

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



**IMPLEMENTATION CHALLENGES OF TB DOTS STRATEGIES IN AJUMAKO
ENYAN ESIAM DISTRICT**

BY

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MASTER OF PUBLIC HEALTH (MPH) DEGREE**



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DECLARATION

I, Emmanuel Kwaku Sarfo, hereby declare that with the exception of referenced works of other people, which have been cited and duly acknowledged, this work is an output of my own initiative. This research has neither in whole nor in part been presented for an award or a degree elsewhere.



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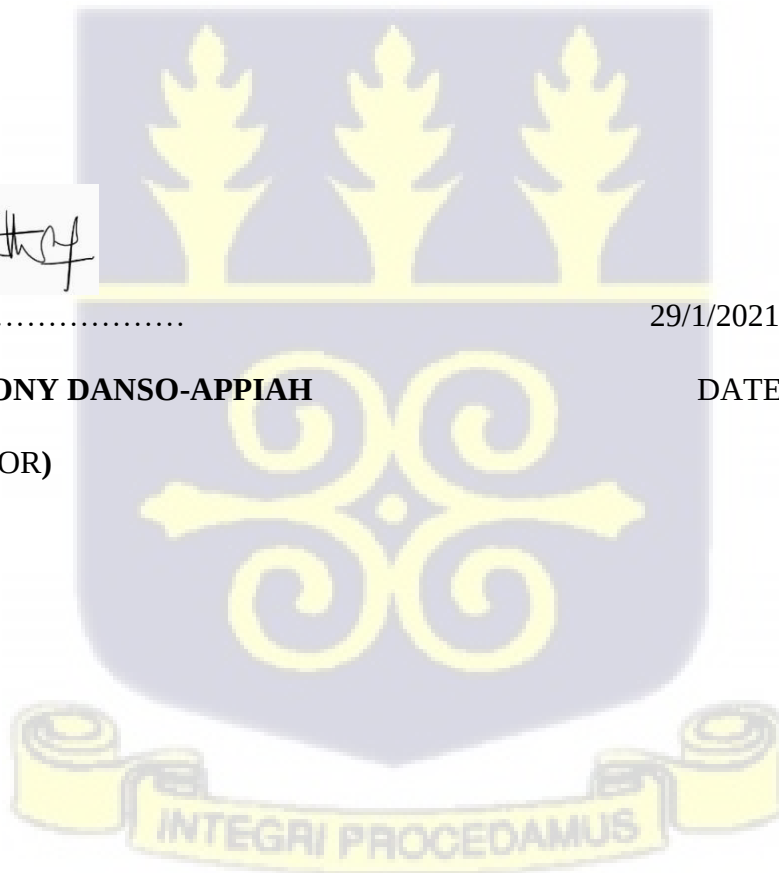
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DEDICATION

To my lovely wife, Mrs Rose Sarfo and my two sons, Kwadwo Ampomah Sarfo and Fiifi Ofori Sarfo for supporting me spiritually and being there for me at all time.



ACKNOWLEDGEMENT

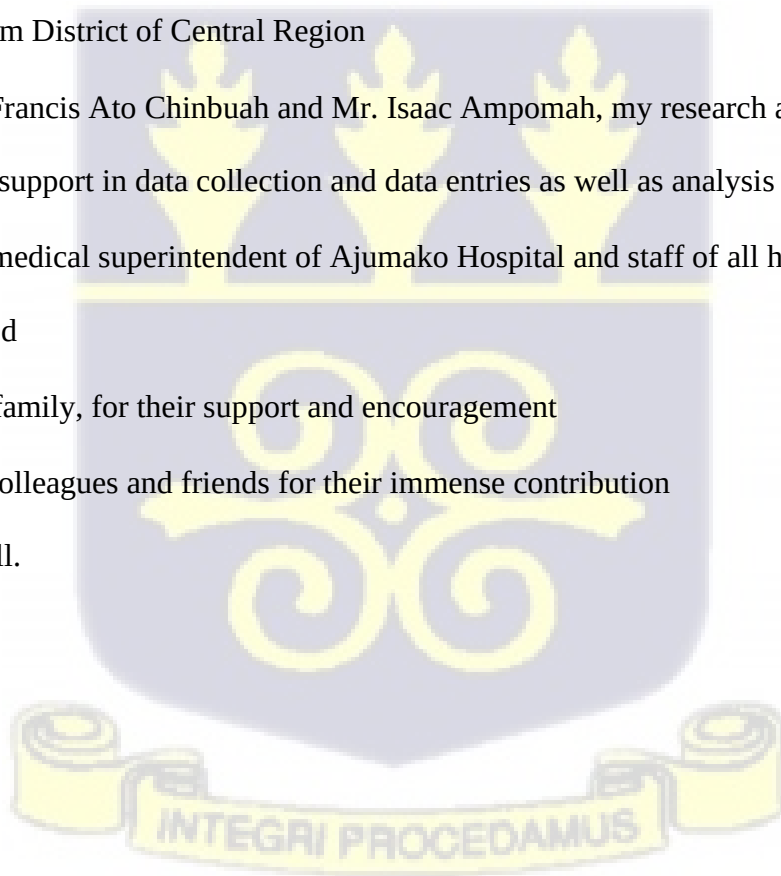
To the almighty God, may His name be praised!

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Thank you all.



ABSTRACT

Background: Tuberculosis (TB) is one of the deadliest infectious diseases in the world. It is estimated that in 2000, more than 1.7 million people who lived with tuberculosis but without HIV were killed. Similarly, in 2018, nearly 1.2 million people living with TB died. In this regard, WHO with its member partners introduced measures including the Directly Observed Treatment Short-Course (DOTS) Strategy as a tool in curbing the menace. With the introduction of the DOTS strategy, it was expected that the rate of detection will increase with the burden of TB incidence reduced. However, available records showed otherwise of the adopted strategy. This study, therefore, seeks to assess the challenges that the DOTS strategy implementation face in Ajumako-Enyan-Essiam District.

Method: The research was a cross-sectional study using both quantitative and qualitative approaches. Variables for this study included health-related factors, community-based factors, and TB patient-based factors. At each level, different stages of the sampling approach were applied. For TB patients, a complete census was conducted on all TB clients registered from 2017 to 2019. On health factors, frontline health workers in TB case management were randomly sampled from the various health facilities in the district. Communities were randomly sampled among communities in the district. Data collected were entered and analysed using STATA version 15.0 and results presented in frequencies and tables. All Ethical considerations were appropriately addressed.

Results: The study recruited 19 health facilities and 184 Tb patients. General knowledge among TB patients was high with 91.8% having adequate knowledge. Patients who were Christians (AOR: 7.5; CI: 1.62-35.30), females (AOR: 3.4; CI: 1.05-10.81) patients who live between 5-10kms away from a facility (AOR: 6.2; CI: 1.34-28.9), patients who always have access to nutritious food anytime TB drugs are

taking (AOR: 8.3; CI: 1.71-40.58) and patients who have not been stigmatized before (AOR: 8.2; CI: 2.73-24.88) are more likely to adhere to TB treatment. The implementation of the DOTS programme in the various facilities is faced with challenges such as limited funding, delay in testing for samples that are referred from other facilities and inadequate training for health workers.

Conclusion: The DOTS programme implementation faces a number of challenges both from the facility and patient levels which have implications for policy and control. However, there are positive outcomes within some of the areas that enhances the programme implementation if it is managed in a appropriate manner.



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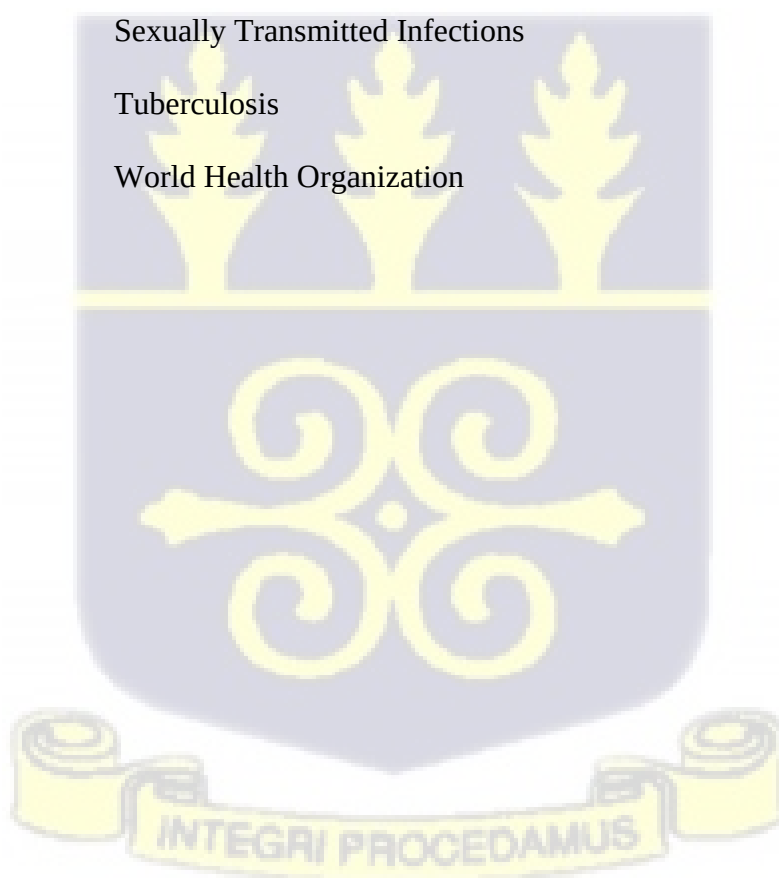
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LIST OF ABBREVIATIONS

CDC	Centre for Disease Control
CHPS	Community Health Planning and Services
CSS	Community System Strengthening
DHIMS	District Health Information and Management System
DHMT	District Health Management Team
DOTS	Directly Observed Treatment Short-course
GHS	Ghana Health Service
HIV	Human Immuno-deficiency Virus
HSS	Health System Strengthening
MDR	Multi-drug Resistant
STIs	Sexually Transmitted Infections
TB	Tuberculosis
WHO	World Health Organization



CHAPTER ONE

INTRODUCTION

1.1 Background

Tuberculosis (TB) is the deadliest infectious disease in the world (Global Fund, 2019). It is estimated that in addition to HIV, more than 2 million people died from TB in 2000 and although there is reduction, still, over 1.7 million deaths were reported in 2017 (WHO, 2018). Mortality caused by TB without HIV has reduced by only 3% annually from 2000 to 2017. Notwithstanding, TB continues to cause higher deaths among infectious diseases, far higher than HIV/AIDS (Lonnroth et al., 2010) and continues to dominate the top 10 causes of death globally (WHO, 2018). It is estimated that one person with active untreated TB has the potential of infecting around 15 people in a year (Global Fund, 2019b). The World Health Organization (WHO) further indicates that over 25% of all TB-related deaths occur in Africa but combined with HIV, more than 80% of the deaths in 2016 occurred in Africa and Asia (WHO, 2018).

Globally, cases of TB have remained relatively unstable as the introduction of the DOTS program has improved case detection (WHO, 2017). Between 2000 and 2010, more than 10 million cases of TB were detected, and this remained relatively the same in 2018 (WHO, 2019). It is was estimated that about 10.4 million people, largely adults, were infected with TB in 2016 and 10.1 million cases in 2018 (WHO, 2017; (WHO, 2019). It is estimated that about 25% of the global TB incidence occurred in Africa. Figure 1 shows the global TB incidence and deaths between 200 and 2015.

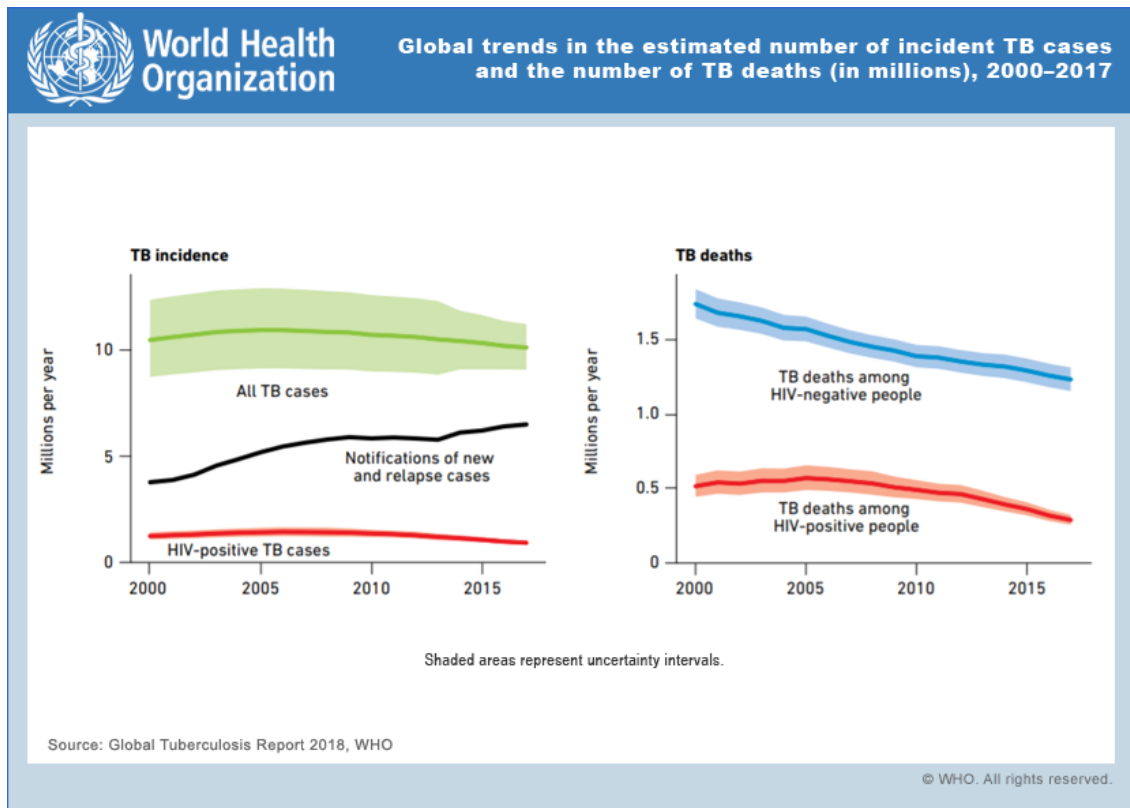


Figure 1: Global Trends in Estimated TB cases and deaths (in millions) from 2000-2017

World Health Organization (2011) indicated that there were about 8.8 million cases with more than 1.4 million deaths. These records keep increasing over time. Further reports suggest that the rate of incidence and death continues to rise in Africa and Asia where there is limited knowledge on prevalence as well as inadequate health facilities to manage the spread (WHO, 2011; Hargreaves et al, 2011; Ott, Stevens, Groeger, & Wiersma, 2012). The rates of TB cases and death per capita is relatively higher in Africa than in any other region, constituting about 24% of all global burden (WHO, 2013). One of the key factors that have exacerbated the conditions is the prevalence of HIV which has aggravated TB condition, generally. For instance, it was estimated that more than a quarter (28.5%) of TB cases that were recorded globally in 2006 were recorded in HIV-coinfected patients while 2018 reports show that persons living with HIV have 15 to 22 chances of getting TB than those without HIV (WHO, 2008; WHO 2018).

The WHO has outlined a number of causes and various points of transmission of tuberculosis with its associated symptoms. Tuberculosis largely spreads as droplet infection which is mostly through coughing, sneezing and exhaling. When any of these three happens, tubercle bacilli are released into the air. When one comes in contact with the infected fluid, he/she may get the infection. It is estimated that one in three of all people who come into contact with tuberculosis infected person gets infected with the bacteria. Severely infected people have a high potential of transmitting the infection than those with light infections. There is a lot of myth about the transmissions of TB including getting the infection through coming into contact with infected patients' clothes, dishes or bed-spread. The WHO has put in a lot of effort to dispel the myth but, still, this is a major challenge (WHO, 2014).

The WHO explains that the probability of getting infected with TB is much higher among those you live with than people who do not stay permanently with TB clients. With the introduction of antibiotics, the level of drug-resistant TB has increased over time and remains one of the main challenges in the fight against TB. Multidrug-resistant TB most often occurs through the failure of the antibiotics to eliminate all the bacteria. When this happens, the remaining bacteria develop resistance to any drug introduced to the system and therefore make treatment far difficult.

The stronger the immune system, the better the resistance to TB infection (WHO, 2014). This analogy is explained in the risk factor analysis where people with deficiencies in the immune system have a higher risk of getting infected with TB bacteria than those with a strong immune system (WHO, 2017). This can further be explained with HIV patients who have weak immunity. Another risk factor is the use of tobacco. Several studies have shown a strong association between tobacco consumption and TB (Zyl Smit et al., 2010). Other studies have shown that people with conditions such as diabetes, certain cancers, malnutrition and kidney

disease have an increased risk of developing active TB (Young, et al., 2009; Baghaei & Marjani, 2013). Ahorlu & Bonsu (2013) reported major causes of TB in Ghana and observed that the most common causes in northern Ghana are pollution, airborne exposure, smoking, physical work (construction work), blood-related problems and drinking of fresh milk from infected animals.

Tuberculosis infection grows through the lungs to present some conditions as symptoms such as continuous bad cough for 3 days, chest pains and coughing up blood or sputum. These symptoms are notably the major ones with which health diagnoses are not delayed. Other symptoms that sometimes are not diagnosed early by health workers as mentioned in some studies as part of the challenges include weakness or fatigue, weight loss, loss of appetite, chills, fever and sweating at night. These are not obvious signs of TB and may either relate to HIV and any other sickness. When a patient presents symptoms of this nature, health workers tend to diagnose for all available viruses and bacteria.

1.2 Problem Statement

Tuberculosis continues to be a major public health issue as more and more death cases are reported. Different approaches have been adopted to ensure that the trend of TB reported deaths are reduced drastically. With the introduction of the DOTS strategy, it was expected that the case detection rate will be improved to ensure all cases are detected and treated to minimize TB mortality. However, the number of TB deaths recorded each year raises concerns. In fact, the global TB case detection rate has over the past years deteriorated, hovering around 60% (Amenuvegbe et al 2016).. It was expected to be at least over 70% with more than two-thirds of these cases treated. The Sub-Saharan Region has shown lower TB case detection at 52% (WHO, 2014). Amenuvegbe et al., (2016) observed that when the rate of TB case detection is very low, the rate of transmission increases resulting in high TB prevalence. It is estimated that

each active case has the potential of infecting more than 10 people within a year (Amenuvegbe et al., 2016).

With increase in TB cases and reported deaths, the World Health Organization introduced the Stop TB strategy as the recommended approach to be adopted by countries in the fight against TB as clearly stated in the global targets (Vitoria et al., 2009) discussed earlier. Among these strategies, the directly observed treatment short-course (DOTS) strategy has been globally accepted as the main strategy for TB treatment (Ahorlu & Bonsu, 2013). This strategy largely depends on case detection and treatment as the main instrument for action, with laboratory diagnosis to either confirm or otherwise of suspected cases as central to the strategy (Gilani & Khurram, 2012; Sara Ijaz Gilani & Leon, 2013). The treatment is mostly done with antimicrobial drugs for at least six months. Comprehensively, the DOTS programme was designed to ensure that no cases are left behind untreated which eventually leads to a reduction in MDR TB cases (WHO, 2014). The Ghana National Tuberculosis Control Programme policy and strategy (Mauch et al., 2013) mandates health institutions and facilities to lead the implementation of the DOTS strategy through frequent case search/detection for treatment (Amenuvegbe et al 2016).

In the Central Region, the TB cases have equally not reduced much. In 2015, the incidence of TB cases was 54% but reduced marginally to 50% in 2017 (GHS, 2017). The case detection rate in the Ajumako-Enyan-Essiam District has also not improved. The district detected 85 and 66 cases in 2017 and 2018 per 100,000 population with a case detection rate of 43% and 41.5% respectively. Cases of Multi-drug resistant TB are also increasing. The district diagnosed two MDR cases in 2017 and it increased to seven cases in 2018 (GHS, 2019). TB treatment success rate has also declined from 95.2% in 2017 to 91.8% in 2018 (GHS, 2019). The above data and analysis have shown some gap in the TB implementation. The DOTS implementation

has faced a number of challenges which have resulted in low detection and declined treatment success rate. Case detection has been limited even though there are unconfirmed reported cases of TB within the district. Similarly, there are frequent reported cases of untreated TB cases in the district. These problems are most often not clearly known and well defined. There might be some underlining factors. The programme continues to receive little attention at the community level while community support remains limited. The expected results of the DOTS strategy are missing in the district. The district's performance in TB management has remained one of the lowest in the region and country. The five components of the DOTS strategy have had some challenges from the political commitment to case detection, standardized treatment, drug supply and monitoring and evaluation of the DOTS implementation.

1.3 Justification of the study

The DOTS strategy has been identified as a key strategy for reducing the burden of TB globally. It helps in TB case detection among families who are affected or with at least one person infected. However, there seem to be poor results from the implementation of the DOT strategy. Even though there have been improvements in the fight against TB, the pace has significantly been low which has called for critical review of various strategies. In Ghana, there is paucity of data on the challenges facing the implementation of the DOTs strategy generally. To the best of my knowledge and after a review of the literature, it appears that challenges with the implementation of the DOTs strategy have not been sufficiently investigated in the Ajumako Enyan Essiam District. This study, therefore, assessed the main implementation challenges affecting the success of implementation of the DOTS strategy in the district. The challenges to the DOTS strategy have been analysed and discussed at different levels including health factors, individual factors, and community factors. The study further documents and recommends strategies that can help address identified challenges.

1.4 Conceptual Framework

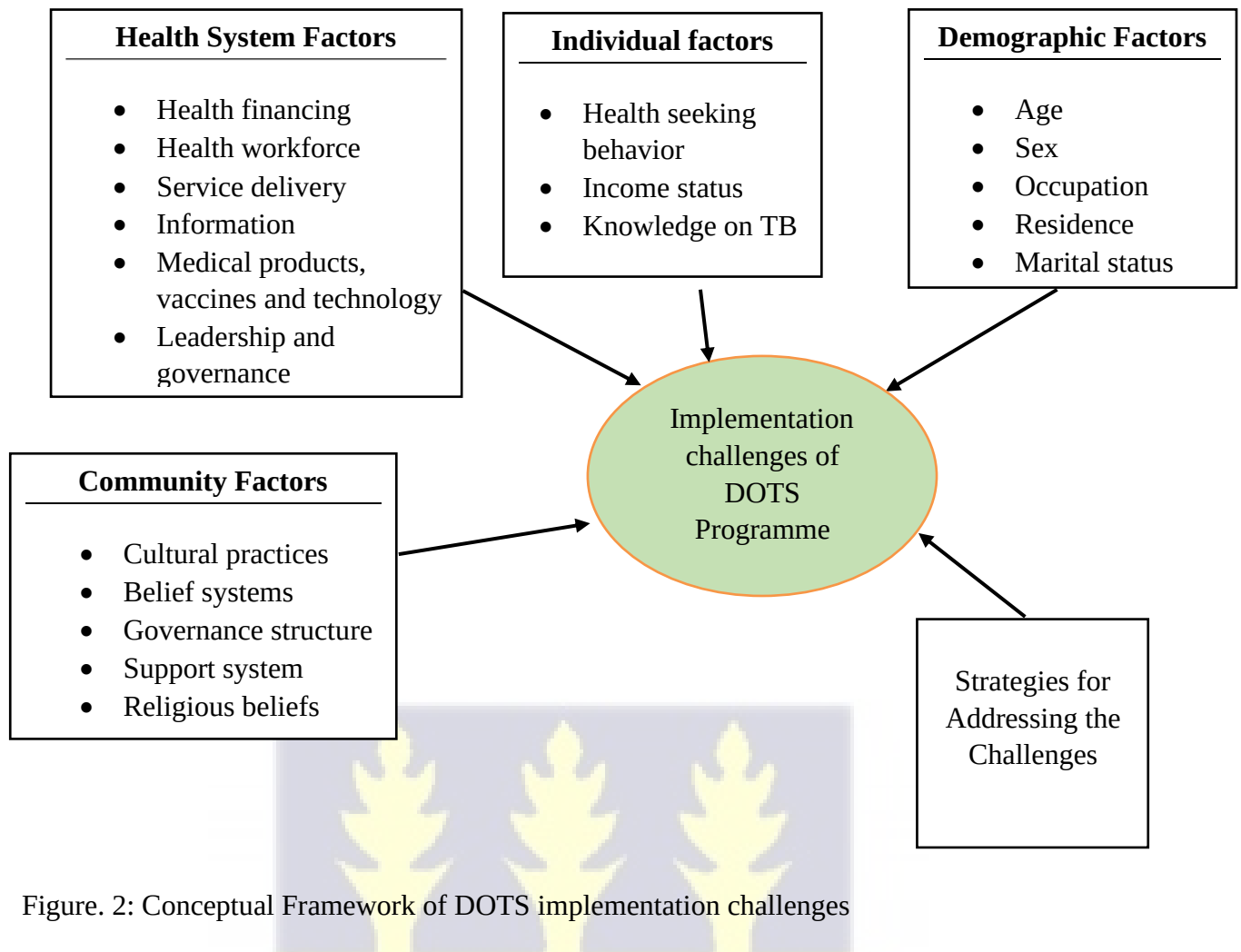


Figure. 2: Conceptual Framework of DOTS implementation challenges

Figure 2 presents the conceptual framework for the study. The theory behind the model is the WHO Health System Strengthening (HSS) model interlinked with community health systems strengthening (CSS). The HSS model helps to explain how the health care system can be improved within a country. The HSS framework seeks to increase understanding of key components of the health system and possible ways of improving health indicators. USAID (2019) defines health systems as “*consisting of all people, institutions, resources, and activities whose primary purpose is to promote, restore, and maintain health*”. The focus of strengthening a health system requires the integration of key components of the health structures or systems to work together to improve health outcomes.

For a well-sustained health outcome to be achieved over a long period requires a committed effort in improving the health system and facilitating the coordination of each of the blocks. The health system is linked by six inter-related building blocks which coordinate to achieve improved health outcome. A challenge in one of the blocks invariably affects the outcome of the other blocks. WHO categorizes the building blocks according to 1) health workforce, 2) health financing, 3) service delivery, 4) information, 5) medical products, vaccines and technologies and 6) leadership and governance. The conceptual framework which seeks to analyse health service challenges of the DOTS programme will adopt key components of the health system to understand the key challenges within some of the building blocks. The emphasis for this study will be on three of the six blocks – health workforce factors, governance and leadership challenges and technology, vaccines and medical products challenges that are associated with the DOTS programme.

The three health services factors that are explained in this conceptual framework are health workforce, leadership and governance and vaccine, technology and medical products. These health service factors are the anticipated root cause of DOTS implementation challenges. The assumption underlying this concept is that if these health service factors are addressed, TB cases detection rate with increased treatment rate and a reduction in TB related mortalities. The health service factors are assumed to be the main causes of DOTS implementation challenges. With the identified challenges, there is the need to address the challenges to ensure effective implementation of the DOTS programme. These strategies will have a direct linkage with the outcome of the challenges identified.

Community health systems strengthening (CSS) was developed by WHO and other UN systems including Global Fund with the aim of developing the roles of the population who are affected by health conditions. The CSS involved all community actors who are contributing to

the overall outcome of health in the communities they live in. It focuses on the role of community members while strengthening the structures that are involved in the administration of health services to facilitate prevention, treatment, care and support of people who are mostly infected and affected by the spread of diseases like HIV/AIDS, Tuberculosis and malaria.

The framework of the CSS outlines six key components as in the case of HSS. First, the framework describes an enabling environment and advocacy which enhances community engagement for improving the policy, legal and governance systems while improving social determinants of society. Secondly, the framework defines various community networks, linkages, partnerships and coordination that facilitate the implementation of effective health service delivery thereby maximizing resources and impacts. The third component outlines the resources the community requires in achieving health outcomes as well as capacity building for the various structures. Resources include humans with appropriate technical know-how and skills, financial resource for core and operational activities (which may be either locally mobilized or from outside), and material resources including essential commodities, infrastructure, etc.

Additionally, CSS looks at community activities and service delivery at the community level. Access to service delivery is key in the fourth component where everyone who needs the service has no difficulty in accessing any service and this is largely based on the needs of the community. Further, the CSS framework outlines organizational and leadership strengthening capacities that help implement health activities which require that leadership is accountable to the people they serve while effectively managing resources that are entrusted into their hands. Monitoring and evaluation and planning as the final component of CSS looks at the M&E systems that help to follow up on the implementation of activities. The monitoring depends on evidence building and research that informs learning and planning as well as facilitating an

increase in knowledge of emerging health issues in the community. The six components of CSS is built on the assumption that if all the components are strengthened and functioning, communities will have improved health outcomes and well-being, respect for the health needs and rights of individuals, increase social and financial protection, and improved responsiveness of any health intervention.

The HSS model will be used to explain the health system factors while CSS will be used to explain both the community and individual factors that influence the implementation of the DOTS program.

1.5 Research Questions

The main research questions that will be addressed in order to answer the research problems are:

- What are the health system challenges/factors that affect the implementation of the DOTS program?
- Which individual factors and characteristics affect the implementation of the DOTS program?
- What are the community factors that affect the utilization of the DOTS program?
- What are the main strategies that have been adopted to mitigate the DOTS implementation challenges?

1.6 General Objective

The general objective of the study is to assess the implementation challenges of the directly observed treatment short-course (DOTS) strategy for TB in the Ajumako-Enyan-Essiam District.

1.6.1 Specific Objective

The specific objectives are:

- a. To assess health service challenges influencing DOTS implementation
- b. To assess individual factors that influence DOTS implementation
- c. To assess community factors that influence DOTS implementation
- d. To assess key strategies adopted to address the implementation challenges of DOTS



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review chapter discusses the concept of tuberculosis in a global context with emphasis on the status of the condition. The chapter discusses various sections according to the specific objectives of the study with a discussion on the DOTS strategy. The challenges of DOTS strategy implementation are discussed regarding other studies conducted in other countries and the key findings of the challenges are presented. Further, the chapter discusses some of the strategies that were adopted to address the challenges identified. The literature for this study was a combination of different studies that have been published in different journals as well as other online publications and from the website of recognised institutions or organizations. For peer review journals, search was done in Google Search, PubMed, Embase and Ovid Medline. At first level of the search, all studies that had been published on the DOTS methods as well as related subjects on tuberculosis were included. However, studies that were more than ten (10) years were excluded from the list. The final set of articles that met the inclusion criteria were used for the discussions in this chapter as per the different headings under this section.

2.2 Strategies for Tuberculosis Control

As part of the effort to reduce the global incidence of TB infection and its associated deaths, the WHO in 2006 introduced the STOP TB strategy (World Health Organization, 2006). As at the time of the strategy development, the focus of the Stop TB was to reduce the global burden of TB as per the targets that were set in the Millennium Development Goals as well as targets defined in the Stop TB Partnership goals. With the advent of Sustainable Development Goals (SDGs), the Stop TB strategy has adapted the key targets of the SDGs to facilitate the

achievement of overall health goals. A major objective of the Stop TB strategy is to enhance the achievement of universal access to quality and improved diagnosis as well as treatments that primarily focus on the patient (WHO, 2006). The strategy outlines six key components and implementation approaches, and these are briefly described with key action points as follows:

A. High-quality DOTS expansion and enhancement – the DOTS approach targets

- i. Political commitment with increased and sustained financing
- ii. Case detection through quality-assured bacteriology
- iii. Standardize treatment with supervision and patient support
- iv. An effective drug supply and management system
- v. Monitoring and evaluation system, and impact measurement

B. Address TB/HIV, MDR-TB and other challenges

- i. Implement collaborative TB/HIV activities
- ii. Prevent and control MDR-TB
- iii. Address prisoners, refugees and high-risk groups and situations

C. Contribute to health system strengthening

- i. Actively participate in efforts to improve health system-wide policy, human resource, financing, management, service delivery and information system
- ii. Share innovations that strengthen systems, including the practical approach to lung health
- iii. Adapt innovations from other fields

D. Engage all care providers

- i. Public-Private mix approaches

- ii. International standards for tuberculosis care

E. Empower people with TB, and communities

- i. Advocacy, communication and social mobilization

- ii. Community participation in TB care

- iii. Patient's Charter for Tuberculosis care

F. Enable and promote research

- i. Programme-based operational research

- ii. Research to develop new diagnostics

This study discusses one of the approaches of the STOP TB strategy - the DOTS strategy, and provides detailed analysis of the DOTS in the section below.

2.3 The Directly Observed Treatment Short-Course (DOTS) Strategy

The DOTS is a major key strategy proposed by WHO for controlling tuberculosis. It has been noted as the most cost-effective approach to control the spread of TB especially within high incidence areas and has been accepted as the best curative method (WHO, 2006). The WHO 1999 Guidelines for understanding the DOTS strategy provides a historical background on how the DOTS came about. The guidelines explain that prior to the development of anti-TB drugs, treatment of TB cases was mainly done to ensure that patients' immunity is stronger enough to resist TB infection. This was done mainly through dieting and resting (sleeping through sanatorium) with the application of collapse therapy on the affected part of the lung. The sanatorium experience was quite effective, however, expensive and limited to a few numbers of TB patients. For this reason, nearly all the patients who did not receive treatment through the sanatorium died. This led to the development of drugs in the 1950s that were aimed at

eliminating the TB bacilli and eventually reduce the case fatality rate that at the time was high. For this reason, various clinical trials were conducted in some selected countries including India and Singapore. The trial was to test the efficacy of the drugs that have been developed. One of the trials revealed that with an adequate resource (both financial and human), the treatment of TB was possible without a sanatorium which hitherto had been the main option. With this positive result, countries began to shift from sanatorium to out-patient treatment means.

As the years progress, further approaches and treatment options were developed by scientist. For instance, in the 1970s, one major anti-TB drug (rifampicin) was introduced as a means of reducing the rate of treatment options between six and eight months. This approach was termed as short-course drug treatment. With this, patients who were placed on the short course treatment responded to treatment at a faster rate. This was mainly due to the activeness of the drug to depress the bacteria load especially within the first two months of treatment. The rifampicin drug was well accepted and helped to declare more TB patients infectious free. Patients who were put on the drug were able to mingle with family members without any fear of spread.

Within the same period (mid 1970s), another TB control approach was developed led by Dr. Karel Styblo who was then with International Union Against Tuberculosis and Lung Disease. The approach was based on case-finding and treatment and was first tested in Tanzania. The approach which is also termed as long-course treatment, however, did not achieve any positive results within the first five years of the trial and was therefore abandoned. The short course was accepted and was utilized in the country. The failure of the long course method gave room for the general acceptance of the short course treatment globally. However, some basic concepts of the long course method (the Styblo strategy) were adopted.

In the early 1990s, with a high incidence of TB globally, WHO declared TB as an emergency and worked together to improve on the management of TB cases. The approach for managing TB cases was the adoption of the short course method as well as managerial and expanded monitoring with the surveillance component of the Styblo approach (long course method). The combination of these approaches led to the development of the DOTS strategy by WHO and also developed guidelines and training manuals for the roll-out of the DOTS programme. The DOTS strategy began to be roll-out in countries and within 5 years of the DOTS roll-out, number of countries implementing the strategy had increased from 10 to 102 while patients who had been identified and treated increased from 1% to 16% within the same period.

The WHO guidelines on the DOTS strategy outlined five main components of the programme. The components were outlined based on a number of best practices from the implementation of the original short course approach as well as other clinical trials and programmatic operations. The five components have further been explained by WHO in 2004 as part of the revised guideline for DOTS implementation.

2.4 The Six Strategies affecting the implementation of the DOTS Programme

In the development of the DOTS strategy, WHO outlines six key health system components that affect the implementation of the strategy. These components are discussed as follows:

A. Political commitment with increased sustained financing

Political will is key to the achievement of key health indicators. With a continued political commitment and total support from governments of various countries, the DOTS is expected to achieve its expected results. The first component indicates that with political commitment, national and international partnerships will be established and strengthened, and this eventually influences both medium-term and annual plans developed by the various countries through the

national tuberculosis control program. It takes government involvement and commitment to ensure the development of comprehensive national strategic plans. This is largely so since the strategic plan provides a clear understanding of the financial commitment and addresses technical requirements for the TB intervention. Again, the plan is a key to promote accountability which clear outlines achievable indicators. The strategic plan also includes a statement of the government on the political commitment which is supported by a legislator. Political involvement also facilitates the inclusion of local partners who may contribute at the different levels both financially and technically to improve access, equity, and quality of TB intervention.

One major factor for political commitment is the counterpart funding of governments. Since the mid-70s, the treatment of TB cases requires adequate financing. It is therefore important to commit the various governments to be able to raise adequate funding to fight TB. Various public health problems continued to compete for the same resources and therefore make available funding for TB intervention dwindling. It is therefore important to get the commitment of the various governments to contribute to resource mobilization. Financial adequacy might not be enough to eliminate TB. The health workforce plays a major critical role in service delivery. The adequate health workforce is the sole responsibility of the government to train and recruit personnel to support service delivery. It is important for governments to show commitment to training and recruiting the required health professionals to continue to provide the requisite services to identify and treat TB cases.

B. Case detection through quality-assured bacteriology

The central focus of the DOTS strategy in case detection. In line with that, the WHO sees case detection through quality-assured bacteriology as a major component in the DOTS strategy. By case detection, the strategy uses bacteriology for diagnosis while strengthening laboratory networks within countries. With bacteriology, TB cases are detected through sputum smear

microscopy which is then followed by culture and drug susceptibility testing (DST). The WHO recommends that the culture and DST services be introduced at different levels of health service delivery mostly at referral facilities. The referral facilities will then provide services such as sputum smear-negative TB diagnosis, TB among HIV-positive adults and children diagnosis, testing related to periodic prevalence surveys on drug resistance, etc.

On strengthening laboratory networks, the strategy aims at equipping laboratory facilities with appropriate logistics for comprehensive testing. Again, the required personnel for conducting the required testing is also needed at the laboratories. Maintaining the quality of the laboratory network depends on regular training, supervision and support, and motivation of laboratory staff. Best use should be made of existing public and private laboratories. The laboratory network concepts are based on 1) adoption of national standards per international requirements; 2) decentralization of diagnostic services, with high proficiency levels; 3) communication among members at all levels; and 4) functioning internal and external quality management and supervision.

C. Standardized treatment with supervision and patient support

The National TB control program's ultimate objective is to treat all cases identified. The treatment is influenced by international standards for both adults and children. The approved standard for treatment of adults and children with TB is the sputum smear-positive, smear-negative, and extra-pulmonary. The WHO guidelines provide a clear understanding of what to do at each level of treatment with the short course regimes as the main requirement. Beyond treatment are supervision and patient support. To provide comprehensive treatment for TB patients, it is important to identify and address all possible factors that influence adherence to treatment or drugs. This requires continuous supervision and monitoring of patients mainly through the direct observation of therapy (DOT). The DOT approach is key to ensuring that

patients are adhering to their drugs and responding to treatment. The guidelines recommend that supervision is done within a context-specific and patient-sensitive manner to achieve a comprehensive adherence both on the provider and patients' sides. Additionally, the supervision can be carried at different levels (facility, home, at the workplace, in the community) depending on local conditions. The recommended approach is that the supervision is done in collaboration with a treatment partner who could also be a caregiver who is accepted by the patient. With adequate training, the treatment partner can support more supervision even in the absence of the health worker. The guideline further recommends for patients support groups where patients can share experiences and encourage each other to improve adherence.

Access to treatment remains a major challenge in developing countries. The guideline stipulates that each country should, as much as possible, find ways of improving TB treatment. It is a fact (WHO, 2013) that several TB patients are not reached with treatment because of access issues. Access issues include physical, financial, social, and cultural barriers. There are also health system factors that inhibit accessibility. It is, therefore, appropriate to identify and address all these factors and where they are found to ensure all those who are identified are treated.

D. Effective drug supply and management system

The availability of quality-assured anti-TB drugs is an important component of the fight against TB. If the supply of the anti-TB drug is interrupted, access to drugs will ensure that patients who are diagnosed with TB are provided with the needed treatment. This requires an appropriate procurement system with available financial resources to respond to any demand. Again, the distribution system is key to ensure that needed drugs are supplied to all areas of the country even in remote communities. Another aspect of the management system is the tools for documenting activities of the TB control program. Without appropriate documentation, it

will be extremely difficult to estimate the required number of drugs for each year. This further ensures that there is no stock-out. The guideline emphasizes that anti-TB drugs should be made available at no cost to the patient. Countries are therefore required to have legislation that binds governments to continually provide anti-TB drugs free to patients. By this, the Global Drug Facility and the Green Light Committee continue to provide anti-TB drugs to developing countries at a reduced price.

E. Recording and Reporting System

The guideline provides for the establishment of appropriate monitoring and evaluation system which ensures that the flow of information is not curtailed at the lower level but goes through from the low health facility through to the secondary level to the national level. By this, countries are expected to develop systems that ensure that cases and other TB control activities are reported immediately to the national level. In Ghana, the TB control program, beyond its reporting tools, worked through the existing District Health Information Management System (DHIMS) to communicate all activities to the national level. The recording requires the standardization of individual data which helps to provide the required information for monitoring and supervision. The DOTS can be achieved through proper recording of patients' data including the address and family members or treatment partner whom the patient may select. Monitoring may further be conducted to confirm the address provided by the patient or otherwise. Appropriate staff is also needed to facilitate data collection and analysis for decision making. The national TB program is required to monitor the records of both public and private health facilities especially those that are not directly linked to the program to be able to determine accurate TB cases for a prompt response.

2.5 The TB situation in Ghana

Ghana may not be classified as a TB endemic country; however, it does have some concerns about the spread of the disease. In 2007, Ghana was rated as the 38th high burden TB country in a list of 45 TB burden countries and by extension, the 19th high burden country in Africa (Doror et al, 2009). It further mentioned that between 2005-2008, TB remained one of the predominant preventable adult diseases causing severe morbidities and mortalities in the country (WHO, UNICEF, & UNAIDS, 2011). In 2006, an estimated 50,000 new cases of TB were recorded, with notable deaths among adults and children (WHO, 2007). Ahorlu & Bonsu (2013) stated that because of its fearful nature and the rate of morbidity and mortality, TB in early 2000 was tagged as “fear and death” disease which was literally stated as “*Nsamanwa*” in the local parlance and has since been used over the years. It was assumed that immediately one gets infected with TB it marked the beginning of the end of death. TB detection rate in Ghana is very low, it was 33% in 2014 with 67% of cases going undetected (WHO, 2015). In 2015, 14,632 (28%) cases were detected, and all these cases were referred for treatment (GHS, 2017). In the same year, 60 cases of Multi-Drug Resistant TB were recorded, and this increased to 77 in 2016. TB trends over time in Ghana have been presented below (Figure 3).



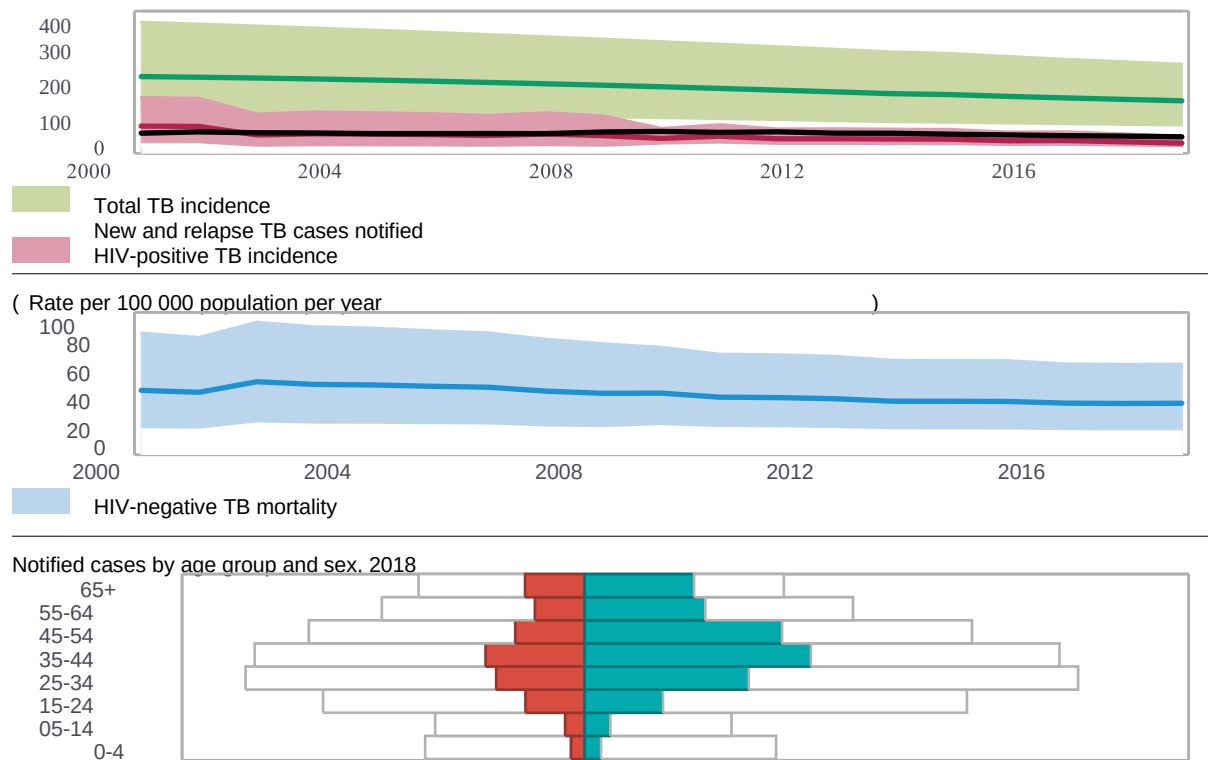


Figure 3 shows new and relapsed TB cases notified, HIV-positive TB incidence, HIV-negative TB mortality and notified cases by age group and sex in Ghana (2018)

The Ghana Health Service in its 2017 Annual Report noted with great concern the rate of increase in TB cases (Ghana Health Service Annual Report, 2017). It was reported that Ghana recorded at least 640 new cases per year (GHS, 2017). Averagely, 122 new TB cases are developed every day in Ghana with 27 of these cases ending in death, which invariably puts the record to one person per day (GHS, 2018). Ghana, like any other TB country, continues to provide surveillance and adopts several approaches to detecting cases and following up with treatment. In 2010, among the reported TB cases in Ghana, 7.2% of all cases resulted in death while 85.5% of all cases resulted in a successful treatment while a little over 3% were clients who defaulted in TB treatment (Mauch et al., 2013).

2.6 DOTS Implementation challenges, health system factors

The discussions on components of the DOTS strategy clearly shows that at least four had a strong relationship with health services. Failure in any of the four components will affect the roll-out of the DOTS strategy the same as the political commitment. It is therefore important to analyse the key health service challenges that affect the rollout of the DOTS strategy. Bello (2010) discussed extensively some key challenges of the DOTS implementation strategy among TB patients at the University of Ilorin, Nigeria. The study sampled a total of 300 TB patients who attended the out-patient clinic of the pulmonary unit of the University of Ilorin Teaching Hospital, Nigeria. The study participants included patients who had been on the anti-TB drug for over a month. At the time of the study, patients with sputum containing tubercle bacilli on direct smear or culture and patients who showed cardinal clinical features like chronic cough, etc. Patients aged below 15 or were more than 75 were excluded from the study as well as patients with HIV/AIDS. The results showed that knowledge on the DOTS strategy was limited with less than a quarter (23%) of the participants had adequate knowledge about the DOTS and this was a result of inadequate awareness-raising sessions conducted for the patients. It was observed that some patients who had been to the facility for treatment had not heard of the DOTS strategy, which is key to the TB control program.

The study further showed that with adequate supervision and continued supply of anti-TB drugs, more than half (57%) of the participants on the DOTS program followed the instructions and consistently adhered to the prescription. However, when there was a stock-out of anti-TB drugs, only 5% of the participants could afford to buy the drugs and continued with adherence. One of the key components of the DOTS strategy is the uninterrupted supply of anti-TB drugs which can contribute to more than half of adherence to the DOTS strategy as shown in the

study. Again, more than half (52.8%) of the participants who attended counselling sessions at the Pharmacy, adhered to the prescription.

Tadesse et al., (2013) discussed some of the factors that affect the implementation of the DOTS strategy in Ethiopia. The study, which was carried out between October 2010 and September 2011, used TB smear-positive patients who utilized facilities with the DOTS program. The study observed several factors affecting the DOTS implementation. Two key health service factors were identified. First, the study noted that one major delay for TB patients to start treatment sessions was the geographical location of the facility which implements the DOTS program. It was observed that more than half of the patients were coming from rural communities with a walking distance of more than two hours. The program requires that prior to monitoring and supervision with a treatment partner, a TB patient must initiate the diagnosis and treatment at a facility. Patients who were coming from rural communities were finding it difficult to travel long distances to access the DOTS facilities. Where there were available vehicles as a means of transport, some had financial challenges to pay for the cost of transport as well as the treatment. Second, the study noted that some healthcare providers delayed in conducting tests on suspected cases by failing to diagnose TB cases as early as possible. While some presented with clear signs of TB infection, others showed no sign. However, the healthcare providers were not prompt in their response to diagnoses and thereby defeating the purpose of the DOTS program. The study revealed that the delays were a result of inadequate equipment at the facilities. The staff in the two study facilities admitted they had not been trained on early diagnosis but had been posted to manage TB cases in the facility. Some of the patients had to wait for about 12 months before being enrolled in the treatment program.

Mclaren et al, 2016) discusses some of the DOTS implementation challenges and observed that cost of TB treatment was a major barrier to the implementation of DOTS in developing countries. However, one of the components of the strategy entails the government's commitment to resource mobilization and financing to ensure that anti-TB drugs are provided at no cost to the patient. Where health service managers through the health providers are charging fees, DOTS implementation becomes a challenge. Amo-Adjei, (2016) sort the views of healthcare providers on obstacles to TB control program including the DOTS strategy in Ghana and identified clinical complications, funding challenges, physical infrastructure, poor coordination between TB and HIV activities as well as weak monitoring. On clinical complications, the study observed that the drugs that were administered under the DOTS program were conceived as been big by patients and therefore made it counterproductive for ensuring adherence to treatment. The funding bottlenecks were mainly linked to the delay of excessive delays in releasing funds for TB interventions. With infrastructure, the study observed that there was no challenge with facilities in the country since over 1000 DOTS centres had been constructed across the country, However, some of the infrastructures were poorly cited with ventilation challenges. Some also had a problem with privacy.

Nohaji, et al, (2016) discussed the DOTS implementation challenges that South Africans faced in the control of tuberculosis. The study, among others, discussed a number of the challenges which were also linked to the challenges in integrating TB and HIV/AIDS programs. It was noted that one of the major failures or challenges of the DOTS was its weak relationship with HIV/AIDS programs and this affected the number of TB cases that were detected and treated. The study further observed that there was a gross shortage of health staff which made it extremely difficult for home visits and follow-ups to be conducted on patients who have had to be visited. This is one major gap that leads to default. Again, the shortage of the health staff

affected the provision of education and counselling of clients and recordings in the register could not be properly done. Another challenge the DOTS implementation in South Africa faced was the shortage of drugs, one of the important components of the DOTS strategy. The program consistently faced a shortage in the availability of essential drugs mainly from the central medical stores. It was noted that RH which is a combination of rifampicin and isoniazid posed a lot of problems to the program. Also, a weak referral system and poor supervision of treatment were other health system challenges that were identified in the implementation of the DOTS program in South Africa. The poor supervision of the treatment was linked directly to the shortage of staff as well as the long distances of the clients. Accessibility to health facilities for TB treatment was a major challenge as the location of most of the facilities was far from clients which made it difficult for easy access resulting in poor treatment among clients.

2.7 DOTS Implementation Challenges, Individual factors

The DOTS implementation has faced many challenges from different perspectives from different countries. In Nigeria, Shakirat, (2010) discusses some of the key challenges that the implementation of the DOTS strategy in late 2000 faced. The study observed that the side effect of the TB drugs affected the effective utilization of the program. It noted that more than 72% of the patients experienced side effects which included nausea and vomiting, the impaired vision among others. Again, the financial status of the patient affected the utilization of the program. Patients with high-income levels were able to procure the drugs that were not provided for free while those who could not procure did not comply fully. Sex played a major role in DOTS program utilization as 22.3% of males defaulted in adherence to TB drugs while 14% females defaulted.

Nohaji, et al, (2016) discussed the DOTS implementation challenges that South Africans faced in the control of tuberculosis. The study observed several client-related factors affecting the implementation of DOTS including the availability of a helper, knowledge of TB treatment and induced vomiting before or after TB treatment. Nearly 62% of those who defaulted in TB treatment indicated that they had nobody in the house to help in their activities and that put a lot of strain on them. On knowledge, the study observed that more than half of the participants had inadequate knowledge about treatment and the need for adherence, in that when some felt a bit ok, they discontinued the treatment. About 14% of the participants frequently induced vomiting anytime they experience stomach upset after taking TB drugs. Again, some clients complained of access to nutritious food to help in adherence to drugs while there was a misunderstanding with when to take the drugs. While 37.5% of the clients took their treatment before breakfast, 62.5% had breakfast before taking treatment.

Li et al., (2010) in a study on adherence to treatment on tuberculosis infection in New York compared the treatment of isoniazid and rifampicin. The combined overall treatment adherence of latent tuberculosis was 45.2%, far below the expected target of the DOTS program. The treatment differed from each treatment type. While clients with treatment on rifampicin had 44% treatment rate, those with isoniazid alone had 60% treatment adherence. The study observed that the presence of HIV did not affect the rate of adherence to treatment as only 1% difference existed between HIV positive TB patients and HIV negative TB patients. One of the major challenges the study observed for adherence to treatment was the advanced drugs to patients. About 78% of the patients who discontinued treatment had received 6-months of advanced treatment drugs and felt completed after finishing the drugs. The study further observed that patients aged 35+ were more likely to complete treatment than those below.

Patients who were monitored under the directly observed preventive therapy were more likely to complete treatment.

Gebremariam et al.,(2010) in a study in Ethiopia discussed barriers as facilitators of adherence to TB among patients, using the DOTS approach for treatment. Qualitatively, the study assessed co-infected patients and health professionals to understand why patients adhere to TB treatment or otherwise. On the barriers to adherence to TB treatment, the study observed that side effects of TB drugs together with the burden of the pills (continuous taking of pills) were a major barrier as patients who frequently experienced side effects either discontinued the treatment or missed periods for taking the pill. Again, the absence of food to support pill intake was a major challenge. Other barriers that were identified in the study include economic constraints, the stigma associated with disclosure and inadequate communication with health professionals. It was noted that the DOTS strategy's daily supervision and monitoring did not help the patients as more than two-thirds were not available to be monitored daily due to their work. On the other hand, facilitators to TB adherence, as per the study included beliefs in the curability of TB patients because of what they had witnessed from previous TB patients, support from family members and support from health professionals. Again, one other critical influencer to adherence to TB treatment is the severity of the TB amid HIV.

One of the key strategies of the DOTS program is its ability to detect and diagnose early cases. In a study in China by Li et al., (2013) on factors associated with diagnostic delays among TB patients, it was observed that demographic characteristics and other individual factors affect the diagnosis of TB cases. Demographic characteristics that were associated with a delay in diagnosis include the location of the patient, sex, age and education. The study showed that patients who live in rural areas were more likely to delay in TB diagnosis than those in urban areas and females who are in rural areas were more likely to delay in seeking healthcare. With

age, patients who were aged 60+ had relatively lower delays in going for diagnosis than the younger population while low educational status was identified as a risk factor for delay in TB diagnosis. Social indicators that served as a barrier to diagnosis in the China study included the absence of health insurance for patients coupled with low-income levels, difficulty in having time off to attend to a health facility for diagnosis. Health seeking behaviour of individuals played a major role in TB diagnosis. It was noted that some patients had to visit traditional healers for treatment before visiting health facilities for diagnosis. This, most often, exacerbated the conditions by the time they visit the hospital. Knowledge and awareness on TB were also identified as a major barrier to TB diagnosis and that the higher the knowledge and awareness on TB, the higher the rate of an early visit to the facility for diagnosis and vice versa.

Hussen et al., (2015) also discussed the delay in seeking care as one of the major challenges with the DOTS program in Southern Ethiopia among pulmonary tuberculosis patients. The study which was conducted among 129 new smears positive pulmonary TB patients estimated the median delay rate of 97 days. Largely, the delays among patients in seeking care were determined by the first visit to traditional healers, the location of patients, literacy level, distance to the health facility and the severity of illness presented to the hospital. It was noted that patients who first visited traditional healers had more days of delay as compared to those who did not visit any traditional healer but attended the hospital at first illness. Again, rural dwellers had more delay time than those who lived in urban areas while among the rural dwellers, those who lived more than 10kms from TB centre had more delay time than those who lived less than 20km within a TB centre. Illiteracy also affected delay time and this was linked to the knowledge and awareness level. High illiteracy and low knowledge resulted in delays in seeking TB care.

Cramm, et al.,(2010) however observed a different result in a study in South Africa. The study observed that age, knowledge, sex and income did not have much influence on early TB treatment initiation and adherence but people's perception and attitude. The study showed that more than 95% of the study participants knew TB, however, there were delays in initiation as well as a low adherence rate. The main reason associated with these two challenges was an individual's perception of the fear and stigma attached to TB patients. For fear of being tagged TB patient, clients delayed in seeking care and sometimes hid before going to the facility for treatment.

2.8 DOTS Implementation Challenges, Community factors

The WHO (2018) explains that the community system plays a major role in achieving important health outcomes. Weak community systems increase the risk of infections among the general population, especially in a rural setting. It is therefore important to acknowledge the role of a strong community system in reducing TB infection using the DOTS strategy. Different studies have presented the various community factors that have influenced the uptake of the DOTS program at different levels – from diagnosis to treatment. Wynne, et al.,(2014) analysed some of the community challenges that affect the roll-out of the DOTS strategy in Uganda. The study observed that the availability of a community support system for the effective identification and supervision of treatment was a critical factor. It was observed that in most communities, the health professionals are unable to visit the communities regularly for supervision because of inadequate staff at various facilities coupled with the workload at the facility. In that sense, health professionals depended largely on community health systems including trained health volunteers and family support systems. But if these supports are not available, the objectives of the DOTS program could not be fully achieved.

Mangesho et al., (2007) observed that one of the major challenges with DOTS implementation is the level of community knowledge and awareness which affect health-seeking behaviour. The study which was conducted in Central Tanzania revealed that community knowledge on the causes and symptoms of tuberculosis was very low. For this reason, community members did not understand why they had to go early for diagnosis when they observed some of the symptoms. Again, the study observed that because knowledge on cause and/or mode of transmission was very low, there was no urgency in preventive measures by community members including their leaders. Auer, et al.,(2000)further explained that with the limited knowledge at the community level, cultural practices and beliefs that inhibit DOTS are promoted which mostly causes delays in diagnosis. The consequent effect is an increase in the spread of TB infection within such communities.

Viney et al., (2014) also indicated that the community belief system on health-seeking behaviour affects the early detection of cases. The study was conducted in the Pacific Island nation of Vanuatu among community members, with the aim of understanding community systems that affect individual decisions as well as knowledge levels. It was noted that the community had old age belief and practice of consulting traditional healers for any health issue. For this reason, it was relatively difficult for individuals to go to the health facility even if TB symptoms are noticed. The study observed that about 54% of the TB patients who participated in the study first consult a traditional healer with any health-related issue while 34% consulted traditional healers when they first observed signs and symptoms of TB.

Beyond the traditional practices that existed in the community for a long time, the study noted that other reasons such as cost and distance influence the delay in seeking health care. Haasnoot et al., (2010)conducted a study among the Maasai people in Tanzania on knowledge, attitude

and practice of TB. The study observed a high knowledge level among the population with 70% of the people having adequate knowledge about TB with 80% having adequate knowledge about TB symptoms. However, with this increased knowledge in TB, the people continually believed that TB is a punishment from God and that it should be treated with a spiritual approach. In that essence, traditional healers are the main point of call when signs and symptoms are observed in any person.

2.9 Strategies to address challenges of DOTS implementation strategy

The World Health Organization's six-component framework of the DOTS strategy has been adopted largely by all countries as the fundamental strategy for addressing the challenges with TB. However, the country-specific approach is applied, depending on the challenges that are faced in the implementation system. In Pakistan, a study by Metzger et al., (2010) reviewed the successes and challenges of the implementation of the DOTS strategy after a decade of implementation. The study noted that the DOTS strategy had faced challenges including inadequately skilled staff to fight TB and poor supervision.

Given that, different strategies were adopted to improve case detection as well as treatment procedures. Training of staff is critical in the strategies to improve case detection and treatment. Other strategies that were included include the expansion of laboratories across the country to enhance testing of all suspected cases. Again, the country ensured that quality TB drugs were available in all the centres to provide appropriate treatment to patients as and when they are detected. Adequate logistics were provided to facilitate effective surveillance, supervision and monitoring of cases with the intersectoral partnership. This, according to the study, improved the DOTS implementation and detected more cases that were hiding and followed with appropriate treatment and supervision.

Mclaren et al., (2016) assessed whether directly observed therapy was the best strategy for the treatment of TB cases. The study mentioned that directly observed strategy helps to promote effective adherence which enhances the full course of drug therapy. The DOT strategy was noted to have a lot of financial burden on the patients as well as opportunity costs. Due to this challenge, a pragmatic experimental trial was conducted to know to develop strategies that will improve the treatment. The study indicated that the experimental trials showed that it was appropriate for adequate health personnel to be engaged and trained while other resources including financial resources are pumped into the programme.



CHAPTER THREE

METHODS

3.1 Introduction

This section presents the methods that were employed in this study which included the design of the study, study variables and the sampling approach for the study. The study location and the key characteristics of the study area are also presented in the chapter. It further outlines the processes for data collection and the source of data. The chapter further addresses the various stages of analysis.

3.2 Study Design

The research was a cross-sectional study focusing on challenges that influence the implementation of the TB DOTS and strategies to mitigate these challenges. The study adopted both quantitative and qualitative approaches. Quantitatively, all frontline health workers involved in the TB control were interviewed to elucidate health service challenges influencing the DOTS strategy. Additionally, the study gathered individual-based factors as well as community factors that affect the implementation of the DOTS strategy. The qualitative aspect of the study targeted key health care managers at the district level whose decision affects the implementation of the DOTS programme as well as health staff at the forefront of DOTS implementation. Data was gathered qualitatively through in-depth interviews on strategies by health managers in addressing the identified challenges.

3.3 Study Location

Ajumako-Enyan-Essiam District is one of the 22 districts in the Central Region. It covers an estimated land area of 541.3sqkm, about 5.5% of that of the region which is 9828sq km. Ajumako is the capital town and the seat of the Local Government Administration. It is

bounded on the north by Asikuma-Odoben-Brakwa District and the northwest by Assin South District, on the west by Mfantseman, on the east by Agona West and Gomoe East Districts, and on the south by Agona East and parts of Mfantseman. The district has 163 communities in 9 zones with an estimated total population of 147,759. This is based on projections from a growth rate of 3.1%.

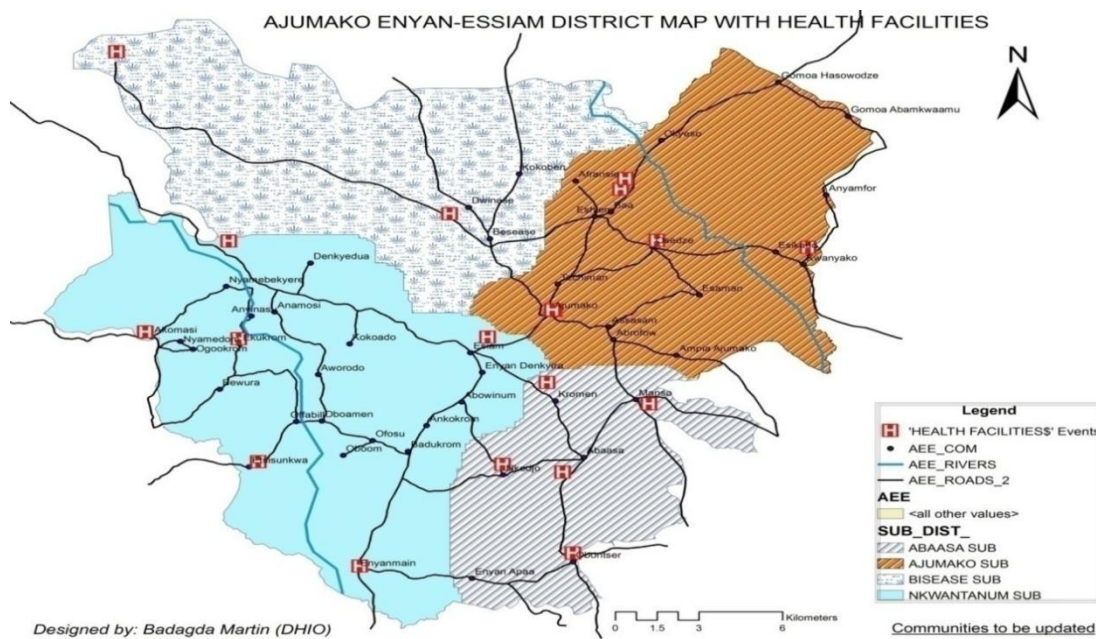


Figure 5: District Map

The people are predominantly Akans with few migrant ethnic groups such as Gas, Ewes, Krobos and others from the northern part of the country. To ensure recognition and effective participation of women in the development of the district, the queen mothers have organized themselves into an association known as the *AEE District Queen Mothers Association*, a dynamic women's association with adequate capacities with development of the district. Generally, the literacy levels are found to be low in the district. However, with the introduction of the non-formal education system, a number of people mostly women have acquired some skills by attending classes organized in the evenings. Majority are Christians. Notable among

them are the Roman Catholic Church, Methodist Church, Presbyterian Church, Anglican Church, Church of Pentecost and Charismatic Churches etc. Other religious organizations present are the Islamic and small proportion adheres to the traditional religions. One spectacular situation prevailing in the district is the existence of very many prayer camps with many followers. These avenues serve as the first point of call for many community members including pregnant women and TB patients in seeking treatment in time of ill health. The people in the district are predominantly farmers. There are also traders who drop in on market days.

The district health directorate has been divided into five Health Sub-districts - Abaasa, Besease, Ajumako, Sonkwa and Nwantanum Sub-districts. The district has one hospital located at Ajumako. It is accessible to many communities and provides health care services to the people of the district and others from outside the district. Other health facilities providing health services in the district comprise of community clinics, CHPS Zones and Private Maternity Homes.

Table 1: Number of health facilities by type in the Ajumako-Enyan-Essiam District

Health Facility Type	Number
District Hospital	1
Polyclinics	2
CHAG Institutions	2
Health Centres	3
Community Clinics	2
Private Maternity/Clinics	2
Quasi-Government	1
CHPS Compounds	16
Outreach Centres	105
Number of communities	132

Although there has been general improvement in the health conditions of the people in the AEE district, malaria continues to be the fundamental cause of ill health. Acute Upper Respiratory Infections, skin diseases, diarrhoea, hypertension, rheumatism, anaemia and enteric fever are some of the topmost registered diseases prevailing in the district according to the 2019 DHMT records. Sexually transmitted infections (STIs) among the younger generation as well as teenage pregnancy and low supervised delivery are of great concern.

3.4 Study Variables

The main dependent variable for this study was TB DOTS implementation challenges. This was determined from the various discussions from health workers and community members including TB patients and were measured in terms of proportion and classifications. The independent variables for this study included health challenges, individual challenges, and community challenges. For individual challenges, demographic characteristics such as age, sex, marital status, etc. were key in the independent variable discussion. Details of the study variables and their measurement levels have been described in Table 2.

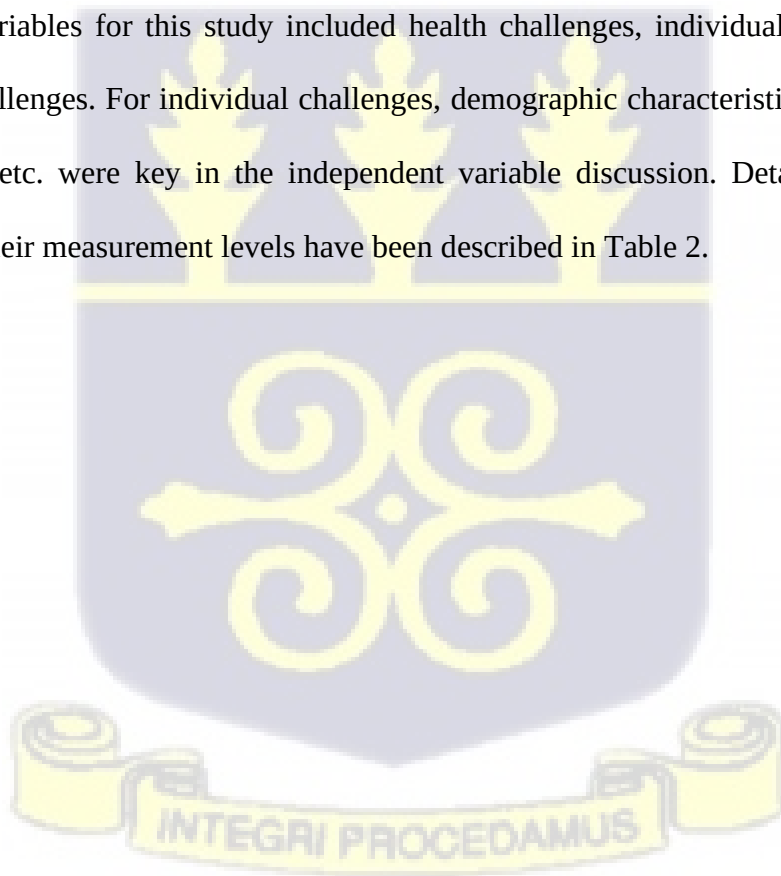


Table 2: Study Variables and its detail description of patients

Variable	Operational Definition	Source	Measurement
<u>Dependent Variable</u>			
TB Implementation challenges	DOTS Described according to the six strategy challenges of TB DOTS programme	Respondent	Explanatory
<u>Independent Variables</u>			
Age of patients	Age in absolute years	Respondent	Numerical
Marital Status	Whether married, single or divorced	Respondent	Categorical
Educational Status	Level of education status attained	Respondent	Categorical
Residence	Place of residence – rural and urban	Respondent	Categorical
Occupation	Type of work of the woman	Respondent	Categorical
Religion	Type of religion – Christian, Islam, Traditional, etc	Respondent	Categorical
Distance to TB centre	Measured in kms from place of residence	Respondent	Numerical
Payment for drugs	Classified as Yes or No	Respondent	Categorical
Level of facility	Type grouped under hospital, clinic, health centre, CHPS, etc	Respondent	Categorical
Number of health workers	Health workers who are engaged in TB programme	Respondent	Numerical
Implementation of DOTS programme	Date (month/year) the programme started in the facility	Respondent	Numerical

3.5 Sampling

Kumar (1999) explains that a sample is a sub-group of the population which is an ideal representative of the entire population. For this study, three levels of data collection were gathered, and each comes with its own approach.

Stage 1: Individual-based data collection included TB patients. A complete census was conducted on all TB patients who have been detected and followed up in the last three years (2017 – 2019). In the last three years, a total of 219 TB cases have been detected. All these clients formed part of the study. With non-responds rate, it was expected that at least 90% of the TB patients will participate in the study

Stage 2: At the health facility level, frontline workers who were involved in TB case management were interviewed. A random sampling method was adopted to select three (3) health workers each in the hospital and polyclinics, two (2) frontline workers in health centres and private clinics and one (1) each from both community clinics and CHPS compounds.

Stage 3: Community-level assessment was carried out through a simple random approach. There are five (5) sub-districts within the district. Two (2) communities in each sub-district were randomly selected for the study. Focus group discussions were conducted among key community groups and leaders to discuss the challenges that impede TB DOTS implementation.

3.6 Quality Control

Nederpelt and Daas, (2012) indicated that in research work, the amount of emphasis on data quality is critical especially on the type of data collected and how it is processed. In light of this, the study will primarily focus on data gathered from the primary sources. Data accurateness will be verified to eliminate all incomplete data. Data gaps will be filled with follow-ups to facilities and individuals whose data were not consistent with the discussions. Data obtained from the field will be processed in various forms to ensure the consistency of data.

3.7 Data Collection and Management

The questionnaire was designed in line with the outlined objectives for the data collection from health-workers and patients on their socio-demographic characteristics, political commitment, case detection and testing supervised treatment and patient support. Interview-guide was also employed to collect data from community groups. Three data collectors were recruited and trained to support in data collection. The data collectors were trained to observe all protocols of data collection including confidentiality, interview techniques and covid-19 preventive

protocols. Data collection was completed in two weeks. The first week of data collection targeted all TB patients while the second week followed up on health workers and community leaders. Data collected were transcribed and typed into excel, stored both in both computer memory and external hard drive. Hard copy papers were stored under lock and key after coding and transcribing the data. Data collection forms were coded in numbers without names of individuals who responded to the questions. This was to ensure that respondents are linked to any of the responses.

On qualitative data, 7 focused group discussions were conducted in 7 communities, i.e., one in each community. Each FGD had an average of 8 participants.

3.8 Data Analysis

Data analysis for each of the objectives were done at different levels. On the key challenges of the DOTS programme, data were analysed using proportions and graphs. Demographic data of health workers were analysed using proportions and means for discrete variables. Views from managers of health services were analysed qualitatively with some quotes from key informant interviews. Strategies for addressing the challenges were analysed using qualitative methods including quotes. Suggestions were sought from health workers and were analysed and presented in graphs and compared with the views of health managers. On individual factors related to clients, logistic regression analysis was done to identify the key factors that affect TB DOTS implementation. Test of the association was reported using a confidence interval at 95% and the odds ratio.

Under the qualitative session, the FGDs that were conducted were analysed according to various themes. All the discussions were categorised and matched under specific and key

themes. The themes were linked to the main objectives of the study. Where necessary, different quotes from different discussions were used to reflect what transpired in the discussions.

3.9 Ethical Consideration

The main source of this study was the primary data source. In view of that, key ethical issues were addressed to ensure that all regulations were followed.

Ethical Clearance: Ethical clearance was sought from the Ghana Health Service Ethics Review Committee as a requirement for the conduct of this study with an approval # GHS-ERC-037/07/20.

Study Approval: A letter of introduction from the School of Public Health (SPH) was sent to the District Director of Health in the district to seek permission to interact with health workers within the identified districts. A letter from the district authorities was requested to the various facilities as approval from the district for such a study to be carried out in the facilities.

Purpose of Study: The main purpose of the study was to determine challenges that influence the implementation of the TB DOTS programme.

Study Subjects: Consent was sought from all health workers who were involved in the study.

Potential Risk/Benefits: The researcher anticipated minimal risk in the study. This was largely so because the study was not related to behaviour of individuals and as well as the health conditions of individuals. Notwithstanding, the study ensured that the privacy of the individuals involved in this study was protected.

Privacy and Confidentiality: Participants were assured of confidentiality and privacy of the information provided. To assure privacy and confidentiality, study codes were used on all data forms (completed questionnaires). Participants did not provide names to prevent easy

identification of individuals on a particular questionnaire. This was discussed prior to the conduct of an interview. Data gathered were encrypted whereas sheets that contained face sheets were removed. Similar codes were used for health facilities to avoid easy tracing of the data source by a third party.

Data security, storage and usage: Data collected from the individuals were collected with a questionnaire and entered into table format and stored on a hard drive of a computer and at the same time kept the questionnaire in a safe for two years before disposing them of. Data files on computers and external hard drives were protected with security codes (password) to prevent easy access by another person.

Safety Protocols: With the emergence of the Covid-19 pandemic, data collectors were provided with adequate Personal Protective Equipment (PPE). Each data collector recruited to participate in the data collection was given face masks, hand gloves, hand sanitizers and liquid soap to be used in areas where water was easily accessible. All data collectors were required to observe social distancing protocols. For interviewees (study participants), face masks were provided to each prior to the start of the interview. Additionally, each participant was required to wash hands with soap and where appropriate, use hand sanitizers before the start of an interview.

Description of consenting process: For primary data, CHVs were provided with the purpose of the study. Participants were also informed of the potential risk and benefits of the study related to them while they participate in the study. The consent highlighted the areas of confidentiality and privacy to the participants. Participants were further informed of how the data collected will be stored. The decision to participate solely relied on the participant. The participant was therefore informed that participation was a matter of choice. After these discussions, if a participant agreed to participate in the study, he/she was made to sign a consent

form to affirm the willingness to participate in the study. All health workers participating in the study were made to sign a consent form.

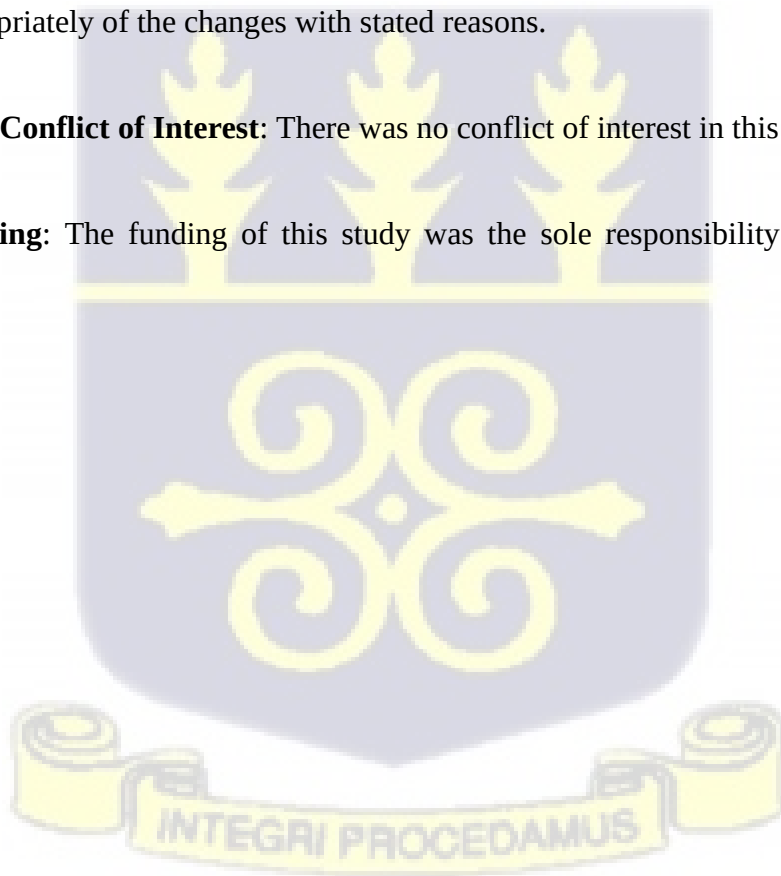
Voluntary withdrawal: Participants were assured of the voluntary nature of the research and that they can decide to participate or withdraw. Additionally, participants were made to understand that at any point in time of the interview, they can decide to discontinue without any prejudice from the researcher.

Compensation: Respondents were not provided any reward/compensation for participation or responding to the questionnaire.

Protocol Amendments: During the field survey, when there were changes in the approved protocols as a result of any field observations and interactions, the Ethics Committee were informed appropriately of the changes with stated reasons.

Declaration of Conflict of Interest: There was no conflict of interest in this study.

Protocol Funding: The funding of this study was the sole responsibility of the principal investigator.



CHAPTER FOUR

ANALYSIS AND RESULTS

4.1 Introduction

The chapter presents the findings of the study. The results are presented according to the four objectives of the study. The result for each objective is presented in tables and reported either quantitatively or qualitatively depending on the objective.

4.2 Health Service Factors

In line with objective one, this session discusses the health service challenges that affect the implementation of the TB DOTS programme.

4.2.1 Characteristics of Health Facilities

The district has a total of 29 health facilities, however, 19 health facilities were selected and participated in the interview. Details of the characteristics of the health facilities have been presented in Table 2. The only available hospital in the district participated in the survey. Eight (42.1%) of the health facilities that participated in the survey are CHPS compounds. None of the facilities are serving more than 10 communities as per their geographical location except the district hospital which serves as a referral facility to all other health facilities and providing secondary services to communities in the district. Among the 19 health facilities that were assessed, 5 (26.3%) of the facilities have more than five (5) staff dedicated to the TB DOTS programme and these are mainly the hospital, polyclinics and health centres. Less than a quarter (n=3; 15.8%) of the facilities do not implement the DOTS programme. For those implementing the DOTS programme, nearly half (n=9; 47.4%) of the facilities have implemented the programme for more than

five years with only 1 (5.3%) having started the DOTS programme within the last 12 months.

Table 3: Type of Health Facilities in the District

Variable	Frequency [N=19]	Percent (%)
Level of Facility		
Hospital	1	5.3
Polyclinic	3	15.8
Health Centre	4	21.0
Clinics	3	15.8
CHPS	8	42.1
Number of Communities served by Health Facility		
1-5	12	63.2
6-10	6	31.6
>10	1	5.2
Number of Health Workers on TB programme		
1-2	9	47.4
3-4	5	26.3
≥5	5	26.3
Facilities Implementing DOTS Programme		
No	3	15.8
Yes	16	84.2
When DOTS Programme started		
Within 1 year	1	5.3
2-3 years	4	21.0
4-5 years	5	26.3
More than 5 years	9	47.4

4.2.2 Political Commitment with Increased Financing

Figures 5 and 6 presents a summary of the political commitment with increased financing among the health facilities. For facilities implementing DOTS programme, 5 (31.3%) have annual budgets less than GHS 1,000 for conducting activities while a quarter have annual budgets exceeding GHS 2,000. The facilities with annual budgets exceeding GHS 2,000 per annum are the district hospital and the polyclinics. Additionally, half of the facilities have multiple sources of funding to implement DOTS programme. However, half of the facilities either depend on only government for funding or through donors or

internally generated funds (IGF). Largely, private and Christian Health Association of Ghana (CHAG) facilities are the ones who depend solely on either IGF or donors. Notwithstanding the diversity of funding sources, the TB units of the various facilities have never had enough funds to implement their activities. For those who receive funds from government sources and donors, there are always delays in the release of funds to implement activities. The budgets for various facilities from government has not increased in the last three years. In general, all the facilities indicated that the cost of screening and drugs for treatment is paid for by the programme, mostly through national health insurance scheme. The delays in release of funds and the availability of adequate funding for DOTS programme in the facilities have resulted in conducting limited contact tracing and follow-ups or home visits.

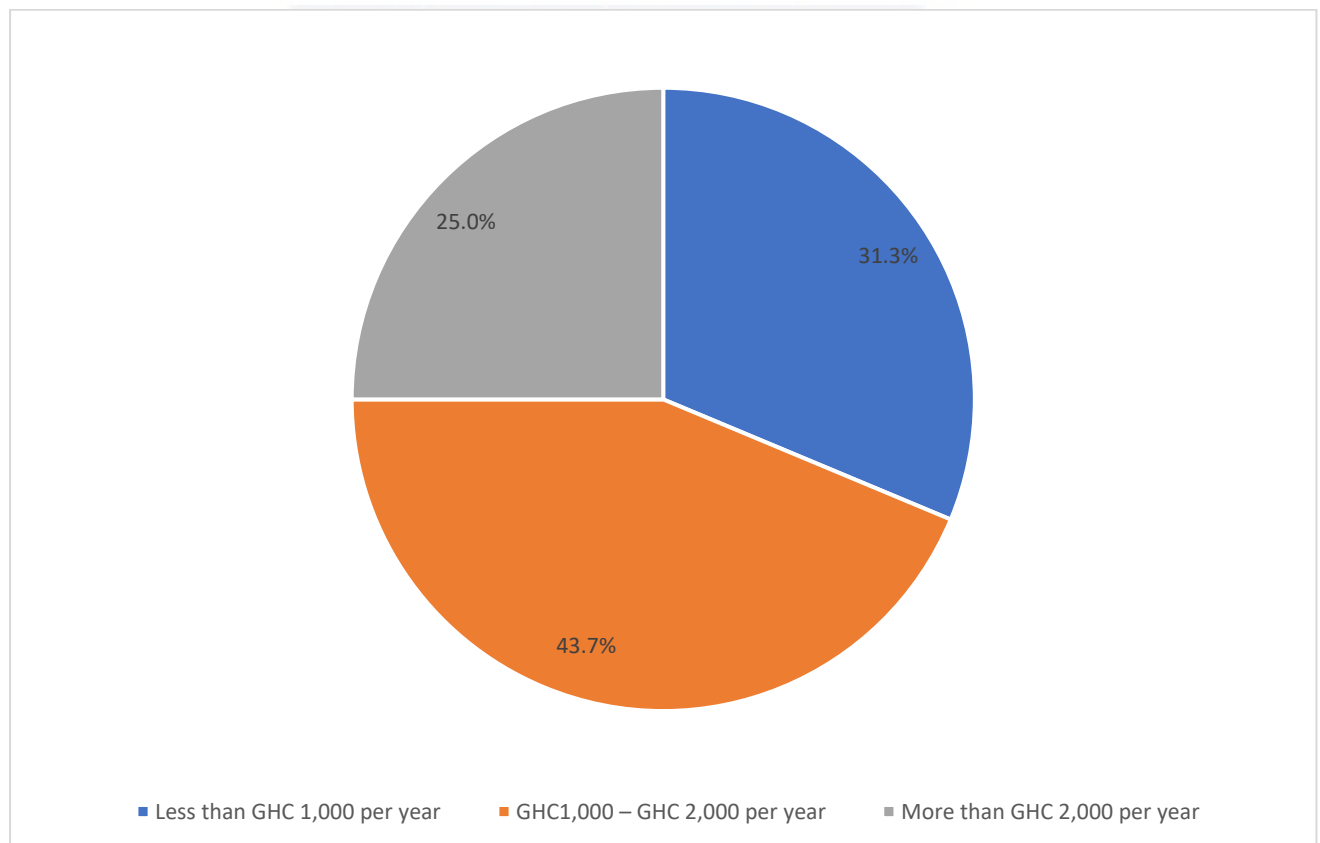


Figure 3: DOTS Programme Budget as reported by the facilities

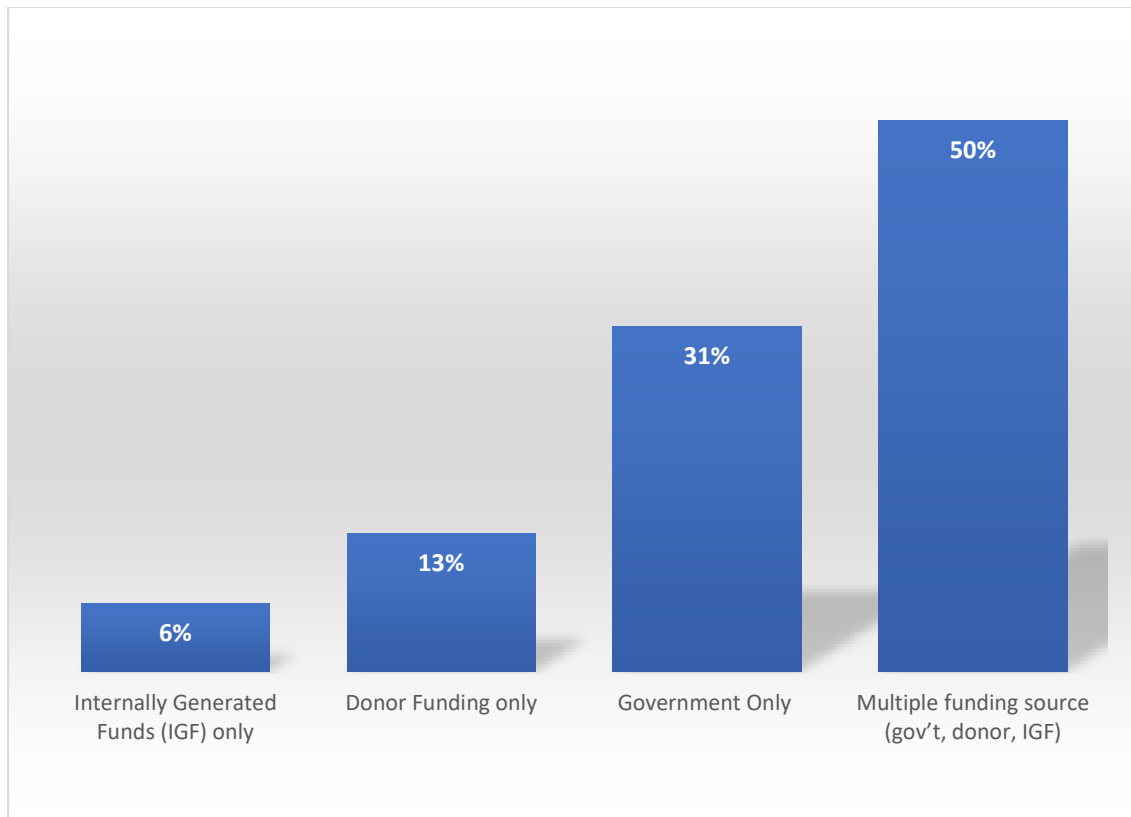


Figure 4: Main Sources of Funding for TB DOTS Implementation Programme for the facilities

4.2.3 Case Detection and Testing

The 16 facilities implementing the DOTS programme were asked to briefly describe the process for case detection. The results show that all the facilities use the sputum test to either confirm or otherwise of TB infection. Only the district hospital and a private health centre have a reference lab for TB case testing using sputum. All the other 14 health facilities that implement the DOTS programme take samples of suspected cases and refer them for testing at the district hospital. The district hospital has seven (7) staff working at the lab while the private health centre has two staff working at the lab. The two facilities confirmed that the staff at the labs have received training as well as other health workers involved in case detection and testing. More than a third ($n=6$; 37.5%) of the facilities are able to receive results of TB test within 24 hours with nearly a quarter having TB test

delaying for more than a week or more. The facilities that receive results of test after 48hours indicated that the delays are mostly caused by the distance to the district hospital.

Table. 4: Case detection and Testing

Variable	Frequency [N=16]	Percent (%)
Availability of diagnostic centre for TB detection		
No	14	87.5
Yes	2	12.5
Time period before suspected case is confirmed		
Within 24 hours	6	37.5
Within 48 hours	3	18.7
Within 72 hours	2	12.5
One week or more	5	31.3

4.2.4 Standardized Treatment with Supervision and Patient Support

Details of standardized treatment with supervision is presented in Table 4. The results show that more than half (n=9; 56.2%) of the facilities conducted daily awareness on TB. For those who conduct awareness and education on a weekly or monthly basis, TB clinics are organized on those days. When TB cases are confirmed, exactly three-fourths start treatment immediately or within 24 hours. Just a little over half (n=9; 56.2%) of the facilities implementing the DOTS programme are able to treat at least 80% of all cases detected within the year. Prior to treatment, all the facilities indicated that clients are given adequate information to enhance adherence and good treatment. This is done in the presence of a caregiver. More than half (n=9; 56.2%) of the facilities have an HIV centre. All TB cases are referred to HIV centres for further test on HIV when clients are confirmed positive for TB. All the facilities indicated that clients mostly complain about drugs for treatment. Some of the complaints that are mostly mentioned by the clients as

stated by the facilities include inadequate nutritious food to support the uptake of the drugs giving, shortage of drugs and side effects. These complaints by clients largely affect adherence to treatment.

Again, all the facilities indicated that they conduct house-to-house visits and monitor clients, however, it is not done extensively as expected. The main reasons cited by the facilities as limiting the number of visits they are to conduct include inadequate funding and logistics including motorbikes to facilitate movement to clients who live some distance away from the facility. Another challenge stated by the facilities is limited staff to conduct home visits. Nearly a fifth ($n=3$; 18.7%) of the facilities have not received refresher training on TB in the last two years. At the time of the visit, 2 (12.5%) of the facilities implementing the DOTS programme did not have drugs available for TB treatment. The District Health Directorate (DHD) has at least visited each facility within the first half of the year. Almost a third ($n=5$; 31.3%) of the facilities are visited by the DHD every month.

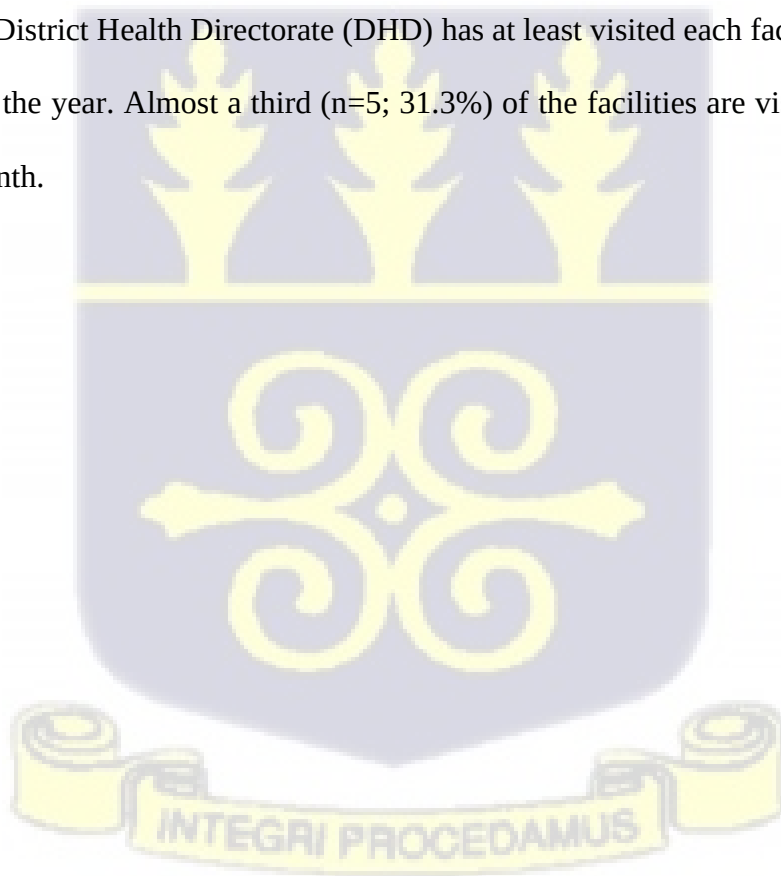


Table. 5: Standardised treatment with supervision and patient support

Variable	Frequency [N=16]	Percent (%)
How often are TB awareness created		
Daily	9	56.2
Weekly	4	25.0
Monthly	3	18.8
Time between TB case confirmation and treatment		
Within 24 hours	12	75.0
Within 48 hours	3	18.7
After 48 hours	1	6.3
Percentage of TB case detected that are treated		
41 – 60 %	2	12.5
61 – 80 %	5	31.3
81 -100 %	9	56.2
Availability of HIV Centre in the facility		
No	7	43.8
Yes	9	56.2
Health workers on TB trained in the last 2 years		
No	3	18.7
Yes	13	81.3
Availability of drugs for treatment		
No	2	12.5
Yes	14	87.5
DHD visit to TB facilities		
Monthly	5	31.3
Quarterly	8	50.0
Bi-annual	3	18.7

4.2.4 District Health Directorate perspective of Health Service Challenges of DOTS implementation

Key informant interview was conducted with the TB Coordinator for the district who is also the Disease Control Officer. The TB Coordinator revealed that about 151 TB cases had been recorded in the last two years (2018-2019). It was noted that the district's annual TB budget for 2019 was GHS 23,460.00, funded by Global Fund through Ghana Health Service. The Coordinator indicated that the district has adequately drugs in stock and that, it is rare for the district to run out of stock of TB drugs. However, sometimes there might be delays of the drug reaching the facilities because of transport challenges. It was further mentioned that there is a

strong collaboration between TB Unit and the HIV Unit, and this has helped to increase referral system and improve treatment and management of TB and HIV cases respectively. However, the coordinator mentioned a number of health service challenges that the Unit has been facing and has frequently affected the implementation of the DOTS programme.

- a. Inadequate or irregular training for health workers responsible for DOTS programme implementation
- b. Limited funds are committed to TB programme. Global Fund remains the main source of funding for DOTS implementation. However, the funds do not come as expected thereby delaying the release of funds from the district to the facilities
- c. Little attention is given to the TB programme by management. Priority is given to other programmes. Low priority results in limited resource and logistics support to the programme
- d. Commitment of health workers is low with regards to the support and implementation of DOTS programme

4.3 Client Related Factors

Client related factors were also assessed in response to objective two of the study.

4.3.1 Demographic Characteristics of TB Clients

The demographic characteristics of the clients that participated in the study is presented in Table 5. As per the district health status report for 2019, 216 TB patients had been identified and were going through treatment under the DOTS programme. However, during the study, 184 were available and willing to participate in the study. More than half (n=94; 51.1%) of the TB patients who participated in the study were below 46 years of age with some (3.8%) above 75 years of age. There were more males (n=112; 60.9%)

than females who participated in the study. Similarly, less than a fifth are not Christians while majority (n = 131; 71.2%) of the participants have had at most primary level of education. Majority (n=115; 62.5%) of the TB clients are self-employed with 10 (5.4%) being students. Only 24 (13.0%) of the participants are living in urban communities while 127 (69.0%) are married.

Table. 6: Demographic Characteristics of TB patients

Variable	Frequency	Percent
Age		
<30 yrs	27	14.7
31-45 yrs	67	36.4
46-60 yrs	54	29.3
61-75 yrs	29	15.8
>75 yrs	7	3.8
Gender		
Male	112	60.9
Female	72	39.1
Religion		
Christian	154	83.7
Muslim	20	10.9
Traditional	7	3.8
Others	3	1.6
Education Status		
Never Schooled	29	15.8
Primary	102	55.4
Secondary	47	25.5
Tertiary	6	3.3
Occupation		
Unemployment	38	20.6
Self Employed	115	62.5
Private Sector Worker	9	4.9
Public Sector Worker	8	4.4
Housewife	4	2.2
Student	10	5.4
Residence		
Rural	160	87.0
Urban	24	13.0
Marital Status		
Single	30	16.3
Married	127	69.0
Divorced	9	4.9
Widow	18	9.8

4.3.2 Access to TB DOTS programme and other related client challenges

Access to TB DOTS programme and other client-related challenges was discussed and results presented in Table 4.6. Almost half (n=91; 49.5%) of the participants access TB services within a 5km radius with only 5 (2.7%) accessing the services from a facility which is more than 20kms away from their residence. As shown in Figure 7, majority (n=94; 51.1%) travel to the health facilities for TB services through vehicle. Nearly three-fourth (n=132; 71.7%) indicating that they are able to pay for the transport cost. About 5% of the participants indicated that they sometimes pay for TB drugs. Nearly a tenth (n=17; 9.2%) do not have national health insurance authority (NHIA) cards. Less than a quarter (n=40; 21.7%) mentioned that they do not need a caregiver, however, only 16 (8.7%) do not have caregivers at the time of the study. Again, more than a quarter (n=53; 28.8%) experience some reactions and side effects anytime they take the TB medication. Some of the common side effects that the participants reported as having experienced include vomiting, body pains, weakness, itching, difficulty in sleeping, among others. For those who experience side effects, almost two-thirds (n=33; 62.3%) report back to the health facility for support. However, 9 (17.0%) of the participants indicated that anytime they experience a side effect, they stop taking the drug for some time until they feel ready to continue taking it. Less than a tenth (n=17; 9.2%) of the participants indicated it is not all the time that they are able to get nutritious food anytime they are taking the drug. Almost all participants (n=179; 97.3%) are given a one-month interval for visits to the facility for review or the next drug. There were 6 (3.3%) participants who have not declared their TB infection status to any family member. Nearly a quarter (n=44; 23.9%) of the participants have ever experienced some level of stigma. Only 14 (7.6%) of the participants have never been visited by health workers in the last 12 months. Adherence to TB treatment among the study participants was 79.4%.

Table. 7: Access to TB DOTS programme and other client related challenges

Variable	Frequency	Percent
Distance to TB centre		
Within 5kms	91	49.5
5-10 kms	50	27.2
11-20kms	38	20.6
Above 20kms	5	2.7
Able to afford transport cost		
No	52	28.3
Yes	132	71.7
Sometimes Pay for TB drugs		
No	175	95.1
Yes	9	4.9
NHIA Member		
No	17	9.2
Yes	167	90.8
Needs a Caregiver		
No	40	21.7
Yes	144	78.3
Availability of a caregiver		
No	16	8.7
Yes	168	91.3
Experience side effect when drug is taking		
No	131	71.2
Yes	53	28.8
Action taking after side effect		
Stop taking the drug	9	17.0
Report to Health Facility	33	62.3
Report to a caregiver	11	20.7
Availability of nutritious food anytime drug is taking		
No	17	9.2
Yes	167	90.8
Time interval given prior to next visit		
Within 1 month	179	97.3
Two months' time	3	1.6
Above 2 months	2	1.1
Disclosure of TB status to family member		
No	6	3.3
Yes	178	96.7
Have been stigmatized before		
No	140	76.1
Yes	44	23.9
Visited by Health Worker		
No	14	7.6
Yes	170	92.4
Adherence to TB treatment		
No	38	20.6
Yes	146	79.4

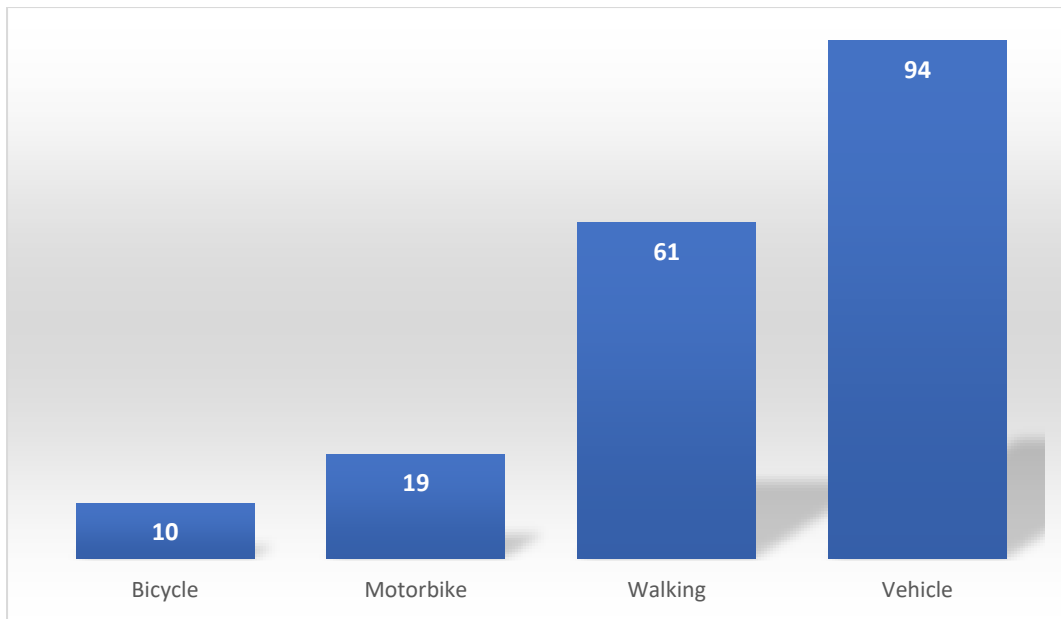


Figure 5: Means of transport to health facilities to access TB services

4.3.3 Knowledge and awareness level of participants about Tuberculosis

Table 7 presents the results of the analysis of knowledge and awareness level of participants on tuberculosis. General knowledge on TB among study participants stood at 91.8%. On specific issues, 119 (64.7%) of the participants correctly responded to the question on the causes of TB while all the participants knew that TB is curable. However, only 61 (33.2%) could indicate correctly that TB does not affect only a group of people but anybody who is exposed. Less than a tenth ($n=13$; 7.1%) did not know that TB patients can infect other people. A little over a quarter ($n=49$; 26.6%) had some knowledge about the existence of the DOTS programme.

Table. 8: Knowledge and awareness level of TB patients

Knowledge Variables	Frequency	Percent
Causes of TB		

Incorrect	65	35.3
Correct	119	64.7
Can TB be cured?		
Correct	184	100
Type of group TB can affect		
Incorrect	123	66.8
Correct	61	33.2
TB patients can infect other people		
Incorrect	13	7.1
Correct	171	92.9
Knowledge about DOTS programme		
No	49	26.6
Yes	135	73.4
General Knowledge score		
Inadequate	15	8.2
Adequate	169	91.8

4.3.4 Factors associated with adherence to TB treatment

Two different levels of analysis were conducted among TB patients to test the level of association that exists between adherence to TB treatment and other independent variables. Bivariate analysis was conducted for each of the independent variables. To further test the strength of the relationship, a second level of multivariate analysis was conducted. The results of both bivariate and multivariate analysis are presented in Table 8. At first level, analysis was done using chi square analysis. All significant variables were further adjusted for and this has been presented in the table. To help appreciate the analysis, both the adjusted and unadjusted results for only the variables that were significant at first level have been presented.

The result of the bivariate analysis showed that religion, distance to a health facility, ability to afford transport cost to a facility, having a health insurance card and having a caregiver were significantly associated with adherence to TB treatment. Other significant

variables that were associated with adherence to TB treatment includes experiencing side effect after taking the drug, having access to nutritious food when taking the drug, disclosure of TB status to any family member ever been stigmatized and visited by health workers at home. However, after adjusting for all variables, religion, gender, distance to health facility, access to nutritious food, ever been stigmatized and knowledge about TB issues were significantly associated with adherence to TB treatment.

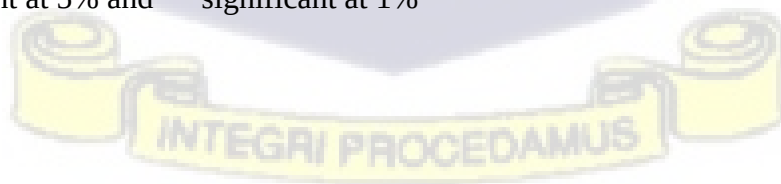
On religion, TB patients who were Christians had 7.5 odds of adhering to TB treatment as compared to Muslims (AOR: 7.5; CI: 1.62-35.30). Females on the other hand have 3.4 chances of adhering to TB treatment than males (AOR: 3.4; CI: 1.05-10.81) while TB patients who live between 5-10kms away from a facility are 6.2 times more likely to adhere to TB treatment than those who live near a TB facility (AOR: 6.2; CI: 1.34-28.9). Additionally, TB patients who always have access to nutritious food anytime TB drugs are taking are 8.3 more likely to adhere to TB treatment than TB patients who do not always have access to nutritious food when a TB drug is taking (AOR: 8.3; CI: 1.71-40.58). Also, TB patients who have not been stigmatized before have 8.2 chances of adhering to TB treatment than those who have experienced different forms of stigma because of their TB status (AOR: 8.2; CI: 2.73-24.88). Lastly, TB patients who have adequate knowledge about TB are 15.0 more likely to adhere to TB treatment than those who have inadequate knowledge about TB issues.

Table. 9: Factors Associated with TB drug adherence

Characteristics	Adherence to TB treatment			
	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age < 30 yrs	1		1	

31-45 yrs	1.2 (0.36-3.71)	0.806	1.7 (0.32-8.81)	0.545
46-60 yrs	0.5 (0.17-1.68)	0.286	0.8 (0.15-4.52)	0.838
61-75 yrs	1.1 (0.28-4.28)	0.901	1.9 (0.25-14.23)	0.532
>75 yrs	1.4 (0.13-14.0)	0.794	5.1 (0.13-198.2)	0.381
Religion				
Muslim	1		1	
Traditional	1.1 (0.19-6.19)	0.922	13.7 (0.66-285)	0.090
Christian	4.0 (1.52-10.69)	0.005**	7.5 (1.62-35.30)	0.010**
Gender				
Male	1		1	
Female	1.8 (0.81-3.82)	0.152	3.4 (1.05-10.81)	0.041*
Distance to Health Facility				
< 5 kms	1		1	
5-10 kms	5.1 (1.68-15.58)	0.004**	6.2 (1.34-28.97)	0.020*
11-20 kms	2.9 (1.04-8.30)	0.043*	3.3 (0.73-15.05)	0.120
> 20 kms	1.8 (0.19-16.63)	0.614	1.0 (0.07-15.19)	0.970
Able to afford transport cost				
No	1		1	
Yes	4.6 (2.16-9.72)	0.000**	1.5 (0.45-4.91)	0.513
Payment for TB drugs				
No	1		1	
Yes	0.9 (0.18-4.55)	0.905	1.9 (0.20-17.48)	0.579
Access to Health Insurance				
No	1		1	
Yes	3.1 (1.08-8.70)	0.035*	3.3 (0.74-15.18)	0.116
Have a caregiver				
No	1		1	
Yes	3.4 (1.19-9.93)	0.023*	0.2 (0.01-2.84)	0.231
Any side effect after taking TB drug				
Yes	1		1	
No	3.8 (1.80-8.02)	0.000**	1.7 (0.53-5.21)	0.378
Access to nutritious food anytime TB drug is taking				
No	1		1	
Yes	8.3 (2.80-24.79)	0.000**	8.3 (1.71-40.58)	0.008**
Disclosure of TB status				
No	1		1	
Yes	8.5 (1.49-48.16)	0.016**	19.0 (0.59-61.0)	0.096
Have experienced stigma before				
Yes	1		1	
No	5.6 (2.61-12.23)	0.000**	8.2 (2.73-24.88)	0.000**
Visited by health workers at home				
No	1		1	
Yes	4.5 (1.47-13.71)	0.009**	3.9 (0.51-30.95)	0.190
Knowledge about TB				
Inadequate	1		1	
Adequate	2.6 (0.80-8.51)	0.111	15.0 (1.94-11.6)	0.010**

NB: * significant at 5% and ** significant at 1%



4.4 community-related Factors to TB DOTS Programme

In response to objective 3, the study looked at the factors at the community level that affects the implementation of the TB DOTS programme. Community-level focus group discussions were conducted in seven (7) communities.

4.4.1 Community Health Management Committee and their Roles

An assessment was done on the availability of community health management committees and health volunteers in the various communities and their roles. The results showed that all the communities have community health management committees (CHMC) as well as health volunteers. The roles and responsibilities of the CHMC and the volunteers as mentioned by the participants in the FGDs followed the standard role and responsibility of all CHMCs.

In one of FGDs, a participant indicated *“the volunteers often come to our houses to find out if the patients are taken their medication. Anytime they come, they ensure that they spend sometime to discuss few things that helps to understand the current condition”* (FGD at Community 3).

Another participants mentioned:

Sometimes they come to even bath bed-ridden clients when their family members are not available. In fact, they are very helpful to us in this community. We know them and they have been a source of inspiration to us (Community 7, FGD).

The CHMCs were further asked whether they had any knowledge of the existence of TB patients in the community. The response showed that, where there are TB patients, the volunteers are aware of them and their locations, however, not all the CHMC members are aware of TB patients' existence. The volunteers work with health workers to conduct home

visits to these clients and further follow up on them to ensure that they are adhering to treatment. The available support system that works in the communities is the role performed by the volunteers and other CHMC members. One unique aspect of the support that was mentioned was that the volunteers are aware that TB is curable and therefore patients are motivated and supported to follow through treatment.

4.4.2 Basic Knowledge on TB and Cultural Systems at the community

The knowledge of health volunteers in each community was assessed to ascertain whether they are well informed about TB to provide the needed information. This was necessary since the health volunteers are the main source of health information at the community level in the absence of health workers. The questions focused on the causes of TB, mode of transmission, effects of TB and the importance of diagnosis. A summary of the responses are as follows:

Community 1:

TB is caused by smoking. It is transmitted if an infected person does not cover his mouth when coughing. Some of the effects of TB include loss of weight and tiredness. It is very important to visit clinic for regular check-ups and treatment.

Community 2:

I do not know the cause of TB. TB transmission is by sharing of cups and spoons with infected person or any sharp material. It is health facility that provides drug to care for this disease. It is very important to visit the clinic for treatment

Community 3:

An infected person can transmit TB through uncovered coughing. The effects are persistent cough, chest pain and numbness. Seek immediate care when you cough for more than 2 weeks.

Community 4:

TB is caused by excessive smoking and drinking. It is transmitted by spitting, sharing materials such as cups and spoons. Some of the effects are weakness in the lungs, chest pains.

Community 5:

TB is an air born and can be transmitted through the sharing of materials such as cups. Effects: loss of weight, shortness of breath and persistent cough.

Community 6:

An infected person can transmit TB through uncovered coughing. The effects are persistent cough, chest pain and numbness. Seek immediate care when you cough for more than 2 weeks.

Community 7:

TB is caused by a germ in the air which causes coughing and headaches. It affects the lungs and causes chest pains. It can be spread from one person to another when one is exposed to droplets from an infected person. Regular screening is important to reduce TB infection.

On community beliefs and perceptions about TB, different perspectives were shared from the communities. The main results are summarised as follows:

1. There is a perception that TB is a spiritual ailment, so people normally do not open up to seek care at a hospital
2. It is perceived as a curse in this community, cases are mostly admitted at prayer camps.
3. There is a superstition that it is witches that cause TB and therefore there is the need to seek help from spiritual healers especially traditionalists.

All the communities agree that there is some level of stigma against TB patients because of how they were first managed in the past and the tag (name) that the disease was given “*nsaman nnwa*”.

4.5 Strategies for addressing the stated challenges

The study further asked various respondents from both health facilities and communities as well as the TB patients to indicate some of the key strategies that have been adopted to address the challenges that have been identified as affecting the implementation of the DOTS programme. The strategies are presented according to the components of the DOTS strategy.

4.5.1 Sustainable Financing for TB DOTS programme

The following strategies and actions were mentioned as key measures that are been taken to address the challenges with regards to DOTS programme financing:

1. Widen the scope of internally generated funds to increase resources for the DOTS programme
2. Collaboration with key traditional and religious leaders to increase advocacy for improved financing from the government through district assembly. Work with other strong Civil Society Groups to support advocacy work for TB funding.

4.5.2 Case Detection and Testing Strategies

For case detection and testing, the various facilities and the district health directorate mentioned the following as key actions that have been adopted to address the challenges.

1. Intensify home visits and consistently conduct contact tracing of all suspected cases and test them. Through contact tracing, all close relatives of TB patients are also identified and tested.

2. Strengthen community education and awareness on the importance of testing. Through this education, community members are encouraged to go to the clinic for testing when they suspect any case.
3. Sustain the use of sputum transport system through the Ghana Post to diagnostic centres
4. Strengthen referral system at the community level through health volunteers and CHMCs. Where suspected cases are identified, health workers are quickly informed to follow up for testing.
5. Established TB coordinators within the sub-districts to strengthen case detection at all levels

4.5.3 Standard Treatment and Supervision

The strategy to ensure consistent adherence to treatment is the responsibility of both health workers and TB patients. Views were therefore gathered from both health workers and TB patients as outlined below:

1. Intensify community awareness and education through durbars and other public gatherings on the importance of TB treatment
2. Strengthen house-to-house visits especially for those who are in hard-to-reach communities with available motorbikes.
3. Strengthen the caregiver system and ensure they are giving the necessary training and capacity to support adherence to treatment
4. Other facilities with donor funding are motivating TB patients through regular visits and an award system

4.6 Chapter Summary

The chapter has presented all the major findings of the study. The results have been presented according to the four main objectives of this study. The main challenges affecting the implementation of the DOTS programme were categorized into health service challenges, TB patients challenges and community challenges. The chapter then concludes with some of the proposed strategies that are either been implemented by the facilities or are yet to be implemented to address the identified challenges.



CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

Chapter five of this study discusses the findings of the study in relation to the available literature. The discussions summarize the main findings for each objective and either confirm or present an opposite finding in other studies. The three main areas discussed are health service challenges to DOTS programme implementation, patient-related challenges and community system challenges.

5.2 Health Service Challenges

The study observed that funding for DOTS activities has been very limited. Few facilities had an amount that could support some of the activities of the DOTS programme. The DOTS implementation requires high government commitment through frequent and timely release of funds to the facilities. However, the available budget from the study showed a very low amount for DOTS implementation. Though some depend on development partners to augment the little they receive from the national through regional and district, the source of funding had been reduced over the years. Limited funding for TB DOTS activities is not only a challenge in Ghana. Bello (2010) indicates that limited funding for the DOTS programme has a significant impact on its implementation. According to the Health Financing towards UHF agenda, governments are expected to gradually increase their commitment to the fight against infectious diseases including TB (WHO, 2016). However, this is largely limited as was observed in the study. The main source of the TB DOTS programme in the district is the Global Fund. Generally, limited funding affects, not only the supply of drugs and logistics for the DOTS programme, it also affects key aspects of monitoring especially with house-to-house visitation by health

workers with support from volunteers. The delays in release of funds and the availability of adequate funding for the DOTS programme in the facilities have resulted in the facilities conducting limited contact tracing and follow-ups or home visits.

The facilities implementing the DOTS programme use the sputum test to either confirm or otherwise of TB infection. The TB DOTS strategy recommends the use of a sputum test for confirmation of a TB case. In facilities where there are no labs for conducting TB tests, referrals are made to the district hospital as required by the protocol for the DOTS programme. However, the challenge that some of the facilities have with regards to referral for testing of samples is the delay in getting results. The DOTS strategy recommends that results should be made available within 24 hours. However, the facilities that take their samples to the district hospitals sometimes received the results of the test after one week. As the test results are delayed, measures in curtailing the spread are defeated. Appropriately, there should be another reference lab that provides similar functions located close to the communities that are far apart. Contact tracing is sometimes used as a means of identifying all persons who may have been exposed to TB patients. However, with limited financing for DOTS activities, this exercise is mostly not done. Another major observation of this study is the amount of time it takes the health facility to initiate treatment. Nearly a quarter do not start treatment within 24 hours when cases are confirmed. This delay contradicts the main procedure as outlined in the DOTS strategy by WHO. The strategy indicates that, as much as possible, all confirmed cases must be enrolled on treatment immediately cases are confirmed. Similar to the study by Tadesse et al., (2013) where delay in start of treatment is largely caused by geographical location of the facility which implements the DOTS program, this study observed that TB patients who live far from the facilities always have challenges with the start of

treatment. Further analysis of the situation revealed that some of the clients may not have presented caregivers while others, for fear of stigma, may not want to visit the facility.

One major positive observation of the study is the high level of collaboration that exists between the TB Unit and the HIV Unit. All TB cases are referred to HIV centres for further tests on HIV when clients are confirmed positive for TB. Amo-Adjei, (2016) in a study in Ghana noted that in most cases, there are challenges with the level of collaboration that is expected to exist between the HIV and TB units. Again, Nohaji, et al, (2016) in a study in South Africa observed that there are weak relationship between TB Unit and HIV Unit. However, this study observed a different outcome. On clinical complications, the study observed that the drugs that were administered under the DOTS program were conceived as been big by patients and therefore made it counterproductive for ensuring adherence to treatment.

The study by Amo-Adjei (2016) confirmed this observation in another region in Ghana. Another major challenge that was observed is the limited number of home visits that is conducted by health workers. This was mainly attributed to limited logistics including motorbikes and fuel, limited health workers coupled with the workload, etc. in the study in South Africa observed that the DOTS programme implementation was also challenged with a gross shortage of health staff which made it extremely difficult for home visits and follow-ups to be conducted on patients who have had to be visited. Nohaji, et al, (2016) further noted that the shortage of drugs affected the DOTS implementation over a long period. Even though a shortage of drugs was not a major challenge to the DOTS implementation in Ajumako Enyan Essiam district, there were pockets of shortage of drugs in a few facilities at the time of the study. This has the potential of delaying treatment should clients visit the facility at the time of the shortage.

5.3 Client-related Challenges to DOTS Implementation

The TB DOTS programme implementation ends with the client utilizing the services. All efforts to ensure that TB is controlled cannot be achieved without the commitment of the patients to adhere to treatment. Treatment remains a major component of the DOTS strategy where the emphasis is placed on prompt and effective treatment. Knowledge about TB issues is also key in the fight against TB. Remarkably, the study observed higher knowledge among TB patients in the district with almost all the participants having adequate knowledge of the causes, mode of transmission and prevention methods. Seyoum & Legesse, (2013) in a similar study in Ethiopia observed that more than 80% of TB patients had adequate knowledge about TB issues. Similarly, Biya et al., (2014) in a study in Nigeria observed that about 84% of TB patients knew about the causes of TB, however, there was little knowledge about some of the symptoms of TB.

Factors associated with TB treatment adherence was further analysed. The results showed that a number of factors were significantly associated with TB treatment adherence. Key among these factors are religion, gender, distance to health facility, ability to afford transport cost to a facility, having a health insurance card and having a caregiver to support treatment. Other factors include adequate knowledge about tuberculosis, experiencing side effect after taking the drug, disclosure of TB status to any family member, ever been stigmatised and visited by health workers at home. Most of these findings have been confirmed in different studies especially in Africa. In Nigeria, Shakirat, (2010) discusses some of the key challenges that the implementation of the DOTS strategy in late 2000 faced. The study observed that the side effect of the TB drugs as well as income levels of patients where drugs are not free influenced adherence to

treatment. Gender was another significant factor as was observed in this study. Nohaji, et al, (2016) discussed the DOTS implementation challenges that South Africans faced in the control of tuberculosis. Nohaji, et al, (2016) observed several client-related factors affecting the implementation of DOTS including the availability of a caregiver, knowledge of TB treatment and side effects. Gebremariam et al.,(2010) in a study in Ethiopia discussed barriers as facilitators of adherence to TB among patients, using the DOTS approach for treatment. The study observed that side effects of TB drugs together with the burden of the tablets (continuous taking of pills), the stigma associated with disclosure and the absence of nutritious food to support the uptake of the pills were major barriers. Inadequate communication with health professionals were also identified.

However, two other studies were slightly different from the findings as observed in Ajumako Enyan Essiam district. Hussen et al., (2015) observed that adherence to treatment was influenced by patients who had visited traditional healers and had a delayed initiation of treatment. Cramm, et al.,(2010) also observed a different result in a study in South Africa. In that study, adherence to treatment was observed to be influenced by people's perceptions and attitudes about TB. All other factors that have been discussed including gender, knowledge, stigma, side effect of a drug, etc did not show any significant association with the treatment adherence.

5.4 Community-related Challenges influencing TB DOTS programme

At the community level, general perception on TB and its' associated stigma are largely contributing to challenges affecting DOTS implementation. Even though stigma issues may not be overwhelming, there are pockets of the stigma that remain in various communities mainly due to the negative tag associated with TB. While some community members believe TB is a spiritual disease and that it must be treated with a spiritual approach, others perceive

TB as a curse and that people infected with TB are admitted to prayer camps. Nonetheless, all the communities have strong support systems that support the role of DOTS implementation. All the communities have strong CHMCs with dedicated volunteers who support health workers in conducting home visits and create awareness on TB issues. The WHO (2018) explains that the community system plays a major role in achieving important health outcomes. Weak community systems increase the risk of infections among the general population, especially in a rural setting. It is therefore important to acknowledge the role of a strong community system in reducing TB infection using the DOTS strategy.

Wynne, et al.,(2014) analysed some of the community challenges that affect the roll-out of the DOTS strategy in Uganda. The study observed that the availability of a community support system. The WHO (2018) explains that the community system plays a major role in achieving important health outcomes. Weak community systems increase the risk of infections among the general population, especially in a rural setting. It is therefore important to acknowledge the role of a strong community system in reducing the TB infection using the DOTS strategy. Wynne, et al.,(2014) in a study on community factors on DOTS implementation observed that the availability of a community support system (including CHMCs and health volunteers) for the effective identification and supervision of treatment improves significantly the implementation of the DOTS programme. It was observed that in most communities, the health professionals are unable to visit the communities regularly for supervision because of inadequate staff at various facilities coupled with the workload at the facility.

Viney et al., (2014) also indicated that the community belief system on health-seeking behaviour affects early detection of cases. This assertion by Viney et al (2014) is similar to the observation made in this study where most of the communities in Ajumako Enyan Essiam have problems with community perception on TB thereby affecting case detection and treatment.

CHAPTER SIX

RECOMMENDATION AND CONCLUSION

6.1 Introduction

The final section of the study presents a summary of the study and provides a recommendation for improving TB DOTS programme implementation. The conclusion part of the study makes a deduction from the various findings and highlights areas for improvement.

6.2 Summary and Conclusion

Funding for DOTS activities is very limited with limited commitment from the government to support the implementation of the DOTS programme. Facilities are adhering to case detection and testing protocols. However, there are delays in testing and getting results. There is a high level of collaboration that exists between the TB Unit and the HIV Unit. All TB cases are referred to HIV centres for further tests on HIV when clients are confirmed positive for TB. Remarkable, knowledge among TB patients in the district is relatively high with all the participants having adequate knowledge on the causes, mode of transmission and prevention methods. Adherence to treatment was also high among TB patients. Largely, on client related factors,

TB adherence by the patients was determined by several factors. However, major significant factors included gender, knowledge about TB transmission and prevention, distance to health facility and experiencing side effects after taking the drug. The availability of a caregiver is key in ensuring effective implementation of treatment protocols in the DOTS strategy.

At the community level, individual perception and attitude towards the disease and people infected play a significant role in the TB DOTS programme implementation. However,

the existence of CHMCs in all the communities provides a platform to addressing the challenges of community perception and attitude on TB.

6.3 Recommendations

Based on the findings and key observations from the three key DOTS implementation challenges, the study proposes the following recommendations:

Public Health Recommendation:

1. Awareness at the community level should be intensified through the use of local media and community information centres to increase community members' knowledge of TB. This will help reduce the level of stigma as well as reduce the community's perception on TB
2. The use of caregivers or treatment support system is key in achieving optimal results in TB treatment. It is therefore important that TB patients are encouraged to present a caregiver or a support person who can facilitate adherence to treatment. Clients who do not present with caregivers at the time of initiation of treatment should be encouraged to do so to improve adherence to treatment.
3. Another significant observation is the positive relationship between TB status disclosure and adherence to treatment. Tuberculosis patients should be encouraged, as part of the counselling for treatment, to disclose their TB status to at least their partners or close relatives as a first step to reducing spread.

Policy Recommendation

1. The policy on the opening or establishing of TB DOTS centres should be applied effectively to ensure that TB DOTS centres are increased at various vantage points to reach majority of clients. Key in that is the opening of diagnostic centres in health centres to support them to be able to conduct some amount test for quick results.

Research Recommendation

1. Further study is recommended to be done to assess the challenges at the national and regional levels within the health system. In such a study, the six-key health system building blocks can be assessed to identify key areas that may contribute to DOTS implementation challenges.
2. Further meta-analysis study is also recommended to be done to ascertain, judging from different studies and countries (focusing on developing countries), the main challenges that the TB DOTS programme face across countries.



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APENDICES

APPENDIX I: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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



Research & Development Division
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MyRef. GHS/RDD/ERC/Admin/App/20/413
Your Ref. No.

19th October, 2020

Emmanuel Kwaku Sarfo
P.O. Box 69
Ajumako - Central Region

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

GHS-ERC Number	GHS-ERC 037/07/20
Study Title	Implementation Challenges of TB Directly Observed Treatment Short Course (DOTS) Strategy in Ajumako Enyan Essiam District
Approval Date	19 th October, 2020
Expiry Date	18 th October, 2021
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

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

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

SIGNED.....
Dr. James Akazili
(Head, Ethics & Research Management Department)

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

Appendix II: Participant Information Sheet

Study Title: **Challenges that influence implementation of TB Directly Observed Treatment Short Course (DOTS) and Strategy to mitigate these challenges in Ajumako-Enyan-Essiam District.**

Principal Investigator: Emmanuel Kwaku Sarfo

Qualification: BSc. Public Health and Allied Sciences.

Address: Box LG 13, School of Public Health, College of Health Sciences, University of Ghana, Legon. Tel. 0204109314/0249033594

Greetings, my name is Emmanuel Kwaku Sarfo, an MPH Student from Department of Epidemiology and Disease Control, School of Public Health, University of Ghana. I am conducting a study on the Challenges that Influence implementation of TB DOTS and Strategies to mitigate these challenges in Ajumako Enyan Essiam District.

General Information about the Research

Tuberculosis (TB) is the deadliest infectious disease in the world.(Global Fund, 2019a)(Global Fund, 2019a)(Global Fund, 2019a) It is estimated that in 2000, more than 1.7 million people without HIV were killed and this reduced to almost 1.6 million in 2005, 1.4 million in 2010, 1.3 million in 2015 and recently, a little over 1.2 million in 2018. The introduction of the Directly Observed Treatment Short Course (DOTS) strategy was purposed to reduce the rate of infection and help identify the cases at early stage and treat them appropriately to reduce the disease burden. The main objective of the study is to assess the implementation challenges that the DOTS strategy has faced over the years in Ajumako-Enyan-Essiam District.

Participant's involvement

I would like to request you to be part of my study. If you agree to participate in this study, I would ask you a few questions centred on the DOTS strategy. This will take about 20 minutes of your time. Participation in this study is entirely voluntary. You have the right to refuse to participate and this will not affect your rights in any way, especially with receiving healthcare. You are at liberty to withdraw from this study at any stage of your participation.

Potential Risk: The researcher do not foresee any potential risk in participating in the study except that it will take part of your precious time and the need to provide to us some personal information of yours.

Notwithstanding, the study ensure that the privacy of the individuals involved in this study is protected.

Benefits: The study seeks to identify key factors affecting TB DOTS implementation. The findings will enable the National Tuberculosis Control Programme (NTP) and Ajumako Enyan Essiam District Health Directorate to device appropriate strategies to address implementation challenges of TB DOTS strategy.

Each participant will be required to wash hand with soap and water where appropriate, and where water is not available, hand sanitizers will be provided for use before the start of any interview for protection against Covid-19 pandemic. We do not for see any potential risk in participating in the study except that it will take part of your precious time and the need to provide to us some personal information of yours.

Cost: The full cost of the research will be borne by the principal investigator.

Compensation: Respondents will not be provided any reward/compensation for participation or responding to the questionnaire.

Confidentiality: All the information collected from you will be kept strictly confidential and will be used for the intended purpose only. You will not be identified by name in any dissemination reports or publications resulting from this study.

Safety Protocols: With the emergence of Covid-19 pandemic, data collectors will be provided with adequate Personal Protective Equipment (PPE). Each data collector recruited to participate in the data collection will be given face masks, hand gloves, hand sanitizers and liquid soap to be used in areas where water is not easily accessible. All data collectors will be required to observe social distancing protocols. For interviewees (study participants), face mask will be provided to each prior to the start of the interview. Additionally, each participant will be required to wash hand with soap and where appropriately, use hand sanitizers before the start of any interview.

Study Subjects: Consent will be sought from all health workers who will be involved in the study.

Privacy and Confidentiality: Participants will be assured of confidentiality and privacy of the information provided. To assure privacy and confidentiality, study codes will be used on all data forms (completed questionnaires). Participants will not provide names to prevent easy identification of individuals on a particular questionnaire. This will be discussed prior to the conduct of an interview. Data gathered will be encrypted whereas sheets that contain face sheets will be removed. Similar codes will be used for health facilities to avoid easy tracing of data source by a third party.

Data security, storage and usage: Data collected from the individuals will be collected with questionnaire and entered into table format and stored on hard drive of a computer and the same time keep the questionnaire in safe for two years before disposing them off. Data files on computers and external hard drives will be protected with security codes (password) to prevent easy access by another person.

Provision of Information and Consent for participants:

For primary data, CHVs will be provided with the purpose of the study. Participants will also be informed of the potential risk and benefits of the study related to them while they participate in the study. The consent highlights the areas of confidentiality and privacy to the participants. Participants will further be informed of how the data collected will be stored. Decision to participate will solely rely on the participant. The participant will therefore be informed that participation will be a matter of choice. After these discussions, if a participant agrees to participate in the study, he/she will be made to sign a consent form to affirm the willingness to participate in the study. All health workers participating in the study will be made to sign a consent form.

Voluntary withdrawal: Participants will be assured of the voluntary nature of the research and that they can decide to participate or withdraw. Additionally, participants will be made to understand that at any point in time of the interview, they can decide to discontinue without any prejudice from the researcher.

Protocol Amendments: During the field survey, when there are changes in the approved protocols as a result of any field observations and interactions, the Ethics Committee will be informed appropriately of the changes with stated reasons.

Declaration of Conflict of Interest: There is no conflict of interest in this study.

Protocol Funding: The funding of this study will be the sole responsibility of the principal investigator.

Data Security and Record Keeping

Study materials (questionnaires and informed consent) will be stored in a locked file cabinet in the office of the principal investigator. Data will be entered STATA software version 15.0 and electronic files will be made accessible only to the research team. Study materials (questionnaires and informed consent) will be labelled and given a unique study identification number for the participants. The data storage will be done by the principal investigator, Mr. Sarfo Kwaku Emmanuel-School of Public Health, University of Ghana, Legon.

Who to Contact for Further Clarification/Question: If any of your questions were not satisfactorily answered by me, or you have further questions regarding this study, you may contact:

Mr. Sarfo Kwaku Emmanuel, (Principal Investigator) at District Health Directorate, Ajumako

Tel.:0242212645

Email: sarfokem@yahoo.co.uk

Dr. Danso-Appiah Anthony, (Supervisor), School of Public Health

Tel: 0269083789

Email: tdappiah@yahoo.co.uk

Madam Abena Apatu (Administrator) Ghana Health Service Ethics Review Committee

Tel 0503539896



Appendix III: Consent Form

Project title: Challenges that influence implementation of TB Directly Observed Treatment Short Course (DOTS) and Strategy to mitigate these challenges in Ajumako-Enyan-Essiam District.

PARTICIPANT STATEMENT

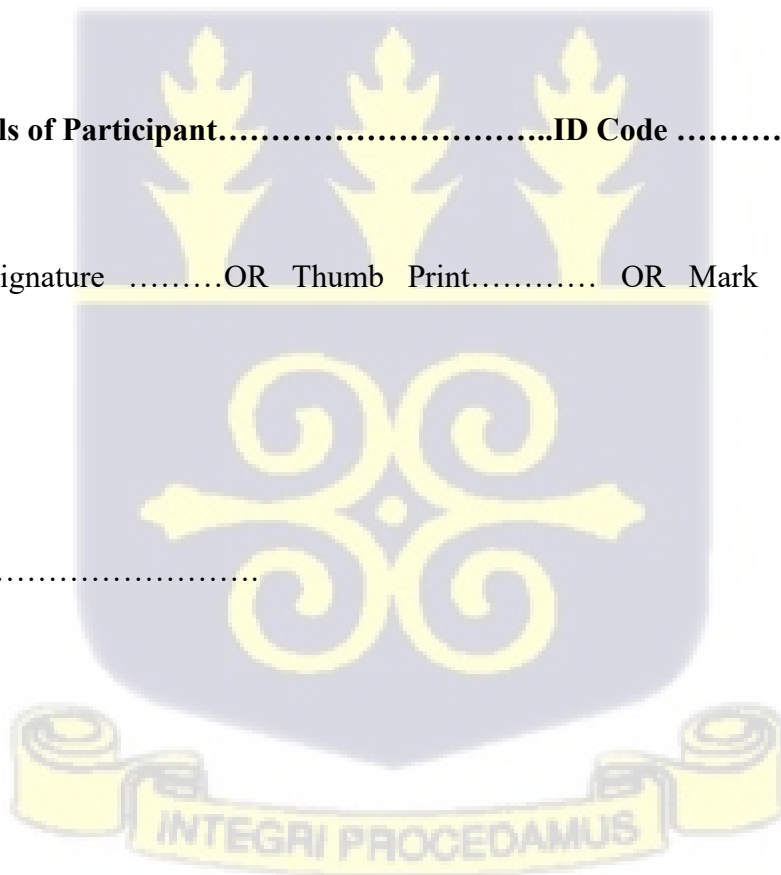
I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and satisfactorily explained to me in a language I understand (English ☐ Twi ☐ Fante ☐ I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Name or Initials of Participant.....ID Code

Participants' SignatureOR Thumb Print..... OR Mark (Please specify)
.....

Date:.....



INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in (English ☐ Twi ☐ Fante ☐) language to his proper understanding.

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

Name of Interpreter.....

Signature of Interpreter.....

Date:.....



STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the (English ☐ Twi ☐ Fante ☐) language, he/she understood.

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

Name:

Signature..... OR Thumb Print OR Mark (please specify)

Date:

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name:

Signature:

Date.....



Appendix IV: Data Collection Tool

School of Public Health
College of Health Sciences
University of Ghana

Dear Respondent,

This is a research carried out on the **Challenges that influence implementation of TB Directly Observed Treatment Short Course (DOTS) and Strategy to mitigate these challenges in Ajumako-Enyan-Essiam District**. The research is limited within the district.

I will, therefore, like to take a few minutes of your precious time to answer these questions.

You are assured that the answers you give will be strictly confidential and your name will not be mentioned in my research reports. Thank you.

HEALTH FACILITY-BASED QUESTIONNAIRE

Section A: Socio-demographic Characteristics

S/N	Question	Response	Code
	Name of health facility		
	Type of facility	Public Private CHAG	
	Level of facility	Hospital Clinic Health Centre Health Post CHPS	
	Number of staff on TB program (permanent and non-permanent)		
	Number of communities the facility covers		
	Is the facility implementing the DOTS programme	Yes No	
	If yes, since when?	Month and year	

	Title of Health Worker	Midwife Community Health Nurse General/Enrol Nurse Lab Technicians Other, specify In-charge of the facility Hospital Administrator/Manager	
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Section B: Political Commitment with increased financing (to be responded by facility manager or in-charge)

S/N	Question	Response	Code
	What is your total DOTS programme budget for 2018 and 2019		
	What are sources of these funds?	Government (%) Internally Generated Fund (%) Donor funding (including support from any other NGO operating in the district (%))	
	Were you able raise/receive all the expected funds in 2018 and 2019?	Yes No	
	If Yes (Q3,) was there any delay in releasing the funds?	Yes No	
	If Yes (Q4), what were the causes of the delay?		
	If No (Q3), how much (% of total budget) were you able to receive?		
	Was the funding enough to support the DOTS activities?	Yes No	
	If No (Q7), what were the challenges that the limited funding brought to you?	List all the challenges or the problems	
	Were client made to pay any amount for screening or case detection test	Yes No	
	If Yes (Q9), how much	State the exact fee charge by the facility for screening	
	If No (Q9), who pays for the screening		
	Do clients pay for treatment of TB?	Yes	

		No	
	If Yes (Q12), how much		
	If No (Q12), who pays for the treatment		
	What are the strategies that the facility has adopted to ensure sustainable financing for TB programme		

Section C: Case Detection and Testing (to be answered by workers directly involved in DOTS programme case detection and testing)

S/N	Question	Response	Code
	Briefly describe how TB cases are detected in this facility?		
	Do you have diagnostic centre for TB case detection?	Yes No	
	If Yes, is it able to carry out sputum smear examination?	Yes No	
	If No (Q3), where are samples taking to for sputum smear examination?		
	How many staff work in the laboratory?	Total number of staff (permanent and non-permanent staff). Non-permanent staff includes Service personnel	
	How many of these staff have received training on TB case detection and diagnosis	Only laboratory staff	
	How many health workers (nurses, physicians, physician assistants) are directly involved in TB case management – detection		
	How many have received training on case detection in the last two years		
	Does the facility have all the necessary equipment to conduct TB test at all times	Yes No	
	If No, what are the equipment that are mostly in short supply		
	Who supplies these equipment?		
	When there are suspected TB cases, how long does it take for the case to be tested?		
	Any reason for this period of time before testing?		

	What is/are the main challenges with respect to case detection and testing?	List all challenges	
	What are the strategies/approached you have adopted in addressing these challenges to ensure prompt case detection?		

Section D: Standardized Treatment with Supervision and Patient Support including drug supply

S/N	Question	Response	Code
	What are the procedures for treatment for TB clients?		
	How often is awareness created in the facility on TB case management		
	When cases are detected and confirmed after test, how long does it take for the client to be enrolled on treatment?		
	What percentage of TB cases detected are treated?	Below 20% (very low) 21% - 40% (low) 41% - 60% (average) 61% - 80% (high) 81% - 100% (very high)	
	Before treatment, are the clients giving information on the treatment s/he is being introduced to		
	Are clients required to present any caregiver prior to treatment?	Yes No	
	Is there an HIV and AIDS centre in this facility?	Yes No	
	If yes, are clients being referred from that Unit to this Unit?	Yes No	
	Is there any coordination between TB and HIV units especially for TB treatment among HIV clients?	Yes No	
	If Yes, kindly describe the type of coordination		

	Do clients complain about the drugs for treatment	Yes No	
	If Yes, what are some of the complains		
	Does these complaints affect adherence to treatment?	Yes No	
	Does the facility conduct monitoring visit to clients who are on treatment?	Yes No	
	If Yes, how often are these visits conducted		
	How many visits was conducted per client on treatment within 2018/2019 (Please indicate averagely the number of visits per clients per year)		
	What are main challenges to monitoring of clients (home visits)		
	If No (Q14), why are monitoring not conducted?		
	How many health workers provide services on treatment?		
	Are health workers who provides treatments services trained in the last two years?	Yes No	
	If Yes, what was the training about?		
	How many received the training		
	If No (Q20), why has no one been trained in the last two years		
	Are drugs available for treatment all year round?	Yes No	
	If No, how long does it take for drugs to be supplied when the facility is in short supply?		
	Where does the supply come from?		
	How often does the district health directorate visit the TB unit for monitoring		
	What are the strategies adopted by the facility to address all the challenges you have mentioned here		

DISTRICT HEALTH ADMINISTRATION

Interview Guide

1. Title of Respondent
2. Role of Respondent on TB programme
3. Records of TB cases for 2018 and 2019
4. Number/List of all health facilities (GHS, CHAG, Private)
5. Number/List of facilities with DOTS programme implementation
6. Budget for TB activities – total annual budget for DOTS programme
7. Flow of funding for DOTS programme – Is it sustainable and consistent
8. Briefly describe the coordination that TB and HIV/AIDS programme
9. What is the current status of drug for TB treatment – are the facilities able to receive all required drugs for TB treatment?
10. Who is responsible for monitoring/supervision? How often is monitoring/supervision done? What are the challenges with district level monitoring and supervision?
11. Are there any training programmes for TB workers – how often are these trainings conducted? How people and sessions are conducted per year?
12. What are the main challenges with the TB DOTS strategy implementation in the district?
13. What, in your own assessment, are the causes for all these challenges mentioned?
14. What are the strategies adopted by the district to ensure that the DOTS programme really work in the district?
15. What percentage of TB cases identified are treated?

QUESTIONNAIRE FOR TB PATIENTS ON CHALLENGES

Questionnaire Code: Date		
Session 1: Socio-demographic characteristics of participants		Code
Age (in years)	1 <30	
	2 31-45	
	3 46-60	
	4 61-75	
	5 75+	
2. Gender	1. Male 2. Female	
3. Religion	1. Christian 2. Muslim 3. Traditional 4. Other, Specify	
4. Current level of education	1 Never school 2 Primary. 3 Secondary 4 Tertiary	
5. Occupation	1.Unemployed 2. Self Employed 3. Private Sector worker 4. Public Sector worker 5. Housewife 6. Student	
6. Residence	Rural Urban	
7. Marital Status	1. Single 2. Married 3. Divorced/Separated 4. Widow	
8. If married, marriage setting	1. Monogamy 2. Polygamy	

Session 2: Access to TB services and other related problems			
1.	What is the distance from your community to where TB treatment center is	1. Within 5km 2. 5-10kms 3. 11-20 kms 4. Above 20kms	
2.	By what means do you visit the facility for TB treatment	1. Walking 2. Bicycle 3. Motorbike 4. Vehicle	
3.	Are you able to afford the transport cost always	1. Yes 2. No	
4.	Do you pay for the TB drugs you are given	1. Yes 2. No	
5.	If yes, are you able to pay for the drugs and any other services that is provided	1. Yes 2. No	
6.	Do you have health insurance	1. Yes 2. No	
7.	Do you need a caregiver	1. Yes 2. No	
8.	Do you have a caregiver who support you at all times	1. Yes 2. No	
9.	Do you experience any side effect when you take TB drugs	1. Yes 2. No	
10.	When you experience side effects, what do you sometimes do		
11.	Can you indicate some of the side effects of the TB drugs		
12.	Are you able to get nutritious food anytime you take your drug	1. Yes 2. No	
13.	How long does it take you to return to the facility for the next drug (what time interval is given for your next visit)	1. 1 month 2. 2 months 3. 3-4 months 4. 5-6 months 5. More than 6 months	
14.	Does your family or other people know about your status	1. Yes 2. No	
15.	Do you sometimes experience some stigma in your community?	1. Yes 2. No	
16.	Has any of the health workers visited you in your house before to check on you?	1. Yes 2. No	

17.	Are you able to adhere to treatment (taking of drugs, visit to health facility for appointment)	1. All the time 2. Sometimes 3. Never	
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Session 3: Knowledge and awareness level of participants on Tuberculosis			
1.	What is/are the cause of TB?		Categorize the response into A. Correct B. Incorrect
2.	Can TB be cured?	1. Yes 2. No	
3.	TB can affect which group of people	1. children 2. adults (18-60) 3. elderly people (above 60)	
4.	Can a TB patient infect another person with TB	1. Yes 2. No	
5.	Do you anything about the DOTS programme	1. Yes 2. No	
6.	If yes, what are some of the components of the DOTS programme		Categorize responses into A. Correct B. Incorrect



INTERVIEW GUIDE FOR COMMUNITY GROUPS (FOCUS GROUP DISCUSSIONS)

1. Do you have any community health management committee in this community that supports health activities? Is there any health volunteer in the community?
2. What are their main roles and responsibility?
3. Are they aware of any TB patient in this community?
4. Are there any tracing and follow up of TB patients?
5. Is there any support system in the community that enhance the treatment and management of TB patients?
6. Basic knowledge on TB – causes, mode of transmission, effects, essence of diagnosis
7. What are some of the cultural beliefs that affects TB diagnosis and treatment
8. Levels of stigma in the community

