TB patient who resides in urban-New Juaben Municipality was used as reference related to the use of Orthodox anti-TB drug to interpret the marginal effect (Refer to Table 5.15 for estimated coefficients). The results showed that TB patients who reside in the rural-New Juaben Municipality is 17.3 percentage points more likely to use Orthodox anti-TB drug and it was found to be significant at 5% compared to TB patients in urban New Juaben Municipality. A probable reason attributed to this result is based on the intensification of TB education in the rural areas and fact that the disease is mostly found in the rural areas than the urban areas because of poverty and poor living conditions in the rural areas. There is also an effective monitoring by treatment health supervisors assigned to the patients. However, TB patients in urban Lower Manya Krobo Municipality are 3.8 percentage points less likely to use Orthodox anti-TB drug compared to the urban New Juaben Municipality.

5.4.2 Presentation of Results and Discussion of the Poisson Regression Model: Dependent Variable: Number of Household Members Screened of Tuberculosis Disease

The study examined the role of formal education of household head and informal means of Tuberculosis control education on the number of household members screened. The model proved to be a good fit for the relationship between the number of household members screened and the explanatory variable (Prob > Chi^2 = 0.0000). The estimated Poisson regression has shown some signs of over dispersion since the conditional mean and the conditional variance were not the same (Refer to appendix 6). However, the Negative Binomial Regression would be used in this estimation to correct the over dispersion.

In terms of formal education, a household head having attained a higher level of education is likely to decrease his rate of screening household members by 0.86 for every 1% increase in the level of education compared to a household head with no education. This variable was insignificant at 5%. A probable reason attributed to this outcome is that household heads having acquired such level of education have better information about TB and are less likely to be infected with TB disease and hence less likely to screened household members.

Findings from this study were quite similar to that of Hinman et al., (1976). Hinman et al., (1976) argued that higher socioeconomic groups usually have more access to care, have higher formal education, are less likely to have coexisting diseases and therefore screening programme demonstrated unsuccessful in reaching this group than those who are in the lower socioeconomic group. Melkamu et al, (2013) in their studies argued that individuals who attend formal education are more likely to be efficient producers of health as they have higher awareness and can take precautionary measures to prevent health problems. They concluded that individuals who have no formal education were more likely to acquire TB infection than those who attend formal education and therefore they are more likely to be screened. Oladeji et al., (2010) in their study of assessing Tuberculosis screening and treatment in Osun, Nigeria concluded that patients with a fairly good knowledge of the TB disease is more likely to continuously participate in the treatment programme since their belief is that, Tuberculosis screening is effective enough to prevent them from TB disease and death. However, this finding was contrary to the current study, which reveals the negative role education play in screening of household members.

Household heads who obtained their health information from the radio and receiving community-based education were negatively related to the number of household members screened for TB disease and they were significant at 5%. A household head exposed to the radio and community-based education relating to TB is likely to decrease the rate of screening household members by 0.63 and 0.60 respectively, for every 1% increase to the exposure of the radio and community-based education. The variables were found to be significant at 5%.

In the study, household with a higher size such as households with between 6-8 members and 8 and above members showed a lesser incidence rate of screening and it was negatively related except household with between 3-5 members which was positively related to the number of household members screened for TB disease. Findings from the study revealed that female household heads were likely to increase their rate of screening household members by 1.20 for every 1% increase in the number of female household heads as compared to male household heads. This might be due to the fact that female household heads in both Municipalities are more concerned about their health and that of the members and have more positive health behaviours than their male counterparts.

Control variables such as the number of household members covered by the National Health Insurance Scheme and the location of a TB household were positively related to the number of household members screened with the exception of households with one member covered with National Health Insurance Scheme and TB households in the rural New Juaben Municipality. A household with six or seven of the members covered by NHIS were more likely to increase the rate of screening household members by 1.73 and 1.99 respectively, for every 1% increase in the number of household members covered by the NHIS. The variables were found to be significant at 5%. The provision of free TB drugs for Tuberculosis patients accompanied by the demand for some health inputs in TB treatment under the NHIS is likely to be the main reason for the positive relationship between the number of people covered by the insurance and screening of household members. In terms of the location of TB households, the results revealed that TB households in households in urban-Lower Manya Krobo and the rural-Manya Krobo Municipality were more likely to increase the rate of screening household members by 1.46 and 1.43 respectively for every 1% increase in TB households in both rural and urban Lower Manya Krobo Municipality. The variables were found to be significant at

5%. Detailed results of the Negative Binomial Regression model have been summarized in Table 5.16 below.

Table 5.16 Results from the Negative Binomial Regression Model. Dependent Variable: Number of Household Members Screened.

Negative Binomial Regression			
Variables	**IRR (Standard Errors)**	**z-values**	**P > z**
Household head Educational level			
Primary	.9012214 (.860583)	-0.88	0.379
Secondary/ Higher	.860583 (.1095196)	-1.18	0.238
Never been to school	(Refernce cat.)	**N/A**	**N**/A
Health info.			
Radio	.6322519 (.0983117)	-2.95	0.003**
Health provider	.8456271 (.1225093)	-1.16	0.247
Community-based Education	.5951038 (.0982763)	-3.14	0.002**
Friends/Families	.8294503 (.1774873)	-0.87	0.382
Leaflet/magazine	.9466153 (.1942287)	-0.27	0.789
Television	(Reference cat.)	**N/A**	**N/A**
Sex of household head			
Female	1.151493 (.1118643)	1.45	0.146
Male	(Refernce cat.)	**N/A**	**N/A**

Table 5.16 Continued

Negative Binomial Regression			
Variables	**IRR (Standard Errors)**	**z-values**	**P > z**
Household size			
1-2	(Refernce cat.)	**N/A**	**N/A**
3-5	1.047649 (.1421581)	0.34	0.732
6-8	.9063586 (.13411665)	-0.66	0.507
8 and above	.9611113 (.2236953)	-0.17	0.865
NumNHIS			
0	(Refernce cat.)	**N/A**	**N/A**
1	.8657295 (.136747)	-0.91	0.361
2	1.076432 (.200664)	0.40	0.693
3	1.300255 (.2038961)	1.67	0.094
4	1.030763 (.181673)	0.17	0.864
5	1.001325 (.1943231)	0.01	0.995
6	1.727144 (.3252848)	2..90	0.004**
7	1.988682 (.4316178)	3.17	0.002**
Location			
Urban new juaben	(Reference cat.)	**N/A**	**N/A**
Rural new juaben	.9768381 (.17387)	-0.13	0.895
Urban lower manya krobo	1.460422 (.1906898)	2.90	0.004**
Rural lower manya krobo	1.431619 (.1908588)	2.69	0.007**
Cons.	1.72873 (.3801732)	2.49	0.013**
Prob > chi2 = 0.0000, Pseudo R^2 = .0683		Log likelihood = -390.91849	
Number of observations = 270			
LR chi2 (21) = 57.36			

Source : Author's computation using STATA 13, **-significant at 5%, N/A- Non-Applicable

5.5 ROLE OF EDUCATION

In the first estimation, the role of formal education was significant. Formal education positively influence the use of Orthodox anti-TB drug with TB patients by 19.7 percentage points compared to a TB patient with no education. It must be emphasized that individual who attend formal education are more likey to be efficient producers of health as they have more information about their health.The results of formal education tend to confirm findings by Gebeyehu et al., (2014) who investigated the factors associated with delay in patients initiating treatment of Tuberculosis. The findings revealed that patients with college and above educational level have better information access about TB and are more likely to seek medical care from health facilities at an early stage of the disease. On the other hand, informal education, such as interacting with health providers, friends/families and reading of leaflets and magazines positively influence the use of Orthodox anti-TB drug by TB patients but they were all not significant. Similar findings by Pichu (2004), concluded that health education material was not found to have additional significant improvement in self knowledge and awareness in TB treatment.

In the second estimation, the role of both formal and informal education was quite insignificant. Formal education negatively has an influence on the number of household members screened. A probable reason attributed to this outcome is that household heads having acquired such level of education have better information about TB and are less likely to be infected with the TB disease and hence less likey to screened household members. Informal education also negatively has an influence on the number of household members screened. The findings reveal that the educational level of the household head has no relationship with the number of household members screened of Tuberculosis. Results regarding informal education tend to confirm the findings by Pichu (2004). This was a comparative study among TB patients accessing DOTS programme with and without health education. Findings revealed that TB patients taking DOTs therapy only showed an increase in the knowledge about TB regarding its causes, spread and prevention, location and clinical features, side effects of drugs and complications. However, patients taking DOTS therapy and receiving health education about TB showed no significant improvement regarding predisposing factors, location and clinical features as well as early detection and screening of pulmonary TB.

5.6 CONCLUSION

This chapter reviewed and discussed the estimation results in this study. Formal education attained by Tuberculosis patients was found to be a significant determinant in the usage of Orthodox anti-TB drug by TB patients. The study showed that as individuals acquired higher education, the probability of usage of Orthodox anti-TB drug by TB patients increased. In the same way, informal means of education, such as interacting with health providers, friends/families and community-based education also showed a positive effect on Orthodox anti-TB drug usage by TB patients. However, higher level of education was negatively related to the number household members screened. Indicators of informal means of education were found to be negatively related to the number of household members screened. These findings confirm earlier studies by Pichu (2004), Hinman et al. (1976), Hoa et al. (2003) etc. Thus, formal education has a significant influence on the usage of Orthodox anti-TB drug but not screening of household members for Tuberculosis disease in the Lower Manya Krobo and New Juaben Municipalities.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION, POLICY RECOMMENDATIONS AND LIMITATIONS

6.0 INTRODUCTION

This chapter presents a summary of the findings from this study. The chapter also provides some policy recommendations based on the findings from this study, limitations, suggestions for further research areas and conclusion of the study. Thus, the chapter is divided into three sections. Section one presents a summary of findings in relation to the expected results and conclusion. The second section also provides some policy recommendations based on the results. The third section then enumerates some limitations of the study.

6.1 SUMMARY OF FINDINGS AND CONLUSION

The general objective of this study is to examine the effect of education on Tuberculosis control in the Eastern Region of Ghana. The specific objectives of the study were:

(1) To examine the role of formal and informal education in the treatment of Tuberculosis by TB patients in the Lower Manya Krobo and New Juaben Municipalities.

(2) To find out the role of education on the prevention of Tuberculosis in the Lower Manya Krobo and New Juaben Municipalities in the Eastern Region.

Based on the results from the study, education was found to play a major role in the use of Orthodox anti-TB drug in the fight against TB in Ghana. The study revealed that both formal and informal education has a significant influence on the various intervention schemes used in controlling TB most especially the use of Orthodox anti-TB drug by Tuberculosis patients. This study expected formal education to have a positive influence on the use of Orthodox anti-TB drug with TB patients. As expected, results from the study confirmed that TB patients with Secondary/Higher education were more likely to use Orthodox anti-TB drug as compared to TB patients with no education. The variable was significant at 5% (i.e. 0.019 < 0.05). In the same way, informal means of education, such as interacting with health providers, friends/families and reading of leaflets and magazines also had a positive influence on the use of Orthodox anti-TB drug with TB patients. However, TB patients who obtained their health information from these informal sources were more likely to use Orthodox anti-TB drug as compared to those who obtained their health information by watching Television. The variables were found to be insignificant.

Gebeyehu et al. (2014), in their study in Ethiopia concluded that higher education had a positive effect on the treatment of Tuberculosis. A study by Wikstöm (2011) in Uganda also specified the importance of informal means of educating communities in fighting Tuberculosis. The study also controlled for the variable such as religion which played a negative role in the use of Orthodox anti-TB drugs. Results showed that TB patients who are Christians were less likely to use Orthodox anti-TB drugs compared to non-Christians. The variable was found to be insignificant.

The study also hypothesized a negative relationship between formal education of household head and the number of household members screened for Tuberculosis disease. This implies that a household head with formal education is likely to decrease his rate of screening members of the households compared to a household head with no education. A probable reason attributed to this outcome is that the household head with formal education have better information about TB and are less likely to be infected with the TB disease compared to household head with no education. Findings from the study were similar to the results obtained by of Hinman et al., (1976). Informal ways of promulgating Tuberculosis messages such as interaction with health providers, friends/families, community-based education, the radio, reading leaflets and magazines all proved to be insignificant and was negatively related to the number of household members screened for Tuberculosis disease. This means that informal sources of education, such as the radio, television, leaflets and magazines, community-based education, personal interaction with health providers and friends/ families need to be intensified. Thus, it must be strongly emphasized that the media is a very important avenue to spread TB related knowledge in the general public and therefore suggest that it is used. Findings from the study revealed that female household heads in both New Juaben Municipality and Lower Manya Krobo Municipality were likely to increase their rate of screening household members compared to male household heads. This might be due to the fact that female household heads in both Municipalities are more concerned about their health and have more positive health behaviours than their male counterparts. Control variables such as the number of household members covered by the National Health Insurance Scheme and the location of a TB household was positively related to the number of household members screened with the exception of households with one member covered with National Health Insurance Scheme and TB households in the rural New Juaben Municipality.

Generally, by reasons of the results in this study, it can be concluded that both formal and informal sources of education are very important in the usage of the Orthodox anti-TB drug in the fight against Tuberculosis. However, there seems to be a negative relationship between formal and informal education and the number of household members screened for the Tuberculosis disease. Much attention should therefore be given to how households with a TB patient are screened by policy makers to ensure effective formulation of policies to fight Tuberculosis in Ghana.

6.2 POLICY RECOMMENDATIONS

Since formal education was found to have a positive influence on the use of Orthodox anti-TB drug by TB patients, there is the need for policy-makers to strictly monitor and ensure that the compulsory free basic education is strengthened throughout the country most especially in the Public schools. Since, the compulsory free basic education would help increase basic school enrolment, which also forms the foundation for attaining secondary/higher education as proven to be a significant determinant of Orthodox anti-TB drug usage. However, secondary school education should be made compulsory and free because of its positive and significant role in the use of Orthodox anti-TB drug treatment by TB patients.

The fight against Tuberculosis will be effective if more people attain higher education as Grossman (2000) argued. He argued, inter alia, that individuals with formal education are more likely to get the best from medication and thus improve their health. This study has also brought out the importance of informal means of educating individuals, household or communities on TB prevention and control. The National Tuberculosis Control Programme in Ghana should be encouraged to intensify the promotion of TB messages on radio, television, community-based education, and most especially personal interactions with health providers, friends/families and reading leaflets and magazines since they positively promoted the usage of Orthodox anti-TB drug though they were insignificant. Thus, it must be strongly emphasized that media is also an important avenue to spread TB related knowledge in the general public and therefore suggest that it is used.

Much attention should now be shifted to quality of TB messages. If the messages are well understood, there is the likelihood of individuals acting upon it in terms of prevention, treatment and control of the TB disease. It is therefore important to explain the TB disease and the means of controlling in the local dialect. This is important because the disease being referred to in the local dialect may be different from the TB disease that is widely known. Thus, the disease should be explained very well, especially when using the local dialect so that individuals would have a perfect understanding of the disease and how to control it.

The Ministry of Health and Ghana Health Service, who are major stakeholders, should provide the health training institutions with the necessary facilities to train more health workers and community volunteers to promulgate the messages of TB and its means of control in communities and villages. These people can help, especially in places where there is no establishment of modern health facilities.

A large proportion of people with common symptoms of TB, present themselves to pharmacies and may be sent back with medicines that only address these symptoms. There is the need to involve Pharmacies in identification and referral of people with symptoms of TB to seek medical attention at the hospital.

The National Youth Employment Programme (NYEP) has a "health extension workers" training programme as part of its modules. Therefore, more health extension workers should be trained under this programme to support the health sector to attain its goals. This health extension workers' programme can be extended to all regions of the country. However, these initiatives should be encouraged because they have the potential to empower people to fight TB.

The study also revealed a positive link between the usage of Orthodox anti-TB drug and the number of household members insured. Therefore, the NHIS should be adequately financed and properly decentralized to ensure that the entire nation is covered under the scheme. This will provide access to healthcare by the majority of Ghanaians especially TB patients.

6.3 LIMITATIONS

Due to time and financial constraint, one evident limitation of the study is the fact that the study was limited to the New Juaben Municipality and Lower Manya Krobo Municipality all in the Eastern region of Ghana. Hence, there is the need for further studies to be conducted taking into account the ten (10) regions of Ghana.

Secondly, the less likely effect of household head educational level and informal means of education on the number of household members screened of Tuberculosis were quite striking and also require further investigations.

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APPENDICES

APPENDIX 1

Presentation of Results of the Probit Regression Model: Dependent Variable: Use of Orthodox anti-TB drug by TB Patient.

Regressand: Use of Orthodox Anti-TB drug	Coef.	Std. Err.	z	P > z	[95% conf. Interval]	
Sex	.1679993	.1758937	0.96	0.340	-.176746	.5127447
Age	-.3149843	.1147793	-2.74	0.006**	-.5399477	.090021
Number of dependents	.2678921	.0794242	3.37	0.001***	.1122235	.4235608
Education	.3184216	.1148406	2.77	0.006**	.093338	.5435051
Household head	-.5649298	.1910408	-2.96	0.003**	-9393628	.1904968
Health information	.0085709	.0595949	0.14	0.886	-.108233	.1253749
Member of NHIS	.7886544	.2072566	3.18	0.000***	.3824389	1.19487
Religion	.2349454	.2628135	0.89	0.371	-.2801597	.7500504
Location	.0452026	.0724699	0.62	0.533	-.968357	.1872409
-Cons	-.4715607	.598448	-0.79	0.431	-1.644497	.7013758

Prob > chi2 = 0.000
Pseudo R^2 = 0.1538
Number of observations = 270

Source: Author's computation using STATA 13, *- significant at 1%, **- significant at 5%, *- significant at 10%**

APPENDIX 2

Presentation of Results of the Probit Regression Model: Dependent Variable: Use of Orthodox anti-TB drug by TB Patient.

Regressand: Use of Orthodox anti-TB drug	Coef.	Standard Error	Z	P > z	95% Conf. Interval
Sex					
Male	-.2158455	.1875169	-1.15	0.250	-5833719 .151681
Female	0	(base)	N/A	N/A	
Age					
0-14	.7992417	.4881125	1.64	0.102**	-.1574413 1.755925
15-34	.5750297	.2762138	2.08	0.037**	.0336606 1.116399
35-54	-.0679679	.2486504	-0.27	0.785	-.5553136 .4193779
55 and above	0	(base)	N/A	N/A	
Number of dependents					
None	0	(base)	N/A	N/A	
1-2	.1522501	.2231764	0.68	0.495	-.2851676 .589667
3-5	.2212331	.3649124	0.61	0.544	-.4939821 .9364483
6-8	1.091087	.288763	3.78	0.0000***	.5251223 1.657053
8 and above	.3261571	.531121	0.61	0.539	-.7148209 1.367135
Education					
Never been to school	0	(base)	N/A	N/A	
Primary	.1815421	.2238661	0.81	0.417	-.2572274 .6203117
Secondary/higher	.6113237	.2624842	2.33	0.020**	.0968641 1.125783
Household head					
No	.4505247	.208103	2.16	0.030**	.0426504 .858399
Yes	0	(base)	N/A	N/A	
NHIS Member					
No	-.820004	.2208298	-3.71	0.000***	-1.252822 -.3871856
Yes	0	(base)	N/A	N/A	
Health Information					
Television	0	(base)	N/A	N/A	
Radio	-.1887431	.2964683	-0.64	0.524	-.7698102 .3923241
Health provider	.061168	.2947238	0.21	0.836	-.51648 .6388161
Community-based education	-.1795281	.3200229	-0.56	0.575	-.8067615 .4477053
Friends/families	.0543699	.4306599	0.13	0.990	-.789708 .8984477
Leaflets and magazines	.0006634	.3984038	0.00	0.999	-.7801937 .7815206
Religion					
Christians	-.0254669	.2815493	-0.09	0.928	-.5772933 .5263596
Other Christians	0	(base)	N/A	N/A	

Appendix 2 Continued

Regressand: Use of Orthodox anti-TB drug	Coef.	Standard Error	Z	P > z	95% Conf. Interval
Location					
Urban-New Juaben	0	(base)	N/A	N/A	
Rural-New Juaben	.5569781	.2895748	1.92	0.054**	-.0105781 1.124534
Urban-Lower Manya Krobo	-.1192814	.2313711	-0.52	0.606	-.5727604 .3341976
Rural-Lower Manya Krobo	.40804	.2431662	1.68	0.093	-.0685568 .8846368
Cons	-.6074178	-.496248	-1.22	0.221	-1.580046 .3652103
Prob > chi2 = 0.0000 Pseudo R2 = 0.2055 Number of observations = 270					

Source: Author's computation using STATA 13, *-significant at 1%, **-significant at 5%, *-significant at 10%, N/A- Not Applicable**

APENDIX 3

Marginal Effects for Probit Regression Model: Dependent Variable: Use of Orthodox anti-TB drug by TB patients.

Regressand: Use of Orthodox anti-TB drug	dy/dx	Standard Error	Z	P > z	95% Conf. Interval
Sex					
Male	-.067861	.0587304	-1.16	0.248	-.1829704 .0472484
Female	(Reference cat)				
Age					
0-14	.2543963	.1441559	1.76	0.078	-.028144 .5369366
15-34	.1877396	.0895088	2.10	0.036**	.0123055 .3631736
35-54	-.0224047	.0821251	-0.27	0.785	-.183367 .1385576
55 and above	(Reference cat)				
Number of dependents					
None	(Reference cat)				
1-2	.0479925	.0694788	0.69	0.490	-.0881835 .1841685

Appendix 3 Continued

Regressand: Use of Orthodox anti-TB drug	**dy/dx**	**Standard Error**	**Z**	**P > z**	**95% Conf. Interval**	
Number of dependents						
3-5	.0698119	.1144244	0.61	0.542	-.1544558	.2940795
6-8	.3221878	.0732664	4.40	0.000***	.1785884	.4657872
8 and above	.102899	.1656224	0.62	0.534	-.221715	.427513
Education						
Never been to school	(Reference cat)					
Primary	.0592906	.0730769	0.81	0.417	-.0839375	.2025186
Secondary/higher	.1968518	.0842265	2.34	0.019	.0317708	.3619327
Household head						
Yes	(Reference cat)					
No	.1452812	.068591	2.16	0.031**	.0132975	.2772649
NHIS Member						
Yes	(Reference cat)					
No	-.2674487	.068591	-3.90	0.000***	-4018846	-.1330128
Health Information						
Television	(Reference cat)					
Radio	-.0594601	.093126	-0.64	0.523	-.2419837	.1230634
Health provider	.0191033	.0920693	0.21	0.836	-.1613493	.1995558
Community-based education	-.0565518	.1008067	-0.56	0.575	-.2541292	.1410257
Friends/families	.016987	.1342829	0.13	0.899	-.2462026	.2801766
Leaflets and magazines	.0002079	.1248309	0.00	0.999	-.2444563	.244872
Religion						
Christians	-.007994	.0883194	-0.09	0.928	-.1810968	.1651087
Other Christians	(Reference cat)					
Location						
Urban-New Juaben	(Reference cat)					
Rural-New Juaben	.1726178	0.855313	2.02	0.044**	.0049794	.3402561
Urban-Lower Manya Krobo	-.0377748	.0735391	-0.51	0.607	-.1819089	.106359
Rural-Lower Manya Krobo	.1280773	.074745	1.71	0.087	-.0184201	.2745748

Note: dy/dx for factor levels is the discrete change from the base level.

Source: Author's computation using STATA 13, *-significant at 1%, **-significant at 5%. *-significant at 10%**

APPENDIX 4

Presentation of Results of the Poisson Regression Model: Dependent Variable: Number of Household members screened

Regressand: Number of household members screened for TB	**Coef.**	**Standard Error**	**Z**	**P > z**	**95% Conf. Interval**	
HH educational level						
Never been to school	(Reference cat.)					
Primary	-.1040042	.1182261	-0.88	0.379	-.3357232	.1277148
Secondary/higher	-.150145	.1272615	-1.18	0.238	-.3995729	.0992829
Health Information						
Television	(Reference cat.)					
Radio	-.4584668	.1554937	-2.95	0.003**	-.7632289	-.1537048
Health provider	-.1676765	.1448732	-1.16	0.247	-.4516228	.1162698
Community-based education	-.5190188	.1651406	-3.14	0.002**	-.8426884	-.1953491
Friends/families	-.186992	.2139809	-0.87	0.382	-.6063868	.2324028
Leaflets and magazines	-.0548622	.2051813	-0.27	0.789	-.4570101	.3472857
Household size						
1-2	(Reference cat.)					
3-5	.0465482	.1356919	0.34	0.732	-.2194029	.3124994
6-8	-.09832	.1480273	-0.66	0.507	-.3884481	.1918082
8 and above	-.0396654	.2327454	-0.17	0.865	-.4958381	.4165073
Sex of household head						
Female	.1410588	.0971467	1.45	0.146	-.0493453	.3314629
Male	(Reference cat.)					
Household NHIS Members						
1	-.1441827	.157955	-0.91	0.361	-.4537688	.1654033
2	.0736517	.1864149	0.40	0.693	-.2917147	.4390182
3	.2625598	.1568116	1.67	0.094	-.0447853	.5699049
4	.0302992	.1762501	0.17	0.864	-.3151446	.3757431
5	.0013237	.194065	0.01	0.995	-.3790367	.3816842
6	.546468	.188336	2.90	0.004**	.1773363	.9155997
7	.6874709	.2170361	3.17	0.002**	.2620881	1.112854
None	(Reference cat.)					
Location						
Urban-New Juaben	(Reference cat.)					
Rural-New Juaben	-.0234343	.1779917	-0.13	0.895	-.3722917	.3254231
Urban-Lower Manya Krobo	.3787253	.130571	2.90	0.004**	.1228108	.6346398
Rural-Lower Manya Krobo	.3588056	.1333161	2.69	0.007**	.0975108	.6201003
_Cons	.547397	.2199136	2.49	0.013**	.1163742	.9784199
Prob > chi2 = 0.000 Pseudo R2 = 0.0684 Number of observations = 270						

Source: Author's computation using STATA 13, *-significant at 5%

APPENDIX 5

Presentation of Results of the Poisson Regression Model: Dependent Variable: Number of Household members screened

Testing for Robustness

Regressand: Number of household members screened for TB	**Coef.**	**Robust Standard Error**	**Z**	**P > z**	**95% Conf. Interval**	
HH educational level						
Never been to school	(Reference cat.)					
Primary	-.1040042	.1066765	-0.97	0.330	-.3130863	.105078
Secondary/higher	-.150145	.1073344	-1.40	0.162	-.3605165	.0602265
Health Information						
Television	(Reference cat.)					
Radio	-.4584668	.1442344	-3.18	0.001***	-7411611	-.1757725
Health provider	-.1676765	.1322501	-1.27	0.205	-.426882	.091529
Community-based education	-.5190188	.1740537	-2.98	0.003**	-.8601577	-.1778798
Friends/families	-.186992	.1873484	-1.00	0.318	-.5541881	.180204
Leaflets and magazines	-.0548622	.2135393	-0.26	0.797	-.4733916	.3636672
Household size						
1-2	(Reference cat.)					
3-5	.0465482	.095329	0.49	0.625	-.1402931	.2333895
6-8	-.09832	.1053385	-0.93	0.351	-.3047797	.1081397
8 and above	-.0396654	.2983562	-0.13	0.894	-.6244327	.5451019
Sex of household head						
Female	.1410588	.0855726	1.65	0.099	-.0266604	.308778
Male	(Reference cat.)					
Household NHIS Members						
1	-.1441827	.1036461	-1.39	0.164	-.3473253	.0589598
2	.0736517	.1337495	0.55	0.582	-.1884924	.3357958
3	.2625598	.120951	2.17	0.030**	.0255003	.4996194
4	.0302992	.1548756	0.20	0.845	-.2732514	.3338499
5	.0013237	.1441227	0.01	0.993	-.2811515	.283799
6	.546468	.2202692	2.48	0.013**	.1147483	.9781876
7	.6874709	.2316728	2.97	0.003**	.2334007	1.141541
None	(Reference cat.)					
Location						
Urban-New Juaben	(Reference cat.)					
Rural-New Juaben	-.0234343	.1228043	-0.19	0.849	-.2641263	.2172577
Urban-Lower Manya Krobo	.3787253	.1019325	3.72	0.000***	.1789412	.5859893
Rural-Lower Manya Krobo	.3588056	.1159122	3.10	0.002**	.1316218	.5859893
_Cons	.547397	.1767162	3.10	0.002**	.2010397	.8937544
Prob > chi2 = 0.000	log pseudo likelihood = -390.91849					

Pseudo R2 = 0.0684 Number of observations = 270	Wald chi2 (21) = 94.96

Source: Author's computation using STATA 13, *-significant at 1%, **-significant at 5%, *-significant at 10%**

APPENDIX 6

Presentation of Results of the Poisson Regression Model: Dependent Variable: Number of Household members screened

Regressand: Number of household members screened for TB	IRR	Robust Standard Error	Z	P > z	95% Conf. Interval	
HH educational level						
Never been to school	(Reference cat.)					
Primary	.9012215	.0961392	-0.97	0.330	.7311868	1.110797
Secondary/higher	.8605832	.0923702	-1.40	0.162	.697316	1.062077
Health Information						
Television	(Reference cat.)					
Radio	.6322522	.0911925	-3.18	0.001***	.4765602	.8388088
Health provider	.8456273	.1118343	-1.27	0.205	.6525406	1.095849
Community-based education	.5951042	.1035801	-2.98	0.003**	.4230953	.837043
Friends/families	.8294504	.1553962	-1.00	0.318	.5745386	1.197462
Leaflets and magazines	.9466156	.2021397	-0.26	0.797	.6228861	1.438595
Household size						
1-2	(Reference cat.)					
3-5	1.047649	.0998712	0.49	0.625	.8691035	1.262873
6-8	.9063589	.0954745	-0.93	0.351	.7372858	1.114203
8 and above	.961111	.2867534	-0.13	0.894	.5355652	1.724784
Sex of household head						
Female	1.151492	.0985362	1.65	0.099	.9736918	1.36176
Male	(Reference cat.)					
Household NHIS Members						
1	.8657295	.0897295	-1.39	0.164	.7065755	1.060733
2	1.076432	.1439722	0.55	0.582	.8282068	1.399053
3	1.300254	.157267	2.17	0.030**	1.025828	1.648-94
4	1.030763	.1596401	0.20	0.845	.7609015	1.396334
5	1.001325	.1443136	0.01	0.993	.754914	1.328166
6	1.727142	.3804361	2.48	0.013**	1.121591	2.659632
7	1.98868	.4607229	2.97	0.003**	1.262887	3.131591
None	(Reference cat.)					
Location						
Urban-New Juaben	(Reference cat.)					
Rural-New Juaben	.9768381	.1199599	-0.19	0.849	.7678766	1.242664
Urban-Lower Manya Krobo	1.460422	.1488645	3.72	0.000***	1.19595	1.783378
Rural-Lower Manya Krobo	1.431618	.165942	3.10	0.002**	1.140677	1.796768

_Cons	1.728747	.3054976	3.10	0.002**	1.222672	2.444289
Prob > chi2 = 0.000 Pseudo R2 = 0.0684 Number of observations = 270	log pseudo likelihood = -390.91849 Wald chi2 = 94.96					

Source: Author's computation using STATA 13, *-significant at 1%, **-significant at 5%, *-significant at 10%**

APPENDIX 7

Presentation of Results of Negative Binomial Regression Model: Dependent Variable: Number of Household members screened

Regressand: Number of household members screened for TB	IRR	Robust Standard Error	Z	P > z	95% Conf. Interval	
HH educational level						
Never been to school	(Reference cat.)					
Primary	.9012214	.1065485	-0.88	0.379	.7148201	1.13623
Secondary/higher	.860583	.1095196	-1.18	0.238	.6706054	1.10438
Health Information						
Television	(Reference cat.)					
Radio	.6322519	.0983117	-2.95	0.003**	.4661579	.857526
Health provider	.8456271	.1225093	-1.16	0.247	.6365932	1.1233
Community-based education	.5951038	.0982763	-3.14	0.002**	.4305505	.8225482
Friends/families	.8294503	.1774873	-0.87	0.382	.5453165	1.26163
Leaflets and magazines	.9466153	.1942287	-0.27	0.789	.6331725	1.415223
Household size						
1-2	(Reference cat.)					
3-5	1.047649	.1421581	0.34	0.732	.802997	1.366839
6-8	.9063586	.1341665	-0.66	0.507	.6781073	1.21144
8 and above	.9611113	.2236953	-0.17	0.865	.6090591	1.516659
Sex of household head						
Female	1.151493	.1118643	1.45	0.146	.9518517	1.393006
Male	(Reference cat.)					
Household NHIS Members						
1	.8657295	.136747	-0.91	0.361	.6352286	1.179871
2	1.076432	.200664	0.40	0.693	.7469805	1.551187
3	1.300255	.2038961	1.67	0.094	.9562019	1.768103
4	1.030763	.181673	0.17	0.864	.7296822	1.456076
5	1.001325	.1943231	0.01	0.995	.684193	1.456076
6	1.727144	.3252848	2.90	0.004**	1.194032	2.49828
7	1.988682	.4316178	3.17	0.002**	1.29964	3.04304
None	(Reference cat.)					
Location						
Urban-New Juaben	(Reference cat.)					
Rural-New Juaben	.9768381	.17387	-0.13	0.895	.6891519	1.284619

Urban-Lower Manya Krobo	1.460422	.1906898	2.90	0.004**	.1.13067	1.886346
Rural-Lower Manya Krobo	1.431619	.1908588	2.69	0.007**	1.102422	1.859118
_Cons	1.72873	.3801732	2.49	0.013**	1.102422	2.660229
Prob > chi2 = 0.000 Pseudo R2 = 0.0684 Number of observations = 270	Likelihood-ratio test of alpha = 0: chi2 (01) = 0.0e+00 Prob chi2 = 0.500 LR chi2(21) = 57.36					

Source: Author's computation using STATA 13, *-significant at 1%, **-significant at 5%, *-significant at 10%**

APPENDIX 8

QUESTIONNAIRE- PATIENTS

UNIVERSITY OF GHANA- LEGON

DEPARTMENT OF ECONOMICS

Dear participants,

This questionnaire is to undertake a household survey in the New Juaben Municipality and Lower Manya Krobo Municipality to collect information from households on Pulmonary Tuberculosis. The questionnaire seeks information on patient characteristics, knowledge about Tuberculosis infection, prevention of Tuberculosis and health seeking behaviour. The questions will require approximately 30-40 minutes completing.

Information provided by you will aid the researcher in completing a thesis work titled: **EDUCATION-TUBERCULOSIS CONTROL NEXUS IN GHANA: A CASE OF LOWER MANYA KROBO AND NEW JUABEN MUNICIPALITIES IN THE EASTERN REGION.**

Information provided will be treated with the confidentiality it deserves. Thank you.

Please tick **[x**] the appropriate response and to other questions provide the appropriate response in the space provided.

(A) PATIENT CHARACTERISTICS

(1) Sex: (a) Male [ ] (b) Female [ ]

(2) Age bracket:

(a) 0-14 years [ ] (b) 15-34 years [ ] (c) 35-54 years [ ] (d) 55+ years [ ]

(3) Are you the head of the household?

(a) Yes [ ] (b) No [ ]

(4a) Number of dependents:

(a) None [ ] (b) 1-2 [ ] (c) 3-5 [ ] (d) 6-8 [ ] (e) 8 and above [ ]

(4b) Household size:..

(5) Educational level:

(a) Never been to school [ ] (b) Primary [ ] (c) Secondary or higher [ ]

(6) Marital Status:

(a) Never married [ ] (b) Married [ ] (c) Consensual union [ ]

(d) Separated/divorced [ ] (e) Widow [ ]

(7) Religion:

(a) Catholic [ ] (b) Anglican/Methodist/Presbyterian [ ]

(c) Pentecostal/Charismatic [ ] (d) Muslim [ ] (e) Traditional/Spiritual [ ]

(f) Other Christian [ ] (g) No religion [ ]

(8) Main occupation:

(a) Farmer [ ] (b) Student [ ] (c) Salaried worker [ ]

(d) Unemployed [ ] (e) Self-employed [ ] (f) Retired [ ]

(g) Other, (specify)……………………………………………………………………

(9) Residence:

(a) Urban [ ] (b) Suburban [ ] (c) Rural [ ] (d) Homeless [ ]

(e) Other, (specify)…………………………………………………………………

(B) PATIENT KNOWLEDGE ABOUT TUBERCULOSIS INFECTION

(10) Do you know what TB is?

(a) Yes [ ] (b) No [ ]

(11) Do you think that TB is a serious disease?

(a) Yes [ ] (b) No [ ]

(12) What causes TB?

(a) Bacterial [ ] (b) Virus [ ] (c) Evil eye [ ] (d) Satan or witchcraft [ ]

(e) Don't know [ ] (f) Other, (specify)…………………………………………………

(13) Do you know how TB is diagnosed?

(a) Through sputum examination [ ] (b) Through X-ray [ ]

(c) Other, (specify)............................ (d) Don't know [ ]

(14) Have you or any of your family members been diagnosed of TB disease by a medical officer?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

If yes answer questions 15a-15b

(15a) Did you receive information about TB in the last 3 months before you were diagnosed?

(a) Yes [ ] (b) No [ ]

(15b) If yes, by which medium of information?

(a) Television [ ] (b) Radio [ ] (c) Internet [ ] (d) Health provider [ ]

(e) Community-based education (f) Other, (specify)...

(16) How long have you or any of your family members been with the disease?

(a) 1-3 months [ ] (b) 4-6 months [ ] (c) 7-9 months [ ]

(d) 10 months and over [ ]

(17a) Is TB infectious?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(17b) What are the symptoms of someone infected with TB?

(a) Cough for more than 3 weeks [ ] (b) Sputum with blood [ ] (c) Fever [ ]

(d) Weight loss [ ] (e) Night sweat [ ] (f) No appetite [ ] (g) Don't know [ ]

(18) How can a person get TB? (Transmission)

(a) Contact with TB patient [ ] (b) Unclean food or water [ ] (c) Cough (air) [ ]

(d) Sharing utensils, objects with an infected person [ ] (e) Hereditary [ ]

(f) Other, (specify)..

(19) Do you know that TB can be cured?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(20) Where do you receive most of your health information?

(a) Television [ ] (b) Radio [ ] (c) Health provider

(d) Community-based education [ ] (e) Friends/families [ ]

(f) Leaflets and Magazine [ ] (g) Other, specify ……………………….

(21) How long does the TB treatment take?

(a) 1 month [ ] (b) 2 months [ ] (c) 3 months [ ] (d) 6 months [ ]

(e) 8 months [ ] (f) 9 months [ ] (g) 1 year and above [ ] (h) Don't know [ ]

(22) Do you know that some cases of TB will require a longer treatment to be cured (MDT-TB)?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(C) PREVENTION OF TUBERCULOSIS

(23a) Is TB preventable?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(23b) I f yes, how can TB be prevented?

(a) Avoid contact with TB patients [ ] (b) Eat balanced diet [ ] (c) By not sharing utensil objects with an infected person [ ] (d) Avoid sex with TB patients [ ]

(e) Other, (specify) ……………..

(24) Have your household been screened of TB?

(a) Yes [ ] (b) No [ ]

(2b) If yes, how many members in the household have been screened?

(a) 1 [ ] (b) 2 [ ] (c) 3 [ ] (d) 4 [ ] (e) 5 and above [ ]

(C) HEALTH SEEKING BEHAVIOUR (PATIENTS WITH TB)

(25a) Where did you first seek treatment when you became ill?

(a) Self-treatment [ ] (b) Traditional healer [ ] (c) Private facility [ ]

(d) Chemist shop [ ] (e) Public facility [ ]

(f)Other, (specify)..

(25b) Why?

(a) Was cheaper [ ] (b) Was closer [ ] (c) More convenient schedule [ ]

(d) Better care received [ ] (e) Better attitude from health worker [ ]

(f) Trusted more [ ] (g) Other, (specify)..

(25c) How long were you sick before you first sought treatment?

(a) Days [ ] (b) Weeks [ ] (c) Months [ ]

(25d) Why did you delayed in seeking treatment?

(a) Financial problem [ ] (b) Lack of knowledge on TB [ ] (c) Longer waiting time in the health facility [ ] (d) Stigmatization [ ] (e) Longer travelling time to the health facility [ ] (f) Other, (specify)……………………………………………………………..

(25e) Are you a member of the National Health Insurance Scheme?

(a) Yes [ ] (b) No [ ]

(26a) Are you on Orthodox anti- TB treatment drug?

(a) Yes [ ] (b) No [ ]

(26b) What were the first symptoms that prompted you to seek treatment?

(a) Cough for more than three weeks [ ] (b) Sputum with blood [ ] (c) Fever [ ]

(d) Loss of weight [ ] (e) Night sweat [ ] (f) Other, (specify)............................

(27) After you were given the treatment how was your condition

(a) Improved [ ] (b) Worsened [ ] (c) Same [ ]

(28) Is the recovery complete?

(a) Yes [ ] (b) No [ ] (c) Don't know [ ]