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SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

LEGON

HEALTH WORKERS AND FACILITY LEVEL FACTORS ASSOCIATED WITH KNOWLEDGE ON TUBERCULOSIS CASE DETECTION IN PRU DISTRICT, BRONG AHAFO REGION – GHANA

BY

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SEPTEMBER, 2022

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DECLARATION

I Abraham Num, hereby declare that with the exception of references to the literature and works of other researchers which have been duly acknowledged, this work was personal hand work, and that no part of this thesis work piece has been submitted to any university or elsewhere for the award of a similar degree.

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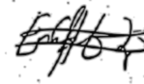

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DEDICATION

I wish to dedicate this work to my beloved father Mr. Kwadwo Busi for his encouragement and support for this programme.

Also to my wife Emelia Gyima and my children Kelly Busi Telbana, Jacqueline Nnaa Suura, Lois Nnaa Lolasom and Nnaa Yaa Mfogyaa for their support and understanding of financial difficulties during the course.

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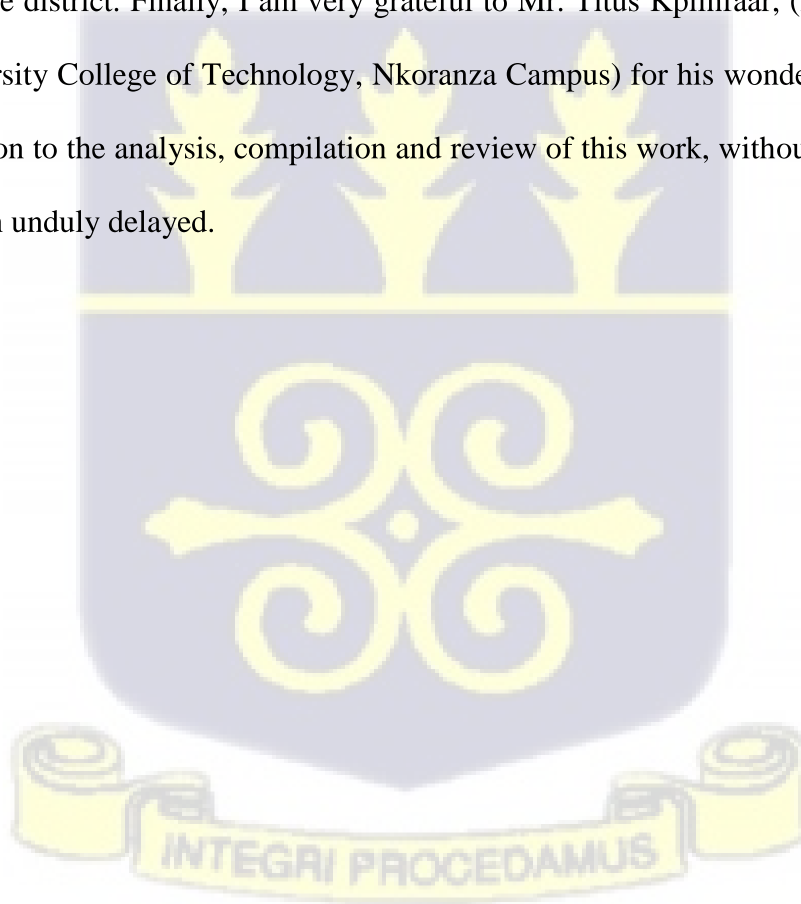

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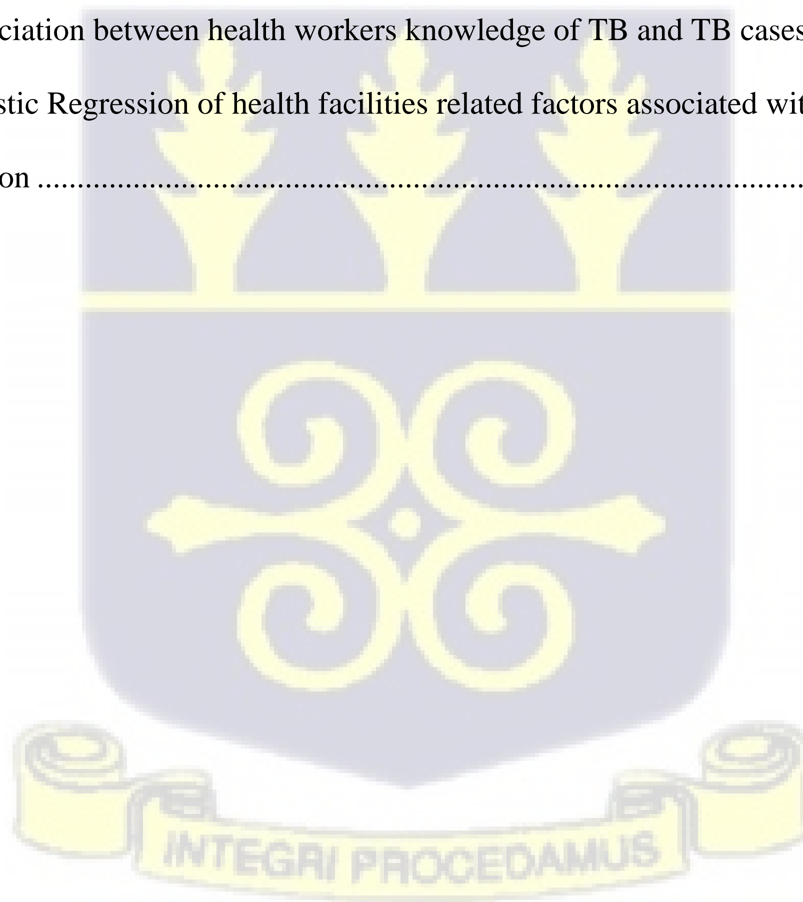

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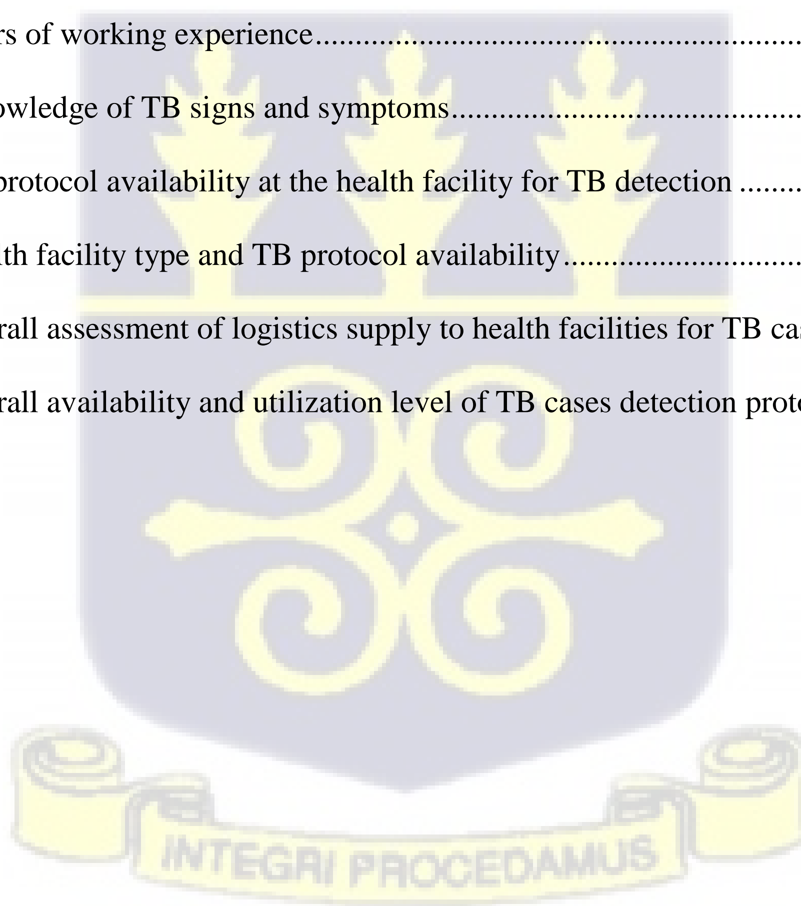

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LIST OF ACRONYMS

AoR	-Adjusted Odds Ratio
BCG	- Bacille Calmette Guerin
CI	- Confident Interval
CHPS	- Community health planning and services
DR-TB	- Drug-resistant tuberculosis
GHS	- Ghana Health Service
HIV	-Human immune-deficiency virus
ID	-Identification
LI	-Legislative instrument
MDG	- Millennium Development Goal
MDR-TB	-Multi-drug resistant tuberculosis
SA	- South Africa
SDG	- Sustainable Development Goal
SSC	- Short-course chemotherapy
TB	- Tuberculosis
TB/HIV	- Tuberculosis/Human immune-deficiency virus
USAID	- United State Agency for International Development
WHO	- World Health Organization

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ABSTRACT

Introduction: Tuberculosis is a public health problem that affects about one-third of the global population; more especially in sub-Saharan Africa. TB is prevalent in Pru district in Ghana. This study aimed to determine health workers and facility-level factors associated with knowledge of TB case detection in Pru district.

Methods: An analytical cross-sectional study was adopted with a quantitative approach to data collection. A structured questionnaire was used, and 10 health facilities and 165 respondents were selected through purposive and simple random sampling. Data were analyzed descriptively and presented in percentages in tables and graphs. Continuous data were summarized into means and standard deviations. Further analysis was done using the chi-square test and logistic regression to determine the significant factors and their respective crude and adjusted odds ratios at 95%CI and a significance level of 5% ($p \geq 0.05$).

Results: About 164 respondents were studied and knowledge of TB was 82.9%, and TB case detection was 62% which was above average. Almost half 45.7% knew TB was airborne and could be transmitted via sputum droplet. More than three-quarters 88.4% knew coughing for two weeks or more was a sign of TB, and 98.6% knew TB was curable. Signs and symptoms of TB showed 49% cited chronic coughing, and extreme weight loss was 19%. The availability of TB protocol and the number of health facilities implementing TB case detection protocol showed that 89.4% of cases were conducted at St Mathias Catholic hospital where there was an adequate supply of TB logistics. Significant factors that influenced health worker's knowledge of TB and TB case detection were; marital status (AOR = 2.61; 95% CI 1.47-7.74; p). years of working experience (OR =0.47; 95% CI 0.20-1.05; p = 0.05), location of health facility (AOR =29.46; 95%CI 4.04-21.46; p=0.002), type of health facility (AOR=0.12; 95%CI 0.02-0.91; p=0.04), knowledge of TB

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signs and symptoms (AOR=22.77; 95%CI 2.91-17.76; p=0.002) and inadequate logistics supply (AOR=0.09; 95% CI 0.02-0.41; p<0.001).

Conclusion: Health workers had adequate knowledge of TB, and significant factors associated with knowledge and TB case detection were an inadequate supply of logistics.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Tuberculosis (TB) is an infectious disease caused by bacteria (*Mycobacterium Tuberculosis*), and mostly affects the lungs of its victims (WHO, 2019). Tuberculosis is a disease that can be cured and also prevented. The disease can be transmitted from one person to another by inhaling contaminated air with the TB bacilli. When people with TB cough, sneeze or spit they release the germs into the air and when people inhale the contaminated air they become infected with tuberculosis (WHO, 2019). According to a world report in 2019, about one-quarter of the world population is infected with tuberculosis. There are more indications that those infected with tuberculosis bacteria have a 5-10% chance of falling ill with tuberculosis (WHO, 2019). On 23rd April 1993, The World Health Organization declared tuberculosis as a global health emergency at the Arata Kochimanager 21st anniversary where TB was described as "a forgotten disease" and "humanity greatest killer". Since then, the disease remains serious a threat to human health worldwide causing 1.3 million death every year (Herbert et al., 2014). Globally, tuberculosis accounts for one of the 10 leading causes of death from a single infectious agent (World TB Report, 2019).

After COVID-19, tuberculosis is the second leading cause of death worldwide. Before the COVID-19 pandemic's resurgence, illness was the leading cause of infectious death (World Health Organization, 2021). Over 10 million new infections and over 1.5 million deaths due to tuberculosis were reported globally in 2019 alone (MacNeil, 2020). Due to the disruption of TB activities brought on by the resurgence of the COVID-19 pandemic, the burden of tuberculosis has gotten worse (Zimmer, 2020). A significant setback in the global effort to cut TB incidence and

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mortality by 80% and 90%, respectively, have been caused by a slowdown in case detection (World Health Organization, 2021).

The most prevalent type of tuberculosis, which is referred to as pulmonary tuberculosis, affects the lungs. Extra-pulmonary tuberculosis is the term used to describe tuberculosis that affects areas of the body other than the lungs (MacNeil, 2020). The primary method of transmission is typically through infectious aerosolized droplet nuclei produced by vigorous coughing, sneezing, or indiscriminate spitting (Zimmer, 2020). With an estimated 9.6 million incidence cases and 1.5 million fatalities in 2014, tuberculosis has been ranked second only to HIV infection in terms of high morbidity and mortality worldwide (Tabong, 2021). Such infectious diseases place an undue burden on the fragile economies and health systems of low- and middle-income nations, including Ghana (Penjor, 2021).

Despite the existence of effective treatments for the management of positive TB cases since the 1940s as well as global changes in social and economic development, TB still claims millions of lives each year, particularly in the African Sub-region (Makori, 2021). With about 25% of the global incidence reported in Africa alone, Asia and Africa carry the heaviest burden of tuberculosis. Evidence demonstrates that although it was estimated that 10 million people were infected with TB disease globally in 2019, just above average (71% of cases) were reported to the health authorities. Persons with TB diagnoses who could not be reported through the health system, those in the private sector, and those who went undiagnosed made up the remaining 29% of missing cases (Boakye-Yiadom, 202).

It was estimated that in 2019 alone there were 10 million people with active tuberculosis worldwide, about 5.6 million being men and 3.2 million being women and children comprised 1.2 million. TB is a global disease that is present in every country and also in every age group.

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According to the World Health Organization, children and adolescents TB is often overlooked by healthcare providers and can be difficult to diagnose and treat. Also, in 2019, the World TB report acknowledged 30 countries as high TB burden and accounted for 87% of new TB cases, with which 8 countries account for two-thirds of the total TB cases, with India leading the count, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa (World TB Report, 2019).

Notwithstanding, globally, TB incidence is falling at about 2% per year and between 2015 and 2019 the cumulative reduction was 9% (WHO, 2019). This was less than halfway to the end TB Strategy milestone of a 20% reduction between 2015 and 2020. Again, the World Health Organization estimated that about 60 million lives could be saved through TB diagnosis and treatment and could contribute to ending the TB epidemic by 2030 as per the health targets of the United Nations Sustainable Development Goals (SDGs) (WHO, 2020). Reaching these global targets, therefore, requires the needs and efforts of national and international focus and commitment to the control of TB. Hence, the World Health Organization 2013, established a Global Task Force on the TB Impact Measurement to ensure the best possible evaluation of whether or not these targets could be achieved by various nations, as well as the WHO recommended goals and strategies to Stop Tuberculosis (Glaziou et al, 2013).

The End TB Strategy was developed by WHO and aimed to reduce TB incidence by 90% and TB deaths by 95% between 2015-2035 (Huynh et al., 2015). Fighting tuberculosis needs political and administrative commitment to provide quality health services that will include an early diagnosis system through the use of smear microscopy and reliable treatment through the supply of frequent drugs of good quality of TB drugs, very potent with short-course chemotherapy (SCC) given to the patient under direct observation and also demanding accountability with proper reporting and effective supervision (Sandhu, 2011). These interventions according to Ahorlu & Bonsu (2013)

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study could help reduce the global burden of TB, most especially in Sub-Sahara African (SSA) countries because geographically, the burden of TB is the highest in Asia and Africa, and contributed to about 29% and 34% of all TB related morbidity and mortality to the global burden of the disease (Ahorlu & Bonsu, 2013, Range, 2013).

According to Ntoumi et al. (2016) study, critically reducing the Global burden of tuberculosis requires bringing down the transmission rates and this is thus dependent on the identification and treatment of all active pulmonary cases and rendering them non-infectious. The study further indicated that individuals with a high risk of re-activation of latent TB infection need to be identified and treated.

In Ghana, an estimated 44, 000 people have TB with another 400 identified multi-drugs resistance TB (MDR-TB) cases coupled with a total of about 224,488 persons living with HIV in the country (Ghana National TB Voice Network, 2016), and therefore the country is at risk of been burdened by TB more than been previously anticipated. Even though Ghana is not considered a high burden country for TB, it is a fearful disease among the Ghanaian population with a different name given to it by the local languages as "*Nsamanwa*" (ghost cough) by the Akans, "*Kesibine"* (black cough) by the Sissalas, because traditionally black colour is considered evil "Yormekpe" by the Ewes meaning "death cough" (Ahorlu & Bonsu, 2013). Poor diagnosis of TB among individuals with active TB necessitated different ways of diagnosis to increase case detection. There is a challenge in measuring the progress of newly introduce programs by policy makers and program coordinators and how to row it out in a successful manner (Blok et al., 2014). Thus, health workers are key stakeholders and play a critical role in the fight against TB prevalence in the country, and hence the current study sought to determine the healthcare workers' knowledge and facility level factors influencing tuberculosis case detection in Pru District, Bono East Region.

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1.2 Problem Statement

Poor knowledge of healthcare providers about TB and cases detection contributes to the escalating incidence cases of TB due to their inability to identify cases and treat them promptly. In Africa, and Ghana; the World Health Organization estimated that Africa contributes 28% of the global tuberculosis burden, where the annual case detection rate was 281 per 100 000 population, which is more than double the global average of 133 per 100 000 (Ntoumi et al., 2016). One key element to the control of TB is for health workers to early detect TB cases and treat them (Abebe et al., 2012). The inability of health workers to early detect and treat TB cases could be due to low knowledge levels. In Ghana, the tuberculosis case detection rate target for 2016 was 290 per 100,000 population, and 14,632 cases were detected, bringing the case detection rate to 51.7% cases per 100,000 population (World TB Day Report, 2017).

Also, in the Pru district, about 98 cases were detected in a population of 144,811 in 2015 which is below the district's target of 281/100,000 population (Annual Health Review Report, 2015). Notwithstanding, in 2016, the case detection rate for the Pru District was 75/per 100,000 population representing 17.4% indicating a decline of 11% in the detection rate in the district (Pru district annual health report, 2016).

Health worker and facility-level factors associated with knowledge could have been influencing the case detection in the Pru district. However, few studies have contributed in the study area to looking at TB case detection but relating to healthcare providers' knowledge and facility-based factors have not been looked at well and are poorly understood, and may be accountable for the low case detection in the district. This may also lead to an increase in late diagnosis, increase in drug-resistant TB (DR-TB) and TB mortalities in the district. Therefore, this current study sought to determine the health workers' and facility-level factors associated with knowledge and

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tuberculosis case detection in Pru District. The study would specifically examine the health worker's knowledge and facility factors such as TB protocols availability and used in TB cases detection and health facility level in the Pru district to generate evidence-informed data that would help to shape the direction for future interventions and improvement on case detection rate in the district.

1.3 Justification

The results of this study would help health workers and program managers as well as policy makers to identify risk factors at the health facility level that negatively affect TB case detection. It would help to identify the risk factors that would help to guide appropriate measures that can be taken to address them to increase the case detection rate in the district. The findings from the study would equally add knowledge to the existing ones in the area of tuberculosis case detection. It would also serve as the basis for future research and helped to promote the development of effective educational programs to create awareness to increase tuberculosis case detection.

1.4 Conceptual Framework

TB case detection is affected by the availability, accessibility, affordability and acceptability of the intervention aimed at detecting the disease at an earlier stage. Also, health facility factors such as TB diagnostic equipment, staff availability and knowledge of staff to diagnose TB would affect TB case detection, as well as service provision, could affect case detection.

Moreover, socio-economic factors such as age, sex, location, religion, and marital status may affect case detection, as well as program factors such as logistics supply, donor involvement and supportive supervision, may affect the tuberculosis service rendered in the district and their participation would also affect case detection of TB in the district. Tuberculosis case detection

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may be affected by participants' (health workers) knowledge of TB. That is whether they have adequate knowledge of TB and may want to participate more in the TB programs which would increase the TB case detection rate.

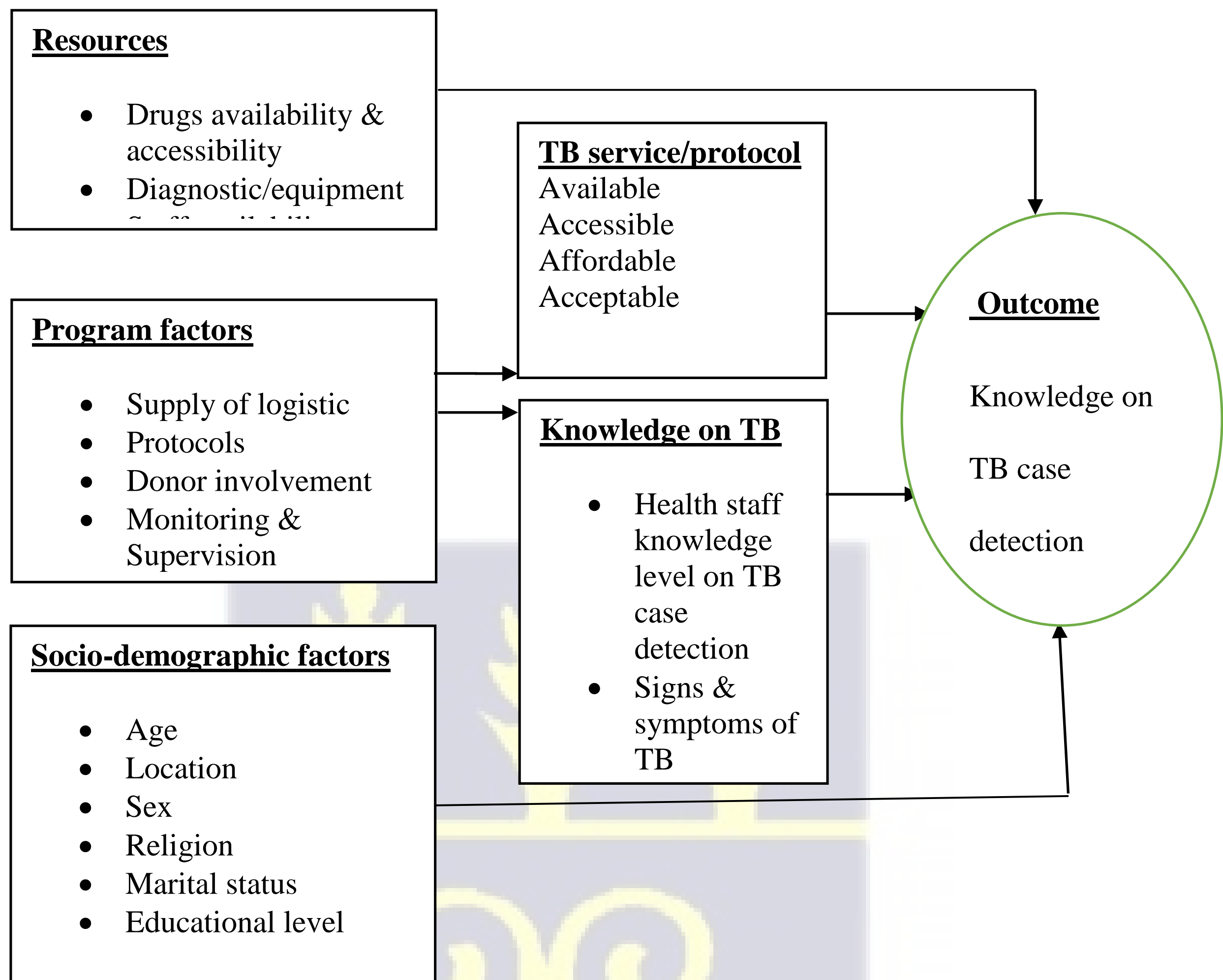

Figure 1. 1: Conceptual framework on health workers and facility-level factors associated with knowledge and TB case detection in Pru district.

1.5 Research Question

1. What is the level of knowledge of health workers on TB case detection in Pru district?
2. Are there enough TB case detection protocols available at the facilities in Pru District for effective and efficient case detection?

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3. What socio- demographic and facility-level factors are associated with knowledge of TB case detection in the Pru district?

1.6 Objective of the Study

1.6.1 General Objective

To determine health workers knowledge and healthcare facility factors in TB case detection in Pru District.

1.6.2 Specific Objectives

1. To assess the knowledge of front-line health workers on TB case detection.
2. To examine the availability and utilization of TB case detection protocols in the facilities.
3. To determine healthcare facility factors associated with the knowledge of TB case detection.

1.7 Scope of Study

The study determined the health workers and facility-level factors associated with knowledge on TB case detection in Pru district. In view of this, the scope of the study covered all health facilities in the Pru district and health workers providing health services for TB case detection in the study area. Health workers working in these facilities for at least six (6) months were selected to administer the questionnaire to determine their knowledge of case detection protocol and protocol accessibility and availability, as well as factors associated with knowledge of TB case detection in the Pru district. Factors that were measured include socio-demographic factors such as age, education, marital status, religion and health-related factors including health staff knowledge of TB, signs and symptoms, diagnosis, equipment/tools, drugs availability and accessibility, program-related factors, protocols availability and accessibility.

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1.8 Definition of Terms

Health workers: refer to individuals providing healthcare services at the selected health facilities in the diagnoses of TB cases and the treatment of TB patients.

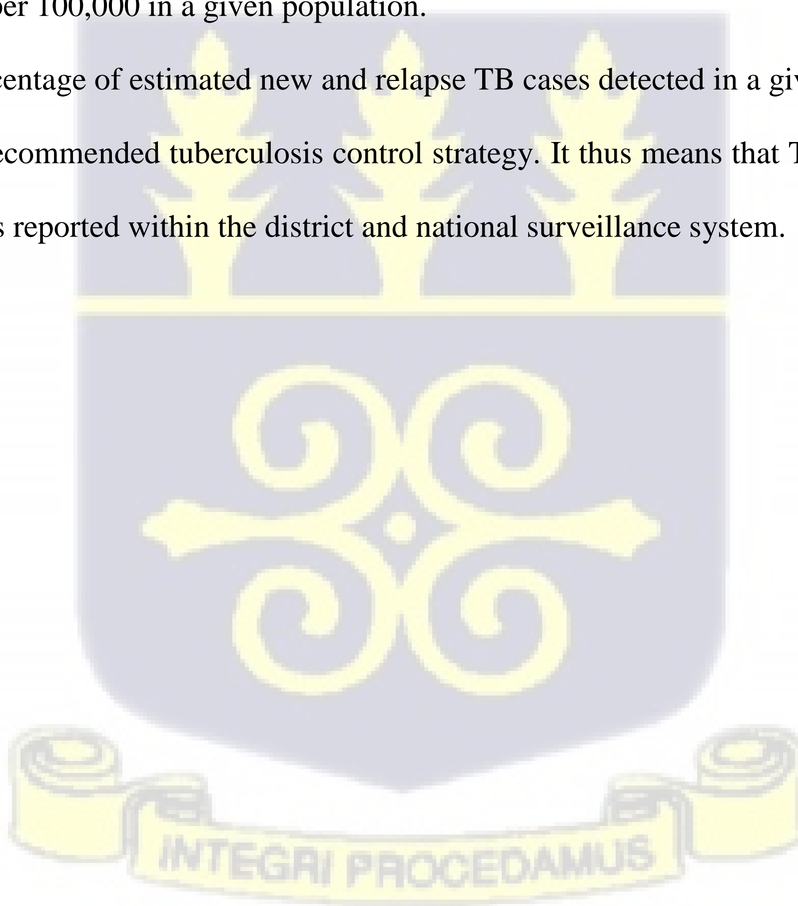
Knowledge of health workers: refer to the health worker's awareness of TB case detection protocol and their ability to effectively use those protocols in the detection of TB cases.

Facility level factors: refer to the health service-related factors such as TB drugs, staff attitude, diagnostic instruments and protocol availability that could affect case detection.

Tuberculosis (TB): refer to a disease transmitted by mycobacterium tuberculosis through air

TB Case detection: refer to when TB is identified in a patient and reported through the national surveillance system and to WHO. The case detection rate is calculated each year and is expressed as a percentage per 100,000 in a given population.

It is also the percentage of estimated new and relapse TB cases detected in a given year under the internationally recommended tuberculosis control strategy. It thus means that TB is diagnosed in a patient and was reported within the district and national surveillance system.



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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines the body of literature already in existence that offers data that can be used to contextualise the current investigation. The goals and conceptual framework for the study serve as the direction for the review. The review discusses topics like the prevalence and modes of transmission of tuberculosis. Additionally, the chapter discusses the clinical aspects of TB, how to diagnose it, and how to treat it. In addition, the case detection literature that has already been published as well as the knowledge of health workers and health system factors that affect case detection.

2.2 Burden of Tuberculosis

An increase in TB deaths in 2020 at all levels global, regional, and national is the most direct result of the significant decline in the number of people newly diagnosed with the disease in 2020. (World Health Organization, 2020). There were an estimated 1.3 million (95 percent uncertainty interval [UI]: 1.2-1.4 million) HIV-negative deaths worldwide in 2020, up from 1.2 million (UI: 1.1-1.3 million) in 2019, and an additional 214 000 (UI: 187 000-242 000) HIV-positive deaths worldwide, up slightly from 209 000 (UI: 178 000-243 000) in 2019. (World Health Organization, 2021). With the first year-on-year increase (of 5.6 percent) since 2005 and the total number of deaths in 2020 returning to the level of 2017, the COVID-19 pandemic has undone years of global progress in reducing the number of people who die from TB.

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With the first year-over-year increase (of 5.6 percent) since 2005 and the total number of deaths in 2020 returning to the level of 2017, the COVID-19 pandemic has undone years of global progress in reducing the number of people who die from TB. In 2020, 1.3 million deaths worldwide were officially attributed to tuberculosis (1.3 million versus 0.68 million for HIV/AIDS), and TB mortality had been more severely impacted by the COVID-19 pandemic than HIV/AIDS. HIV/AIDS-related deaths, as opposed to TB, decreased between 2019 and 2020. The top cause of death from a single infectious agent and the 13th most common cause of death worldwide was TB. After COVID-19, it is predicted that TB will rank as the second most common infectious agent-related cause of death in 2020. (World Health Organization, 2022). Four of the six WHO regions showed the global pattern of a decline in the absolute number of TB deaths up until 2019 followed by an increase in 2020; the exceptions were the WHO African and Western Pacific regions, where there was a flat trend.

2.3 Tuberculosis Case Detection

Tuberculosis (TB) is an airborne bacterial infection caused by an infectious pathogen called "Mycobacterium tuberculosis" (World Health Organization, 2017). Tuberculosis according to the World Health Organization (2017) is transmitted from person to person through the person's droplets from the lungs and has been ranked second to HIV in terms of mortality of infectious diseases.

Globally, about 9 million new cases of tuberculosis are recorded, and those infected with the" Mycobacterium tuberculosis" that later developed active TB constituted about 10-12% (Amenuvegbe et al., 2016). According to Worl Health Organization (2017), Tuberculosis can be subdivided into two main types, which include pulmonary and extra-pulmonary tuberculosis.

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Pulmonary TB occurs when the bacteria attacks the lungs of the individual whiles extra-pulmonary TB is when the bacteria attacks any other part of the body apart from the lungs such as the kidney, spine, and brain (Amenuvegbe et al., 2016). In addition, the World Health Organization (2013) estimated that about 8.6 million tuberculosis cases and 1.3 million deaths were recorded in 2012 worldwide. In the African region and Southeast Asia, the prevalence of tuberculosis among people living with Human Immunodeficiency virus (HIV) was estimated at 303 cases in 2012 and 264 cases in 2013 per 100,000 population respectively, and a cumulative proportion of 75% of TB deaths were recorded in the two years (World Health Organization, 2013).

Again, there are more than 4 million people reported to have suffered from active TB and about 650,000 deaths occurred in Africa every year. It is estimated that 25% of avoidable deaths in adults and transmission of Multy-Drug Resistant TB (MDR) among HIV-infected individuals in hospitals has been documented with a high mortality rate (Demissie Gizaw, 2015).

Tuberculosis is of public health importance because mortality associated with TB is about 2 million deaths every year. However, worldwide TB case detection has been halted to about 60% which is far from the global target rate of 70%, with sub-Saharan Africa recording the lowest case detection rate of about 52%. The Low TB case detection rate has been due to increased incidence and prevalence rates resulting from a yearly active TB case infection rate of about 10-15% (Amenuvegbe et al., 2016).

Globally, the World Health Organization has reported a declining rate of Tuberculosis cases among the general population. However, findings indicated a higher prevalence rate in sub-Saharan Africa with an unacceptably high rate in South Africa (SA). Reasons for the high rate in sub-Saharan Africa were attributed to the highly active and latent TB infection rate and co-infection rate of HIV which is impairing TB cases detection and treatment (World Health

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Organization, 2017). For instance, in 2014, the WHO reported total TB cases of 318,193 people, out of which, about 61% were HIV co-infections. Among these; about 24,000 people were HIV negative and 72,000 were HIV positive and a similar proportion had died from the disease (Kigozi et al., 2017).

In the same study, noted factors that influenced the prevalence of TB cases detection and HIV co-infections were attributed to the failure of the healthcare systems such as patients' resistance to TB drugs which could be due to late detection of TB cases at the health facility as well as poor treatment and management regimen and failure on the part of health staff to retain the TB patient on the necessary drugs and treatment regimen for recovery (Kigozi et al., 2017).

The study further established that about 9% of laboratory cases that were tested found patients to have had resistance to TB drugs. The increased patients' resistance to TB drugs was attributed to patient non-adherence to the drugs regimen/prescriptions due to unhelpful behaviour and bad conduct of some patients of refusing to follow the prescribed medications guideline and as well as other socioeconomic and structural factors that may have impeded both patients and health workers ability to effectively detect early the TB cases (Kigozi et al., 2017). TB case detection has generally been reported as low, with a rate far below the global target rate as in the post-Millennium Development Goal (MDG) and the current Sustainable Development Goal (SDG) with sub-Saharan Africa recording the lowest rate and as well having the highest TB cases and HIV co-infection rate (Kigozi et al., 2017). Major factors hampering TB case detection are health facility related such as health staff commitment to retaining patients for treatment and laboratory services in diagnosing cases early for initiation into treatment. These and among others have necessitated this study to determine facility-level factors that influenced TB case detection in the Pru District in the then Brong Ahafo Region, and now Bono East Region of Ghana.

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2.4 Tuberculosis Detection in Ghana

Despite the advances made in the fight against the disease over the past few years, TB is still a significant public health issue in Ghana. Microscopy-based estimates of the national prevalence of TB in Ghana in 2020 were 111 per 100,000 people, compared to 356 per 100,000 people with bacteriological confirmation. (Bonsu, 2020) The National TB programme and Ghana Health Service identified reasons for this low TB detection rate and broadly categorised them into 3:

- Factors related to the health system failing to identify TB suspects and patients reporting to the health care facilities
- Factors related to access to the health care facilities and
- Factors related to knowledge, attitude and practice of the community.

To ensure the optimization and standardization of TB case detection activities in both public and private health facilities as well as communities, some of the steps include developing standard operating procedures in March 2010. The collaboration of the Ghanaian national TB program and the WHO-CIDA (Canadian International Development Agency) Initiative was a further step. Ghana was one of five countries with a high incidence of TB, and as such, it participated in the implementation of specific strategies that increased both local case detection rates and national case detection rates of TB. The WHO-CIDA initiative was concentrated in Accra.

Since TB is both treatable and preventable, it is essential to increase case detection and start treatment right away to save lives. In order to increase case detection rates, particularly in the Greater Accra Region, the Ghana Health Service and the National TB Control Program have taken several actions, including implementing the WHO-CIDA TB case detection interventions initiative. To determine whether these TB case detection intervention measures are being used in the nation's public health facilities to increase TB case detections, however, no research has been done in this area.

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2.4 Health Workers' Knowledge Associated with TB Case Detection

Adequate knowledge of health staff on TB and the detection of cases could contribute to quality practices and improved TB case detection. A study conducted by Amenuvegbe et al. (2016) among 932 respondents found 23.4% to have known patients coughing for about 2 weeks or more as signs of TB, and 75.4% knew patients who coughed could go to the hospital for further laboratory investigation. The study also indicated that about 24.9% said patients who coughed are equally supposed to be tested through sputum smear microscopy to detect positive cases for TB. Again, it was also established that most respondents knew TB is transmitted through an overcrowded environment (84.6%), and 73.0% said pulmonary TB was more contagious. However, about 55.2%were found to have exhibited poor knowledge of TB, and were found to have said TB could be transmitted through strangers in the family (Amenuvegbe et al., 2016).

According to Kigoziet al. (2017), health workers were found to have had good knowledge and understanding of the susceptibility of TB and more than 90% were found to have known that HIV-positive people are susceptible to getting TB. More than 68.4% were reported to have had good knowledge of TB control and practices such as covering mouth and noses with tissues during sneezing, disposing of tissues with sputum in waste bins and washing hands with detergents when in contact with secretions from the respiratory (Kigozi et al., 2017).

Add, a related study conducted by Gizaw et al. (2015) in Ethiopia assessing the knowledge and practice of health workers towards tuberculosis infection control and associated factors in public health facilities found about 36.1% of health workers to have had poor knowledge and 51.7% had unsatisfactory practice score towards tuberculosis infection control. In addition, the study found about 96.4% to have said all windows and doors should be open when there is a suspected case of TB in the room or when there is a confirmed case of TB in the room to prevent cross infections.

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In terms of practices regarding preventing TB signs and symptoms, reducing transmission rate, and treatment and prevention of TB; the study indicates about 68% have known the various types of protection masks for TB infection control. About 39% of health workers were found to have been able to identify a surgical mask as a means of protection against inhaling aerosols which might have contained the bacteria agent (Gizaw et al., 2015). However, the average mean score of practice among health workers was reported as 10.3, and about 62.4% of health workers were cited to have had good knowledge of the use of protocols and treatment guidelines and how to manage positive cases. Also, about 20.6% were found to have used the treatment guidelines sometimes and 17% were found to have not used the guideline in the management and treatment of TB cases. And about 21.3% were found to know the use of surgical masks and 17.9% had knowledge of the use of N-95 masks (Gizaw et al., 2015).

Notwithstanding this, Mondal et al (2016) examined health workers' knowledge of the symptoms of TB in relation to coughing and found that 97.9% had good knowledge of the signs and symptoms of TB. Also, other signs and symptoms of TB showed that 60.2% of the respondents reported chest pains, 24.2% said shortness of breath, 50.8% loss of appetite, and 56.8% said weight loss and fever with night sweating were 70.6%. Again, the study results had shown most health workers about 94.0% were found to have known that TB could be transmitted through sneezing and 89.8% cited TB as a communicable disease. However, findings further showed about 46.9% of the health workers had poor knowledge of the risk of exposure and TB control measures as 48% of health workers were found to have said individual working hours exposed the person to TB, and 45.8% had poor knowledge on the administration of drugs to the TB patient (Mondal et al., 2016).

To add to this, Shrestha et al. (2017) found 67.4% of health workers to be aware of the major symptoms of TB and the mode of transmission of the disease and more than half (54.7%) could

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distinguish between TB infection and TB disease. Most however were found to have said they had used respirators in the prevention of TB infections within the health facilities. Regarding control measures for TB, about 55% were found to have said personal respiratory protection, the environmental control measure was 47.4% and 14.7% said administrative control mechanism as measures to ensure TB control. The mean knowledge score of health workers was however found to be good and about 46% were found to have poor knowledge of the symptoms and control measures of TB (Shrestha et al., 2017).

Several factors influence TB case detection and among such include health facility level factors influence TB case detection. Health worker's knowledge level of the protocol in cases detection, improper documentation, poor review of TB records, supply and protocol availability, accessibility and surveillance systems for the detection of TB cases as well as inadequate diagnostic centers and low level of active surveillance by health staff were identified as major contributing factors to low TB case detection (Amenuvegbe et al, 2016).

Health personnel factors and health worker types that influence TB case detection were found to include market drug sellers, pharmacists, traditional healers, village health workers, friends and relatives as well as medical were found to have a significant influence on the detection of TB cases (Eltayeb, 2016). Inequalities in education were found to greatly affect how patients received healthcare in TB cases and detection.

TB case detection with inequalities was less likely to affect patient visits to the health centre for laboratory diagnosis (Afoakwa & Taylor, 2018). More than two-thirds of health workers were found to have not been trained on TB protocol for case detection despite increased awareness levels among health workers (Afoakwa & Taylor, 2018). Also, lab technicians and DOT providers were found to have had good knowledge regarding tuberculosis cases detection, and most

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healthcare providers were found to have had adequate knowledge of sputum negative cases, categorization, about number of sputum examination and defaulters of TB cases (Shah et al., 2016). Again, most pharmacy workers (77%) in the study were found to have said that clients with a history of cough for more than two weeks were a sign of TB and could be treated at a healthcare centre with medication and antibiotics (Herna et al., 2018).

A study in Ethiopia to assess healthcare workers' knowledge, attitudes and practices on tuberculosis infection control found that most healthcare workers were found to have had a positive attitude towards TB infection control, and about 65% were found to have said they were at risk of being infected with TB and this was to have a significant influence on TB cases detection (Shrestha et al., 2017). Also in the study patients were found to have been employed, having received TB infection control information from a public health care facility, and being a TB patient had more likelihood chance of adopting good infection control practices and increased cases detection (Kigozi et al., 2017). Again, a study by Demissie Gizaw et al. (2015) established that staff who worked more than six years and related working experience in health facility to have a significant influence on TB case detection (AOR=2.51; 95% CI: 1.5-4.1) and tuberculosis-related training (AOR=2.51 95% CI; 1.5, 4.1) were significantly associated with health staff knowledge on tuberculosis infection control and practice (Demissie Gizaw et al., 2015).

Also, a study conducted in Nepal found stigmatization of patients to have had an association with low TB cases detection and was cited as one of the reasons health workers were found to have avoided the use of respirators for the comfort of TB patients (Shrestha et al., 2017). Other studies also indicated that cases of TB type of patients such as pulmonary TB patients were reported to have an increased chance of 26.8 times more likely to be informed than extra-pulmonary TB patients (Mondal et al., 2014).

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In addition to this, Herna et al. (2018) study found training, supervision and involvement of pharmacy workers in promoting TB screening and creating new points for collection of sputum samples could contribute to an increased number of TB case detection. Notwithstanding this, a study in Ghana established that more than two-thirds of health workers were not trained in TB case diagnosis and case detection and as well as cited low awareness of health workers on TB (Afoakwa & Taylor, 2018). It was also established there is poor initiation and contact tracing of TB cases after disease confirmation of a suspected case of TB patients which could affect TB cases detection leading to a low number of TB cases (Afoakwa & Taylor, 2018).

2.5 Health system factors that affect case detection

The World Health Organization defines a health system as all organisations, individuals, and behaviours whose principal goal is to promote, restore, or maintain health. This covers actions that affect the factors that affect health as well as more direct actions that enhance health. (World Health Organization, 2009). The WHO highlighted six structural elements that are important for strengthening the health system in 2007. Leadership/governance, service delivery, health workforce, management information system, medical supplies/equipment, and health financing are some of these building components (Manyazewal, 2017). These fundamental elements are recognised as being crucial for any disease prevention (WHO, 2009). The six building blocks of strengthening the health system are the basis for the six WHO strategies on DOTS that were mentioned earlier.

2.5.1 Tuberculosis Case Detection Protocols and Availability

Tuberculosis is an infectious disease and it does occur in the lungs or larynx. Tuberculosis treatment according to the World Health Organization (2017) often has three negative acid-fast

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bacilli sputum smears which form the starting point of tuberculosis treatment regimes. In Gizaw et al., (2015) study, when tuberculosis is undiagnosed or unsuspected in a patient with TB disease poses a primary risk to the healthcare workers and closed relation in the general population, thus increasing the cases rate (Gizaw et al., 2015). The transmission risk of Mycobacterium Tuberculosis (causative agent bacteria) from patients to healthcare workers is a major problem, and this may be prevented when there is a correct use of treatment protocols and their availability will contribute to reduced TB transmission. The use of TB protocols and ensuring their availability to health workers equally help to improve on TB case detection rate within the health facilities in the district. Undiagnosed TB poses a major risk factor to close contacts by transmitting the disease before diagnosis (Shrestha et al., 2017). According to the World Health Organization tuberculosis case detection rate (2009) the ratio of the number of notified TB cases to the number of incident cases in a given year. One key target for tuberculosis control programs globally is achieving smear positive case detection rate greater than 70%. In Ghana TB case detection rate over the years remain fairly constant. With the highest rate of 42% recorded in 2013 and 2017, whilst 2016 had the lowest rate of 37%. In a recent study conducted by Osei et al. (2020), the case detection rate was classified as the ratio of the number of new relapse TB cases notified by the national TB to the number of estimated incident TB cases in a given year (Osei et al., 2020).

The guideline for the clinical management of TB is through the provision of the directly observed therapy for TB treatment which covers almost all districts in Ghana. The use of respirators among the healthcare workers help to identify clients who need emergency services, and when healthcare workers lacked respirator; it was found to limit the triage of TB suspects and this form part in low TB case detection (Shrestha et al., 2017). Figure 2.1 below indicates the treatment algorithm of TB from the national tuberculosis program, which depicts the protocol of TB detection and

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initiation of treatment by TB focal persons to follow in recruiting and treating patients at the health facility and during the surveillance process.

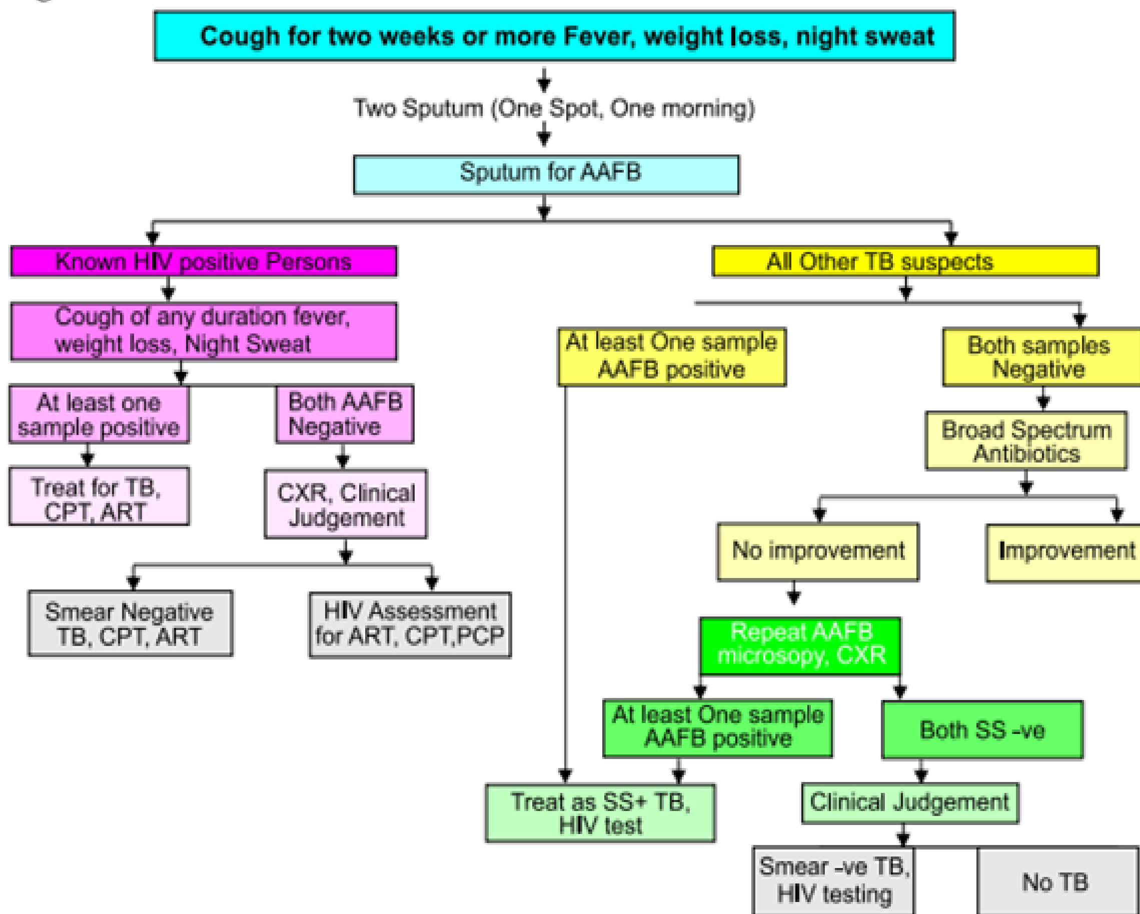

Figure 2. 1: TB Treatment Algorithm/Treatment Protocols

2.5.2 Education

Knowledge of health workers was influenced by their level of education, and patients without adequate knowledge about TB were more likely to delay in seeking care limited knowledge about TB were more likely to delay seeking care. Other studies have also found that there is a strong association between knowledge and level of education. Adequate TB knowledge relates to low TB

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perception and was found to be a protective factor for a patient to delay going to a health centre for TB case detection (Eltayeb, 2016). However, the same study found that there is no statistical association between patient knowledge and educational level, but health worker's knowledge of the causes of TB was strongly associated with the occupation of the healthcare workers(Taylor, 2018). Also, about 53% of patients indicated that health facilities should be the first place to visit when sick but how they received health services dependent on their educational level (Afoakwa & Taylor, 2018). Knowledge of public health medical officers regarding operational components of TB programs e.g. for TB diagnosis, TB defaulter, and the number of sputum samples required for case detection were found to have influenced the detection of TB cases in India (Shah et al., 2016). In addition, health workers who had university training were better informed about TB, and pharmacy workers' who had adequate knowledge regarding the prevention of TB transmission were those who had higher educational attainment which was found to have resulted in an increase in the detection of TB cases (Herna et al., 2018). Also, another study conducted on health care workers' knowledge, attitudes and practices on tuberculosis infection control in Nepal found that health care workers with the highest level of education (12 years or more of schooling) have a significant association with TB cases detection whereby those who had tertiary level education were 8.097 times more likely to have had sufficient knowledge about TB as compared to those who had completed 0-5 years of schooling. The level of knowledge of healthcare workers on TB infection control was almost half (45.8%), and a similar proportion was found to have had poor knowledge of TB infection control and detection of cases. However, knowledge level was significantly associated with educational status, and training and/or orientation received on TB protocol for case detection (Shrestha et al., 2017).

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Again, a study conducted in South West Region in Cameron on socio-demographic and environmental factors affecting the prevalence and spread of Tuberculosis found a significantly higher prevalence of 1.62% among individuals with primary school education when compared with the prevalence rate of 0.20% for those with tertiary education ($p = 0.034$) Also, the study found that TB prevalence was significantly higher in people who earn higher income compared with those who earn less income per a month. Again, the study established that a significant majority of TB patients (53.3%) who had never been vaccinated were exposed to TB more as compared with those who had been vaccinated before (Ane-anyangwe et al., 2016).

Furthermore, the study found that, health care workers sleeping conditions, number of members per household, type of toilet used, and BCG vaccine status have significantly influenced TB case detection, and could either lead to low or high TB case detection in the health facility. In addition, the study found respondents educational status, and patient type to have a significant influence on the knowledge level of health staff on TB case detection and diagnosis, and thus was cited to have potentially influenced the number of TB cases detected and the low number of TB cases (Ane-anyangwe et al., 2016). However, a study conducted by Afoakwa and Taylor (2018) in Ghana found no statistically significant relationship between respondents' knowledge and educational level, and established a strong relationship between respondents' knowledge of the causes of TB and their occupation of respondents. The study also established that health facilities were always the first point of contact on issues relating to TB cases detection and suspected cases, and found respondents marital status and education to affect cases diagnoses (Afoakwa & Taylor, 2018).

In addition, another study conducted in the Volta region found health education and training of health workers significantly increased TB awareness, spread and prevention of TB in the general population (Afoakwa & Taylor, 2018).

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2.5.3 Logistics and Facility Factors

Lack of logistics and other facility-related factors influence TB cases. A study that assesses health facility logistics for TB cases found a lack of logistics such as protocols to affect patient thorough history taking, adequate physical body examination tuberculin skin test, acid-fast bacillus smears (AFB), chest X-rays and sputum culture used for TB diagnosis in patients (Shah et al., 2016). In another study, lack logistics was found to influence the delay period mainly the health-seeking behaviour among the patient.

Health seeking behaviour of the patient was found to have influenced on patient's delay to report to a health facility for diagnosis. It was found that improving treatment compliance and health promotion strategies in a variety of contexts among TB patients would help to increase TB case detection (Shah et al., 2016). HIV status of TB patients was found to have a significant influence on patient's commitment to TB diagnosis as well as other barriers such as stigma, and fear of discrimination was found to have obstructed people living with HIV to continue with the utilization of diagnosis services at the health facility and thus influenced cases detection among respondents (Ahorlu & Bonsu, 2013). Also, visiting a public facility first was the only enabling factor that was found to have an inverse significant association with patient delay and utilization of health services (Eltayeb, 2016).

In addition, it was stated strengthening awareness of TB and improving access to health care services was essential in TB control strategies, TB cases management and detection (Mondal et al., 2014). The study also established that good recordings and reporting of potential cases of TB could help to reduce TB transmission, decrease the number of cases and as well as improve the outcomes of patients with TB in various health facility (Herna et al, 2018). Another study in Ghana cited that TB case detection and treatment are negatively affected by a lack of communication

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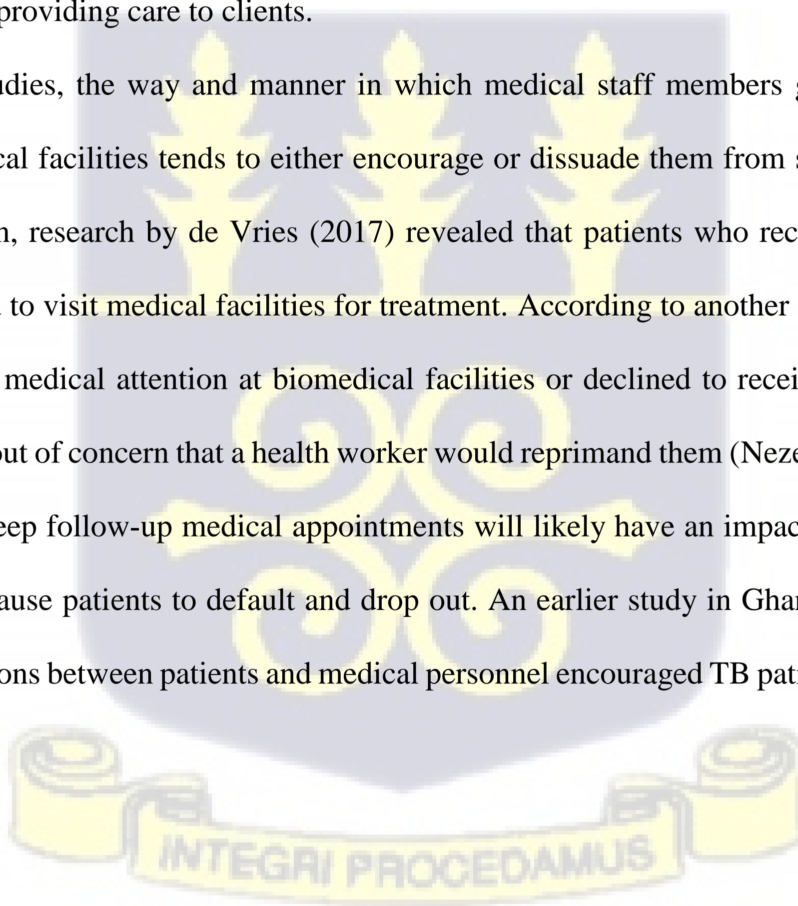
within the health facilities which could help aid laboratory diagnosis and confirmation of TB cases and might lead to a low number of TB cases (Ahorlu & Bonsu, 2013).

2.5.4 The Role of Service Delivery in TB Case Detection and Treatment

A result of the health system's inputs, such as the health personnel, purchasing and funding, is service delivery (Wang, 2019). One essential element of service delivery is the availability of health facilities to offer services to the community. Therefore, it is crucial to identify and treat TB cases at these places of service delivery. Hospitals, clinics, pharmacies, maternity homes, labs, and other diagnostic facilities are the primary health facilities that are directly involved in TB case detection and treatment. In these settings, patients with coughs may seek care or TB may be suspected while providing care to clients.

According to studies, the way and manner in which medical staff members greet and care for patients in medical facilities tends to either encourage or dissuade them from seeking treatment. As an illustration, research by de Vries (2017) revealed that patients who received quality care were encouraged to visit medical facilities for treatment. According to another study, TB patients avoided seeking medical attention at biomedical facilities or declined to receive treatment after skipping a dose out of concern that a health worker would reprimand them (Nezenega et al., 2020). This failure to keep follow-up medical appointments will likely have an impact on TB treatment because it will cause patients to default and drop out. An earlier study in Ghana discovered that friendly interactions between patients and medical personnel encouraged TB patients to finish their treatment.



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CHAPTER THREE

METHODS

3.1 Study Design

The study employed an analytical cross-sectional study design with a quantitative approach to assess the relationship between facility-level factors associated with knowledge on tuberculosis case detection in the Pru district and the outcome of health worker's knowledge, TB detection rate and availability of protocols among health facilities in the Pru district that undertook TB case detection (Joshi et al., 2015; Kesmodel, 2018).

It was a cross-sectional study because information on health workers and facility-level factors associated with knowledge and availability of TB protocols for TB case detection were gathered at a point in time in the Pru district (Mukherjee, 2017). The researcher also adopted a quantitative approach due to the research objectives of the study. Quantitative approach to data collection has become an increasingly used and accepted approach to conducting social research and would enable the researcher to collect quantitative/numerical data and analyzed the data independently to draw sound conclusions.

Moreover, the quantitative approach provided a more comprehensive analysis of the health worker's Knowledge, the number of health facilities implementing/conducting TB case detection using the available protocols or whether these protocols are available for use by these facilities and facility-level factors associated with knowledge and TB case detection to provide better feedback to policymakers.

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3.2 Study Area

The study was conducted in Pru District. Pru District has been part of the Atebubu-Amanten District until its establishment in 2004. The District was established under the Legislative Instrument (L.I.1778) of 2004 (18th February) and lies between Longitudes $0^{0}30$” W and $1^{0}26$” W and Latitudes $7^{0}50$” N and $8^{0}22$” N. The district shares boundaries with six (6) other districts, namely East Gonja to the North (Northern Region), Sene West to the East, Nkoranza and Atebubu-Amantin to the South and Kintampo-North and Kintampo South to the West, all in the Brong Ahafo Region.

The district capital town is Yeji, and has one of the major market centres, which is second to the Techiman market. The Pru District covers an area of 2,195kmsq representing about 5.6% of the total land surface of Brong Ahafo Region, and now Bono East Region. The district according to the 2010 Ghana Statistical Services Population and Housing Census has a projected total population of 148,142 people. The population growth rate is 2.3%. Males constitute 50.9% and females represent 49.1%. About 63.1% of the population resides in rural localities. The District has a sex ratio (number of males per 100 females) of 103.8. The total age dependency ratio (dependent population to population of the working age) for the District is 92.04.

The Total Fertility Rate (TFR) for the District is 3.4. The General Fertility Rate (GFR) is 98.5 births per 1000 women aged 15-49 years which is the fifth lowest for the region. The Crude Birth Rate (CBR) is 23.1 per 1000 population. The Crude Death Rate (CDR) for the district is 2.72 per 1000. Accident/violence/homicide/suicide accounted for 6.3 percent of all deaths while other causes constitute 93.7 percent of deaths in the district. The average household size in the District is 5.6 persons. Children constitute the largest proportion of household members accounting for 49.6%. Spouses form about 10.3% of households.

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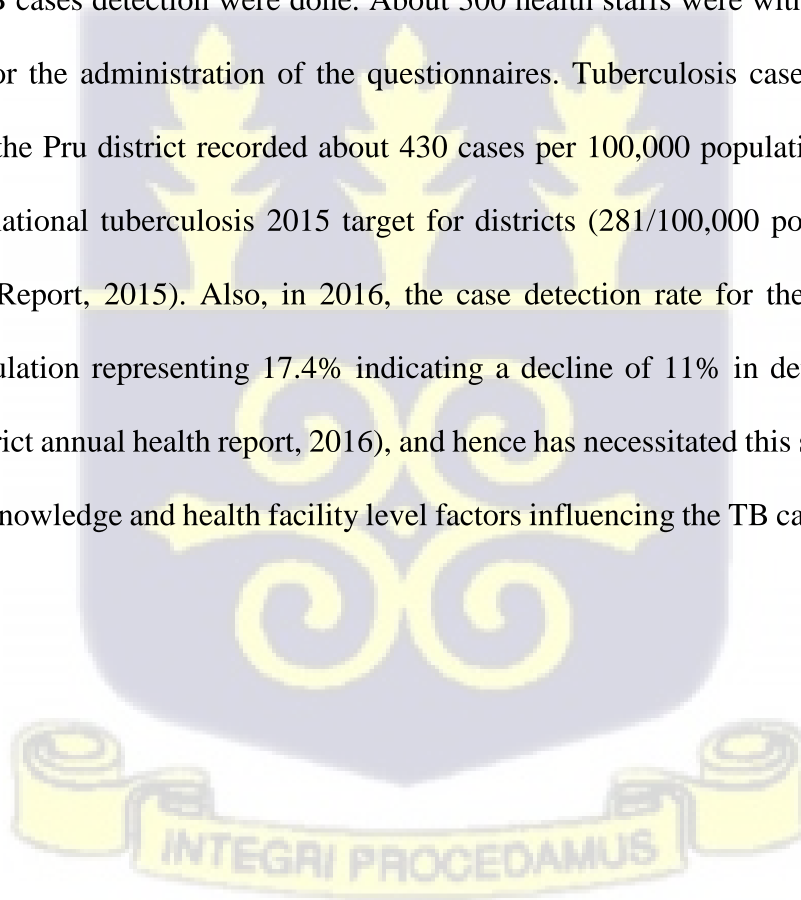
About four in ten (44.9 %) of the population aged 12 years and older are married. Of the population 11 years and above, 50.4% are literate and 49.6% are not literate. About 71.7% of the population aged 15 years and older are economically active while 28.3% are economically not active. Of the economically active population, 97.6% are employed while 2.4% are unemployed. Of the employed population, about 66% are engaged as skilled agricultural, forestry and fishery workers, 11.7% in service and sales, 14.1% in craft and related trade, and 4.3% are engaged as managers, professionals, and technicians.

In terms of health facilities, the district has twenty (20) health facilities comprising 1 Catholic hospital, 1 Maternity home, 5 health centres, 3 clinics and 10 CHPS compounds in which 10 health facilities were purposively selected comprising a hospital, health centres, clinics and maternity homes where TB cases detection were done. About 300 health staffs were within the district and were sampled for the administration of the questionnaires. Tuberculosis cases detection in the district showed the Pru district recorded about 430 cases per 100,000 population in 2015 which was above the national tuberculosis 2015 target for districts (281/100,000 population) (Annual Health Review Report, 2015). Also, in 2016, the case detection rate for the Pru District was 75/100,000 population representing 17.4% indicating a decline of 11% in detection rate in the district (Pru district annual health report, 2016), and hence has necessitated this study to determine health workers knowledge and health facility level factors influencing the TB case detection in the district.



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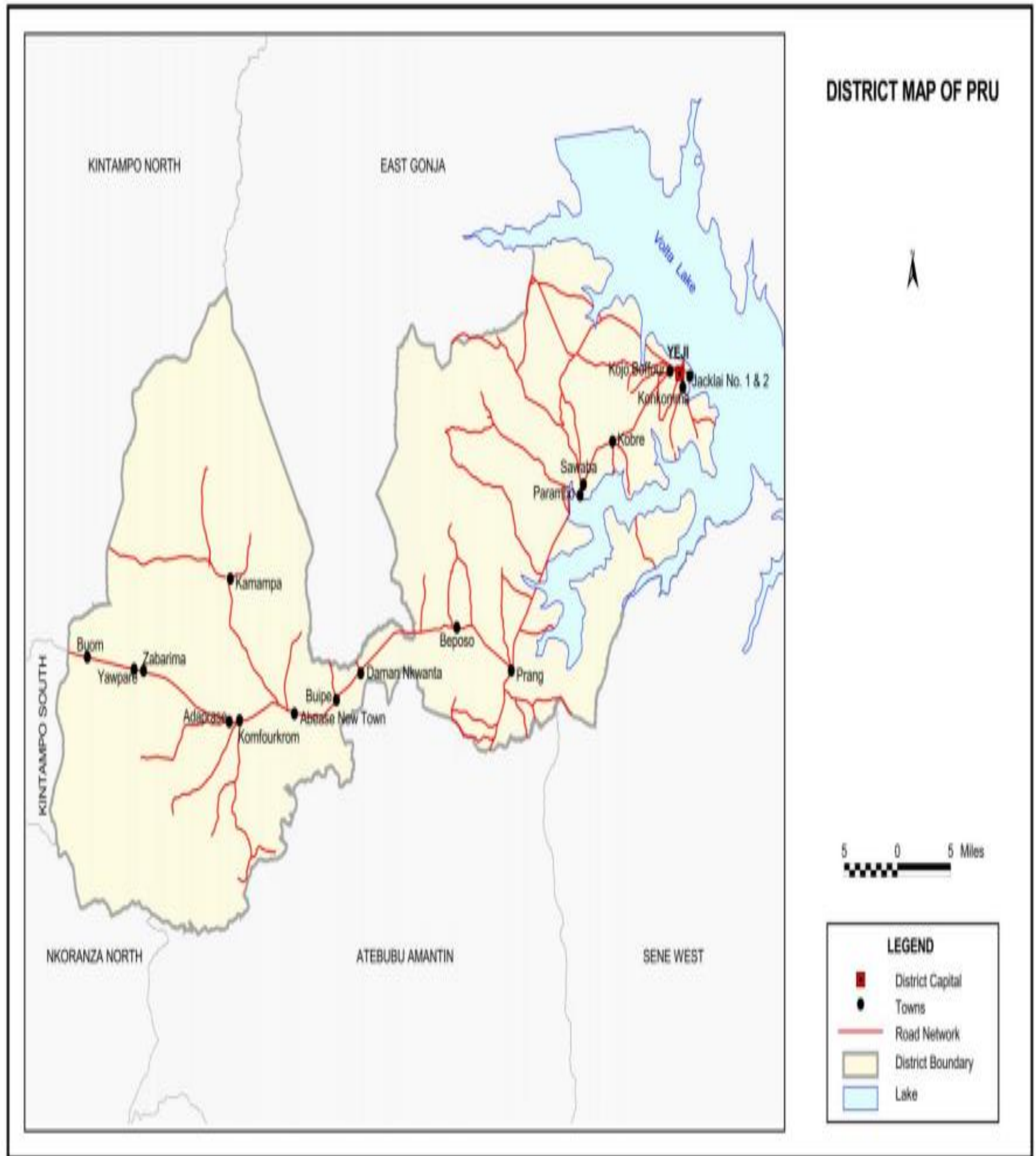

Figure 3. 1: Maps of Pru District

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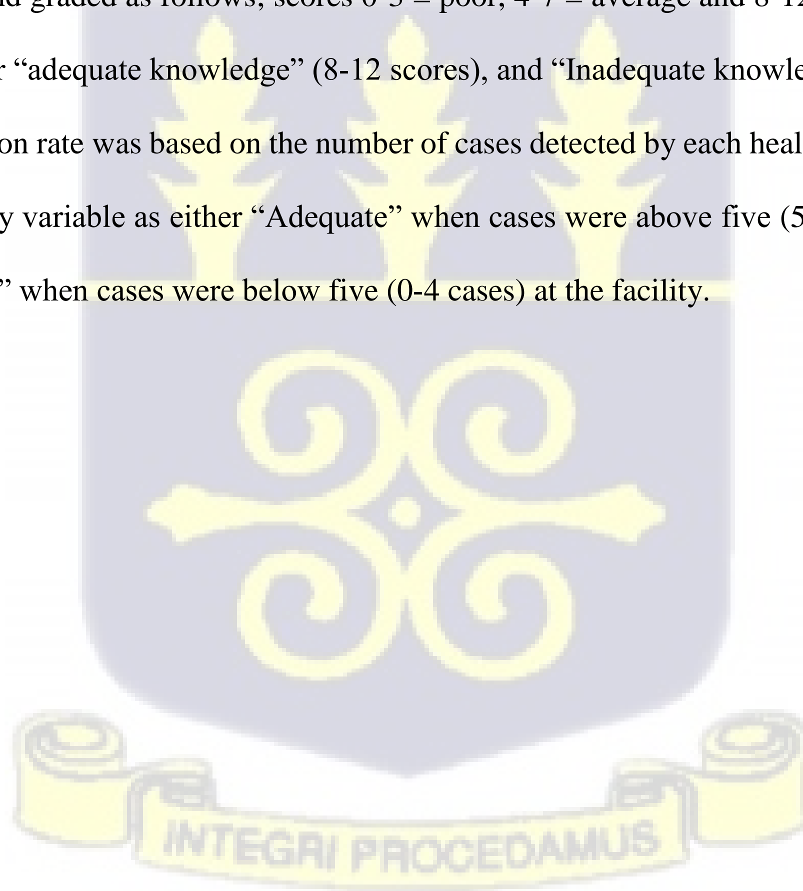
3.3 Study Variables

3.3.1 Dependent Variable

The dependent variables for the study were health worker's knowledge level of tuberculosis case detection. Health workers' knowledge of TB case detection and protocol availability was measured by evaluating their responses to twelve (12) questions on TB signs and symptoms, vulnerability, severity, action taken, and awareness level of the availability of TB case detection protocol at OPD/consulting room, laboratory, and surveillance registers for detection and monitoring of TB cases.

Each correct response was coded to attract a score of “+1” while each “incorrect” or “undecided” (“don not know”) response was assigned a score of “0”. The scores for each frontline health worker were summed and graded as follows; scores 0-3 = poor, 4-7 = average and 8-12 = good, and then recoded as either “adequate knowledge” (8-12 scores), and “Inadequate knowledge” (0-7 scores). TB cases detection rate was based on the number of cases detected by each health facility and was coded as a binary variable as either “Adequate” when cases were above five (5) to ten (10) cases and “Inadequate” when cases were below five (0-4 cases) at the facility.



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3.3.2 Independent Variables

Table 3. 1: Socio-Demographic and economic characteristics

Variables	Operational Definition	Scale of Measurement	Source data
Age	Age of Respondent at last birthday	Continuous	Interview
Sex	Sex of Respondent	**Binary scale** Male Female	Interview
Educational level	Level of formal education	**Ordinal scale** None Primary JHS SHS/VOC Tertiary	Interview
Marital status	Respondent marital status	**Nominal scale** Married Single Divorced Widowed	Interview
Location of facility	Facility location in the study area	**Binary scale** Rural Urban Peri-urban	Interview
Religion	What is respondent's Religion	**Nominal scale** Traditionalist Islam Christian Other	Interview
Occupation	Respondent's occupation	**Nominal scale** Doctor Nurse Public health CF Laboratory person	Interview
Ethnicity	Ethnic group of respondent	**Nominal scale** Akan Ewe Mole-Dagbon Other specify	Interview

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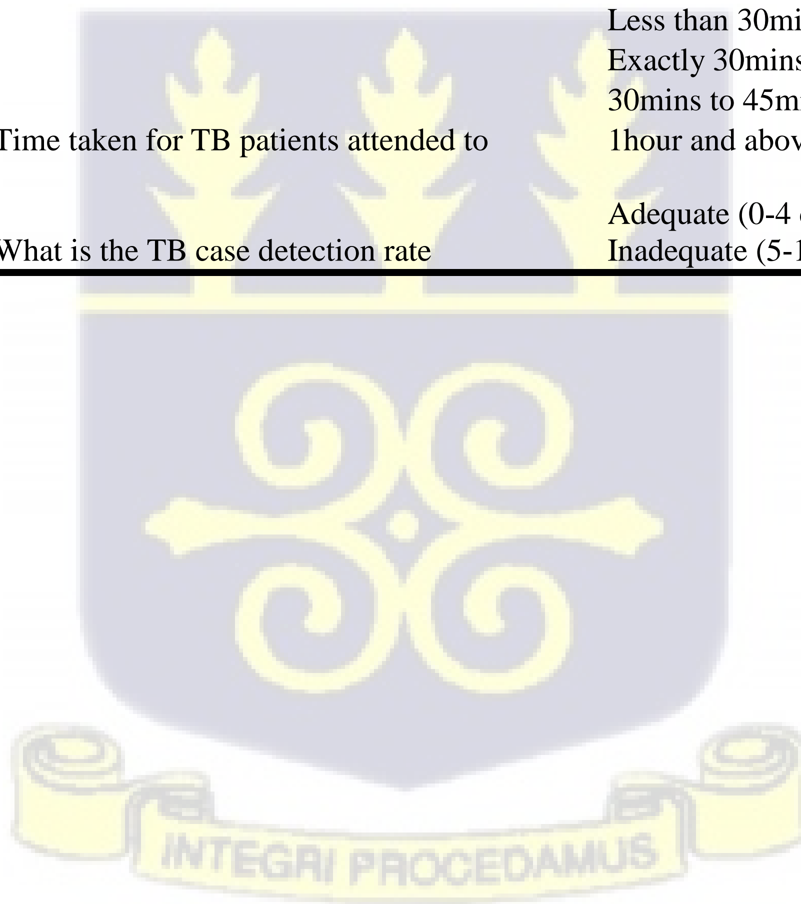
Table 3. 2: Health facility capacity variables

Variable	Operational Definition	Scale of measurement	Source data
Protocols	Knowledge level of TB protocol availability	**Ordinal** Good (8-12scores) Average (4-7scores) Poor (0-3scores)	Checklist
Health workers knowledge	Overall knowledge of health workers	Adequate (8-12 scores) Inadequate (0-7 scores)	Interviews
Personnel	Health seeking behaviors of TB clients	**Ordinal** Good/positive Indifferent Poor/negative	Interview
Logistics	Logistics availability for TB case detection	**Ordinal** Adequate Inadequate Not available	Checklist
Waiting time	Time taken for TB patients attended to	Less than 30mins Exactly 30mins 30mins to 45mins 1hour and above	Interviews
TB cases detection	What is the TB case detection rate	Adequate (0-4 cases) Inadequate (5-10 cases)	Interviews



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3.4 Sampling

3.4.1 Sample Size Calculation

1. The sample size was determined using the Cochrane and Synedecor (1996) formula.
2. N= $\frac{(Z\alpha/2)^2 \times p(1-p)}{e^2}$
3. Where:
4. N= sample size to be determined
5. $Z\alpha/_2$ = Reliability coefficient (z-score) of 1.96 at 95% confidence interval (CI),
6. P= Proportion of TB case detection rate in the Pru which is 11%, 0.11 (Pru district health directorate annual report, 2016),
7. e= Margin of error/level of precision of 5% = 0.05
8. N= $\frac{(1.96)^2 \times 0.11(1-0.89)}{(0.05)^2}$ =150.44 ~ 150
9. Adjusting for a 10% non-response rate=0.10 = 150 x 0.1= 15.0 ~ 15. Thus 150 + 15 = 165
10. Therefore, the calculated sample size used for the study was 165 respondents.

3.4.2 Study Population

The population for this study covered frontline health workers made up of clinicians, nurses and public health staff who were directly or indirectly involved in the detection and diagnosis of tuberculosis in the district. It also covered 10 out of the 20 health facilities that performed the diagnosis of TB cases and undertake surveillance activities in the detection of TB cases in the Pru district. These health facilities covered were; St Matthias Catholic Hospital, Abease Health Center, Harbour Health Center, Parambo Health Center, Prang Health Center, Zabrama Health Center, the only maternity home, and 2 Community-based Health Planning Services (CHPS) which were

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providing health services on the diagnosis and surveillance system for TB case detection were involved in the study.

Pru district has five sub-districts consisting of Abease, Parambo, Prang, Yeji and Zabrama in which all the sub-districts were involved in this study. There were twenty (20) Health facilities in the district made up of one (1) Hospital, two (2) Clinics, one (1) Maternity home, five (5) Health centres and eleven (11) CHPS compounds in which tuberculosis control activities were ongoing. Ten health facilities were purposively selected comprising a hospital, 5 health centres, a clinic and 3maternity homes for this study.

Four doctors were purposively selected from the only 5 available doctors in the district Simple random sampling method was used to select another cadre of staff in the facilities who were directly involved in TB case detection by balloting. Balloting was done whereby numbers were written on some pieces of paper and some were without numbers and were then shaken together before respondents were asked to select at random and so when a respondent select a piece of paper with a number he/she was selected for the interviews and those without numbers were not selected. Simple random sampling by balloting was used to select staff in the cases where the number at the facility was more than the determined number for the interview among each cadre of professionals through balloting, whereby they were asked to pick pieces of papers mixed in a bowl without replacement.

Data were collected using the pre-designed semi-structured questionnaire with closed and open-ended questions. In the closed questions respondents were provided with options or answers to choose the right one(s), whereas in the open-ended questions respondents were allowed to provide their own answers by expressing their opinions or feelings regarding the phenomenon under study. The designed questionnaire also included questions to collect data on the availability and

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accessibility of the protocol on Tuberculosis control strategies and the knowledge of respondents on the protocol at the health facility. Sampling procedures for the total number of 165staff who were involved in TB case detection have been depicted below. The proportion selected for the interview among each cadre of staff was determined by population proportion to size, and summary in table 3.3 below.

Table 3. 3: Cadre of health workers selected for the administration of the questionnaire

No.	Cadre of health workers	Total number	Estimated number to interview
1	Doctors	5	4
2	Physician Assistance	4	3
3	General nurses	15	12
4	Midwives	12	10
5	Community health nurses	35	28
6	Health Assistants	52	41
7	Enrolled nurses	60	48
8	Laboratory workers	11	9
9	Nutrition officers	3	2
10	Field Technicians	6	5
11	Technical officers	4	3
	TOTAL	**207**	**165**

3.4.3 Inclusion Criteria

1. All frontline health workers working in the selected health facilities conducting TB case detection for not less than six months were selected for inclusion
2. Also, all frontline health workers who were involved in the diagnosis and detection of TB cases and surveillance were included.

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3.4.4 Exclusion Criteria

1. All those health facilities and staff involve in TB case detection but not available

3.5 Data Collection Techniques

The data collection technique and tool adopted for the study were an interviewer-administered semi-structured questionnaire and an international recommended checklist by WHO for TB case detection protocol to assess protocol availability and health workers' knowledge of it usage at the various health facilities. The questionnaire was designed based on the objectives of the study. The questions included both closed and open-ended questions. The questionnaire covered four (4) sections in measuring the study objectives.

The first part of the questionnaire centred on the respondents' socio-economic and demographic characteristics such as age, educational level, marital status, ethnic group, occupation and location of the health facility as well as distance/time taken to reach the health facility. The second part of the assessed health facility's capacity to detect and diagnosed TB cases in the health facility. Key variables measured under this section include; health facility type, health knowledge of TB, protocol availability, health-seeking behaviour of TB clients and logistics availability for TB cases detection and availability.

Health worker's knowledge of TB case detection and protocol availability was measured based on twelve (12) points questions on TB signs and symptoms, vulnerability, severity, action taken, and awareness level of the availability of TB case detection protocol at OPD/consulting room, laboratory, and surveillance registers for detection and monitoring of TB cases. Each correct response was coded to attract a score of “+1” while each “incorrect” or “undecided” (“don’t know”) response was assigned a score of “0”.

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The scores for each health worker were summed and graded as follows; scores 0-3 = poor, 4-7 = average and 8-12 = good, and then recorded as either "adequate knowledge" (8-12 scores), and "inadequate knowledge" as (0-7 scores). TB cases detection rate was based on the number of cases detected by each health facility and was coded as a binary variable as either "Adequate" when cases were above five (5) to ten (10) cases and "Inadequate" when cases were below five (0-4 cases) at the facility.

Health workers' behaviour/attitude toward TB clients was assessed using Likert scale and rated as good/positive behaviour, indifferent and poor/negative behaviour of TB clients. The third part of the questionnaire looks at health worker's knowledge of TB signs and symptoms, clients' vulnerability, severity understanding and action taken. The four (4) parts of the questionnaire used the checklist to look at the availability of TB protocol and logistics for TB surveillance and cases detection and were determined using the WHO checklist for assessing the availability and accessibility of TB cases detection and availability protocols.

Any health facility with at least one of the following; task shifting officer, TB poster, TB suspect register, screening form, TB algorithms, laboratory request forms, TB screening tools, evidence of contact tracing, X-ray machine, microscope, and Gen Xpert machine as well as having 1 litre TB reagents, 100 sputum request form and sputum containers were considered "adequate", and those not having either of were classified as "inadequate", and those not having at all were classified as "not available". The overall assessment was rated similar way based on the availability and accessibility of logistics and protocols as "At least 1 and above = adequate", "not having either one of them = inadequate" and "not having all (0) = not available" and other factors contributing to the Low TB case detection in Pru district.

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3.5.1 Permission to proceed

The principal investigator sought permission from the Pru district Health Directorate of the Ghana Health Services, District Assembly and health facilities heads and in-charges before the start of the study.

3.5.2 Ethical consideration

Ethical clearance was sought from the Ethical Review Committee of the Ghana Health Service before the commencement of the study. Written approval was obtained from Pru District Health Directorate and the District Assembly and selected health facilities before conducting the study in the area.

Again, informed consent was obtained from the respondents and confidentiality was assured before the study, and the study participants were fully informed about the study purpose, procedures, risks and benefits of participating in the study. Respondents who do not understand the consent form were read to and explained their understanding in the presence of an impartial witness before responding to the questionnaires.

Respondents who had agreed to be part of the study were either required to sign or thumbprint the consent form as an indication of their willingness to participate before the questionnaire was administered to them. All the information obtained from the study participants was kept confidential and used for the study. The information was securely stored without the names of participants in a file which was accessible only to the research team.

The name of each participant was assigned with an ID code and was kept strictly confidential. In a situation where the result could not be linked to a particular participant's information the result will be dismissed.

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Confidentiality and Privacy: Data were used by the principal investigator and the study supervisor for analysis or publication only and do not bear the names of participants therefore, no possibility of linking the data and the individuals.

3.5.3 Training of Interviewers

Research assistants were trained to ensure the reliability and validity of the data collected, research assistants were trained on the ethics of conducting interviews to aid in translating the questions correctly to respondents to enable them to provide the right responses. Also, the questionnaires were pre-tested with 15% of the total questionnaires (25 respondents)

3.5.4 Pretesting and review of Instrument

A total of 15% of the sample questionnaires were pretested in the Atebubu-Amanten district in the Brong Ahafo region which shares similar characteristics with Pru district and hence was considered for the pre-testing of the questionnaires for their validity to the study.

3.5.5 Data Quality Control

To ensure the quality of the data collected questionnaires were pretested and any mistakes identified were corrected and questions were restructured to improve the data quality before data collection. The data collected were also doubled check by two independent persons for correct data capturing before subsequent entries into the computer software such as excel spreadsheet before importing into STATA version 12.1 for analysis. However, questionnaires were administered in either the English language or via the local dialect (Twi) depending on the preference of the respondents.

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Data storage, security, and usage: All data that were collected for the study were stored in computers under passwords and hard copies (questionnaire and observation checklist) were kept under lock.

Conflict of interest: The principal investigator and the supervisor declare no competing interest

Research Project finding: The principal investigator provided funds for the research.

3.5.6 Data Processing and Analysis

There was an examination of all answered questionnaires from the field by the principal investigator for errors and inconsistencies. Each of the questionnaires was coded and entered into Microsoft Excel version 20216 and cleaned by two independent persons. Processing and analysis of the data were done by importing data into STATA software version 12.1. Appropriate measures of central tendency and dispersion for continuous data were calculated. Variables such as age for continuous variables were expressed in means and standard deviation whilst discrete variables were expressed as frequencies, proportions and percentages and presented in tables, charts and graphs.

Pearson chi-square (chi2) test was used to test the significance of association between knowledge and socio-demographic on case detection at P-values less than 0.05 (≥0.05) were subjected to a logistic regression to determine their crude and adjusted odds ratios at 95% confidence level with their respective significance levels and p-values.

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CHAPTER FOUR

RESULTS

4.1 Health facility characteristics

4.1.1 Locations of Health Facility for TB Cases Detection

Figure 4.1 below presents the locations of health facilities for TB case detection in the Pru district. Nearly two-thirds 64.6% (106/164) of the health facilities for TB cases were located in the rural; per-urban was 22.6% (37/164) and urban facilities were 12.8% (21/164).

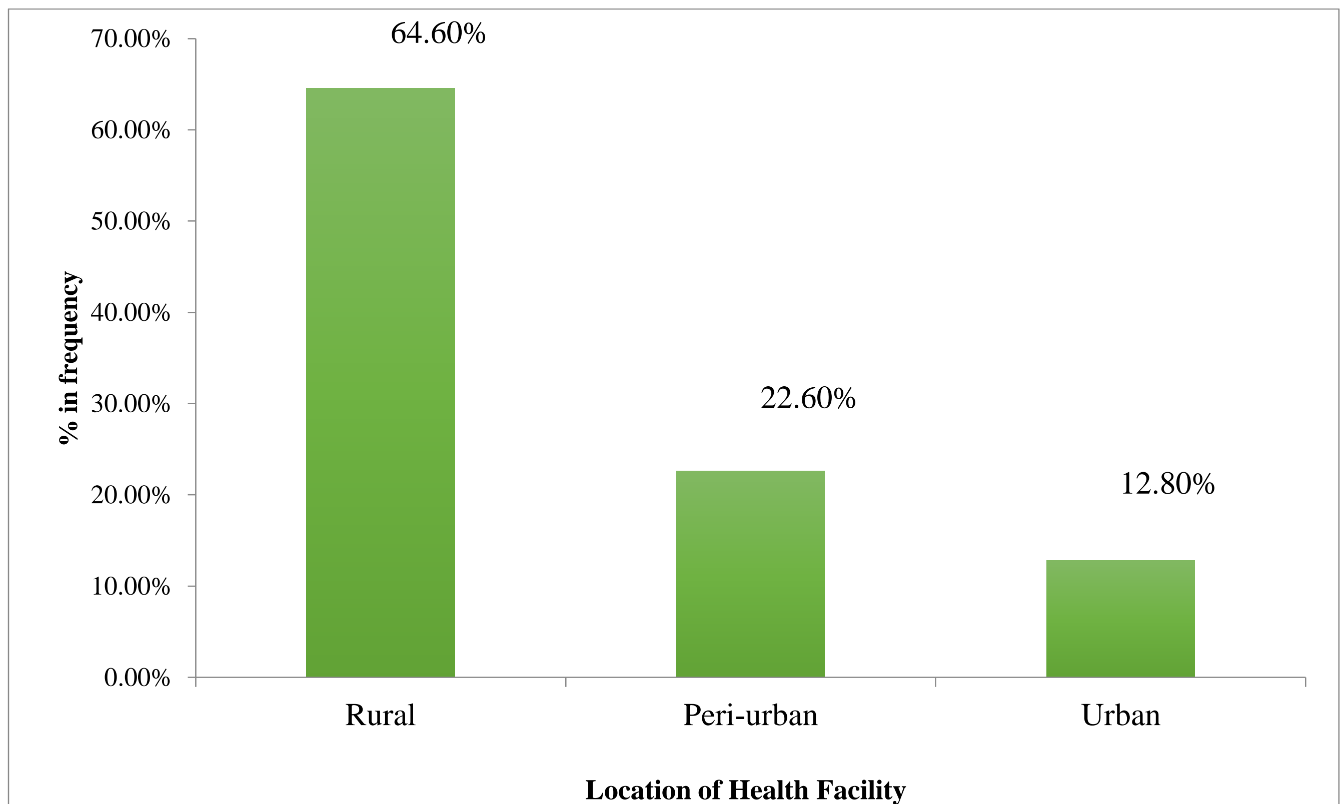

Figure 4. 1: Distribution of health facilities

4.1.2 Occupational category of respondents

Figure 4.2 below shows the occupational category of respondents. About three-quarters 75% (123/164) were nurses, doctors 9% (14/164), Public health officers were 7% (12/164) and other

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professional categories were 9% (15/164). Results showed more nurses in the occupation category than other professional groups.

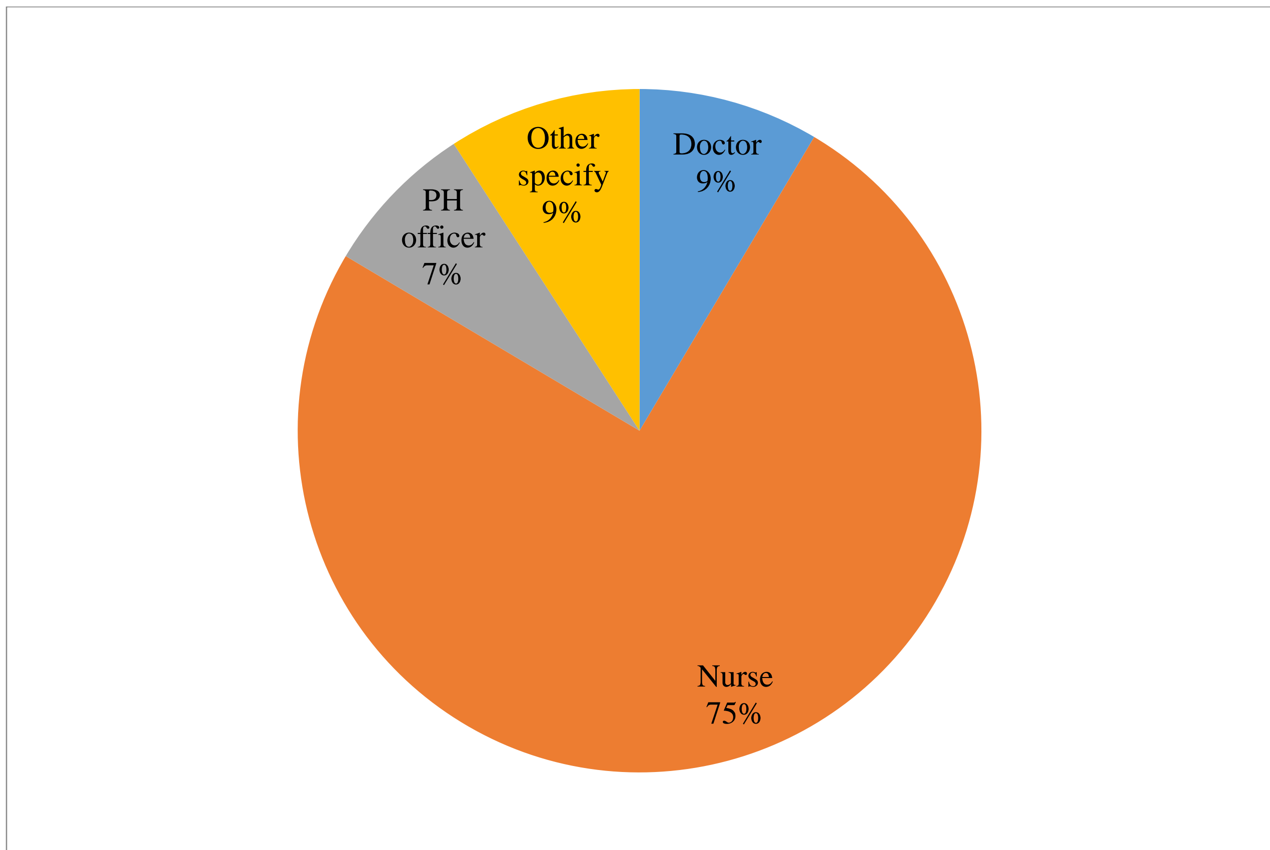
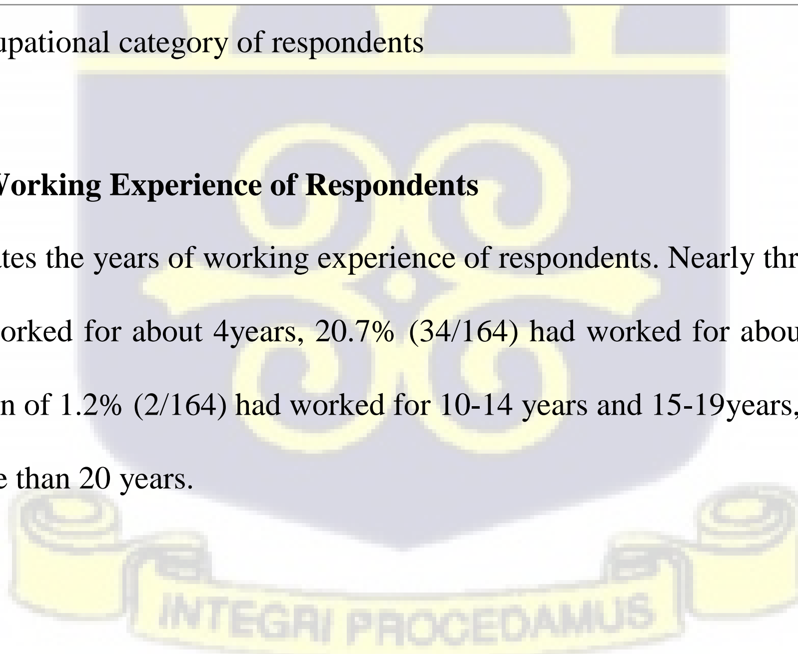


Figure 4. 2: Occupational category of respondents



4.1.3 Years of Working Experience of Respondents

Figure 4.3 indicates the years of working experience of respondents. Nearly three-quarters 74.4% (122/164) had worked for about 4years, 20.7% (34/164) had worked for about 5-9 years, and a similar proportion of 1.2% (2/164) had worked for 10-14 years and 15-19years, and 2.4% (4/164) had worked more than 20 years.

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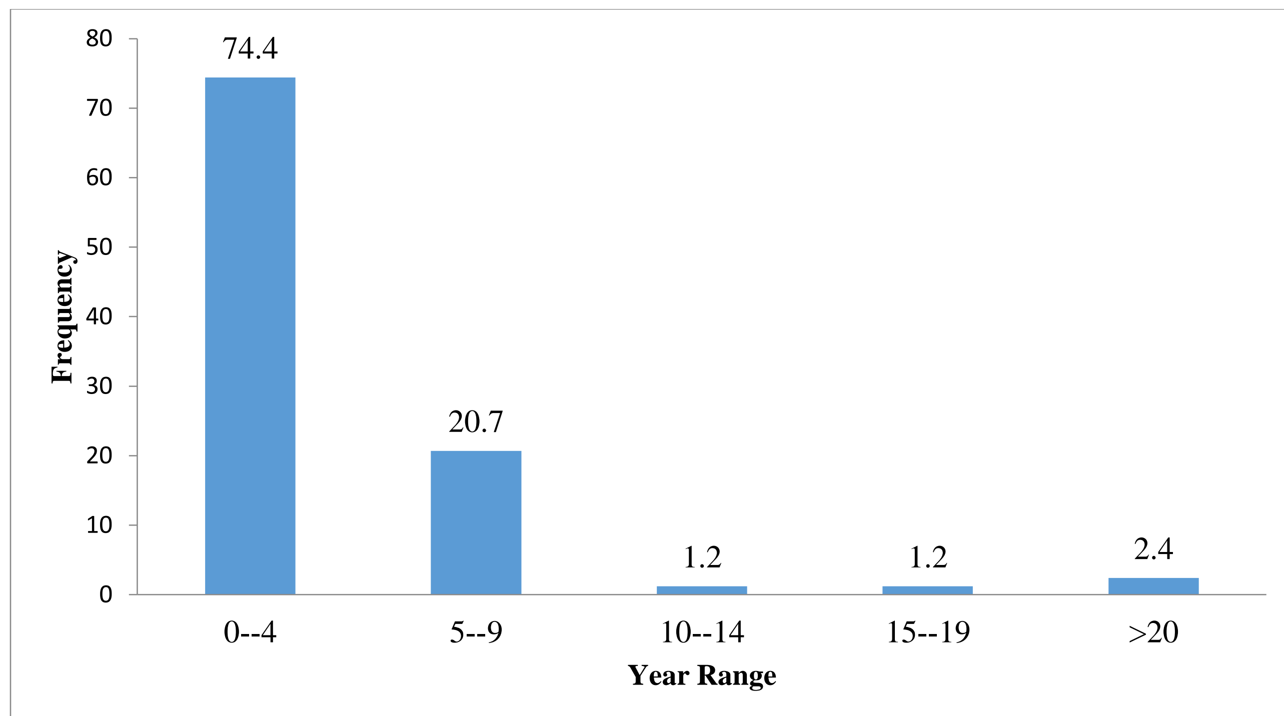

Figure 4. 3: Years of working experience

4.2 Knowledge of front-line health workers on TB case detection

4.2.1 Health worker's Knowledge on TB, Signs and Symptoms, Vulnerability, and Severity

Table 4.1 summarizes respondents' knowledge of TB and signs and symptoms related to TB, vulnerability, severity, and actions taken by health workers in TB cases detection. More than three-quarters 82.9% (136/164) of respondents said TB was a contagious or airborne disease/infection caused by bacteria known as "Mycobacterium Tuberculosis", and 14% (23/164) of the health workers said TB mostly affect the lungs of it victims and 3.1% (5/164)of health workers had described TB as respiratory infections that affect the respiratory organs (lungs) of the victims. Health workers' knowledge of the mode of transmission of TB shows that 45.7% (75/164) said TB was an airborne infection, and 26.2% (43/164) said one could get TB through aerosol droplets of an infected person via contact. Also, about 7.3% (12/164) said one could get TB when the infected

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person at a closed range coughed and 20.7% (34/164) said one could be infected with TB when one comes in contact with an infected person of TB. Regarding the duration of cough to suspect TB shows that, more than three-quarters 88.4% (145/164) said when an individual coughed for two or more weeks, 5.5% (9/164) said when a person coughed for more than one month, 1.2% (2/164) said six months, and 4.9% (8/164) above six months to suspect TB.

Also, more than three-quarters 87.8% (144/164)of the respondents said TB was curable, and 12.2% (20/164) said TB was not curable. However, majority 98.6% (142/144) of the respondents knew that an individual/TB patient could obtain treatment or healthcare at the hospital or health facility, and 1.4% (2/144) of the respondents equally said TB patients can get health treatment from the herbalist or at the herbal centre. To add, about two-thirds (61.6%) of the health facilities have detected or recorded TB cases and 38.4% of the health facilities recorded no TB cases among the selected health facilities.

The number of TB cases recorded for the year under study at the selected health facilities were 78 cases, and TB cases distribution at the health facilities showed 14.6% recorded 0 cases, more than half (57.9%) of the health facilities recorded 1-5 cases and 27.4% of the health facilities recorded 6-10 cases. Also, results showed that 51.3% of the TB cases were recorded at the St Mathias Catholic hospital, 29.5% of the cases were recorded at the selected health centres and 19.2% of the TB cases were recorded at the clinics and maternity homes. However, no TB cases were recorded at the community-based health planning services (CHPS) because it was reported that they lacked the equipment and logistics to diagnose TB cases and only rely on surveillance to identify suspected cases, and then referring them to the hospital for detection and diagnosis of TB cases. Respondents' knowledge level of TB shows that 61.6% had adequate knowledge of TB and TB cases detection, and 38.3% had inadequate knowledge of TB and TB cases detection.

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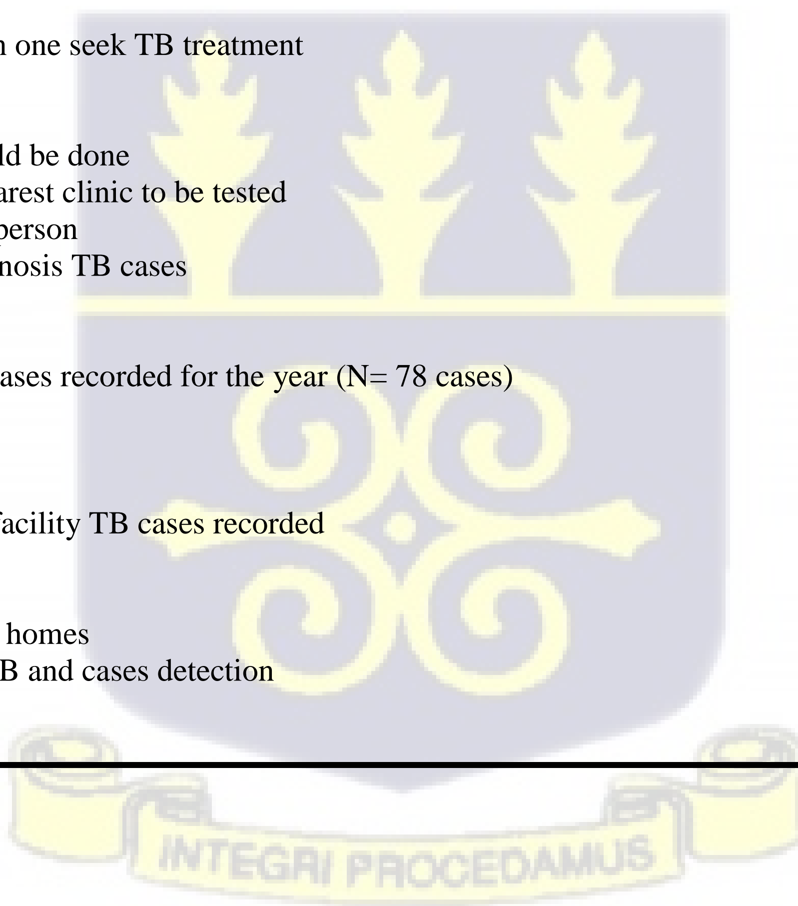
Table 4. 1: Health worker's Knowledge of TB, Signs and Symptoms, Vulnerability, Severity and Understanding of TB.

Variables	Frequency (N = 164)	Percentage (%)
Knowledge about Tuberculosis		
Contagious/airborne infection	136	82.9
Lung infection	23	14.0
Respiratory tract infection	5	3.1
Mode of transmission of TB		
Airborne	75	45.7
Droplet via contact	43	26.2
Through cough	12	7.3
Getting contact with infected person	34	20.7
Duration of cough to suspect TB		
Within two weeks or more	145	88.4
After one month	9	5.5
After six months	2	1.2
Above six months	8	4.9
Is TB curable		
Yes	144	87.8
No	20	12.2
If yes, where can one seek TB treatment		
Herbalist	2	1.4
Health facility	142	98.6
If no, what should be done		
Report to the nearest clinic to be tested	18	90.0
Isolate infected person	2	10.0
Ever detect/diagnosis TB cases		
Yes	101	61.6
No	63	38.4
Number of TB cases recorded for the year (N= 78 cases)		
0 cases	24	14.6
1-5 cases	95	57.9
6-10 cases	45	27.4
Type of Health facility TB cases recorded		
Hospital	40	51.3
Health centres	23	29.5
Clinic/maternity homes	15	19.2
Knowledge of TB and cases detection		
Adequate	101	61.6
Inadequate	63	38.3



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4.2.2 Health Workers' Knowledge on TB Signs and Symptoms

Figure 4.4 below indicates the knowledge of respondents on TB signs and symptoms. From the results, nearly half 49% (81/164) of the respondents cited TB signs and symptoms including chronic cough, and about 19% (31/164) cited extreme weight loss. Also, about 17% (28/164) of the respondents cited fever as sign and symptom of TB and 15% (24/164) of the respondents cited other signs and symptoms to include blood coughing, growing lean, diarrhoea and chest pains.

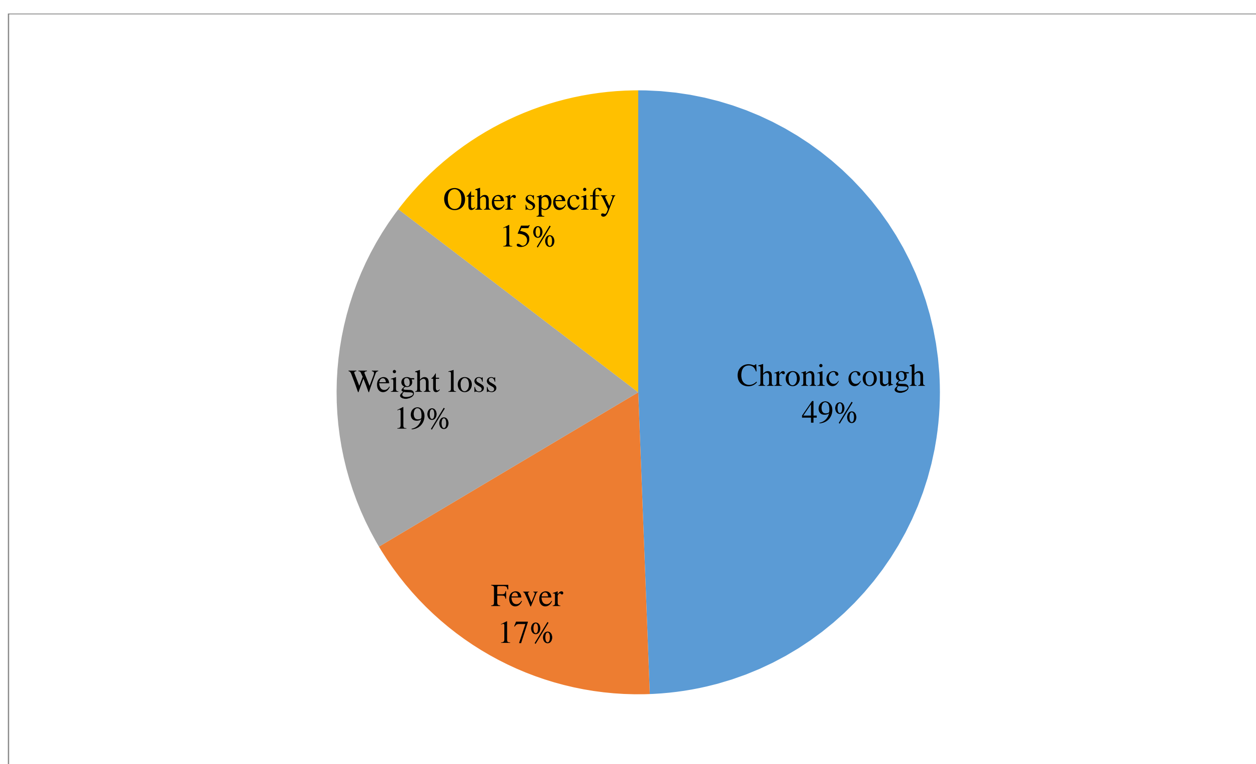

Figure 4. 4 : Knowledge of TB signs and symptoms

4.2.3 Overall knowledge of health workers on TB Protocol for TB Cases Detection

Figure 4.5 below indicates the health worker's overall knowledge of TB protocol availability at the selected health facilities for improve TB cases detection. Nearly two-thirds 62% (101/164) said their facilities have an adequate supply of TB protocol and 38% (63/164) said they have an

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inadequate supply of TB protocol at their health facilities and this was found to have implications on TB cases detection and diagnosis.

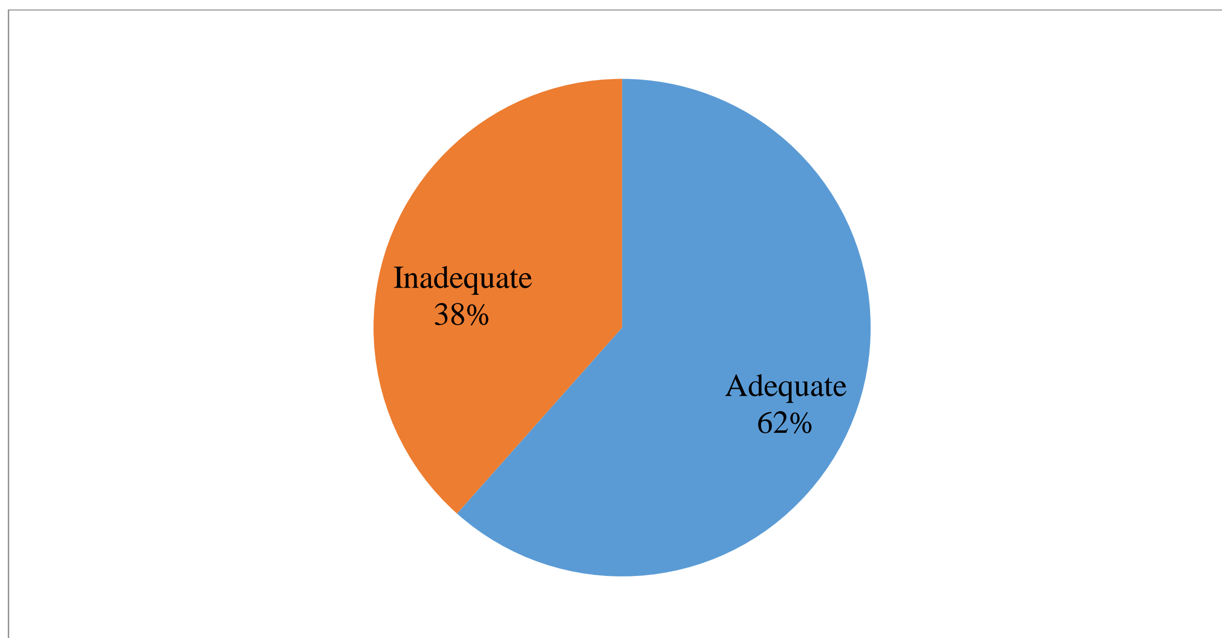

Figure 4. 5: TB protocol availability at the health facility for TB detection

4.3 Availability and utilization of TB case detection protocols in the health facilities

4.3.1 Availability of Logistics and Equipment for TB Cases Detection

Table 4.2 below presents on the assessments of the availability of logistics and equipment for TB case detections in the selected health facilities. From the study, all (100%) health facilities were having task shifting officers, and almost all health facilities were having at least one poster on TB case detection protocol at the health facilities. About 80% of the health facilities have a cough register, and almost all (100%) facilities were having TB screening forms for detection and 70% had a TB algorithm and almost all had TB requesting forms. Also, 50% of the health facilities had a microscope to aid microscopic detection of TB cases and only one (10%) health facility (Mathias

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Catholic hospital) had a gen Xpert machine for TB cases detection. Again, about 40% of the facilities at a time had TB reagents for cases detection and 80% of the health facilities had TB registers for registration of cases. About 70% of the health facilities were found to have had sputum request forms, about 80% had sputum containers for collection of samples for cases detection but these said to be not enough and 30% of the health facilities were found to have had X-ray machines.

Table 4. 2:Availability of logistics and equipment for TB case detection

Variable	Frequency (N = 10)	Percentage (%)
OPD/CONSULTING ROOM		
Task shifting Officer		
Yes	10	100.0
No	0	0.0
Poster		
Yes	10	100.0
No	0	0.0
Cough registers		
Yes	8	80.0
No	2	20.0
Screening forms		
Yes	10	100.0
No	0	0.0
TB algorithms		
Yes	7	70.0
No	3	30.0
Laboratory request forms		
Yes	10	100.0
No	0	0.0
LABORATORY		
Microscope		
Yes	5	50.0
No	5	50.0
Gen Xpert machine		
Yes	1	10.0
No	9	90.0
TB reagents		
Yes	4	40.0
No	6	60.0
TB register		
Yes	8	80.0

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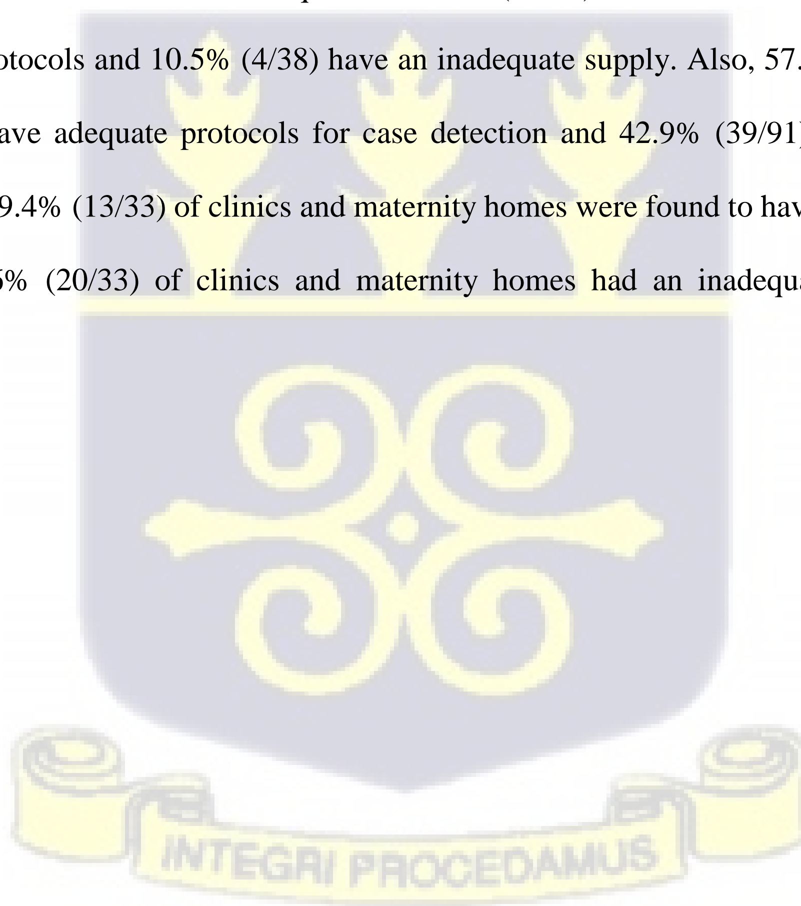
No	2	20.0
Sputum request forms		
Yes	7	70.0
No	3	30.0
Sputum container		
Yes	8	80.0
No	2	20.0
X-ray machine		
Yes	3	30.0
No	7	70.0

Source: Field Data, 2021

4.3.2 Health Facility Type and the availability and utilization of TB Protocols

Figure 4.6 indicates the availability level of TB protocols at the various level of healthcare to aid in TB case detection. More than three-quarters 89.4% (34/38) of the facilities have an adequate supply of TB protocols and 10.5% (4/38) have an inadequate supply. Also, 57.1% (52/91) of the health centres have adequate protocols for case detection and 42.9% (39/91) have inadequate supply. Again, 39.4% (13/33) of clinics and maternity homes were found to have had an adequate supply and 60.6% (20/33) of clinics and maternity homes had an inadequate supply of TB protocols.



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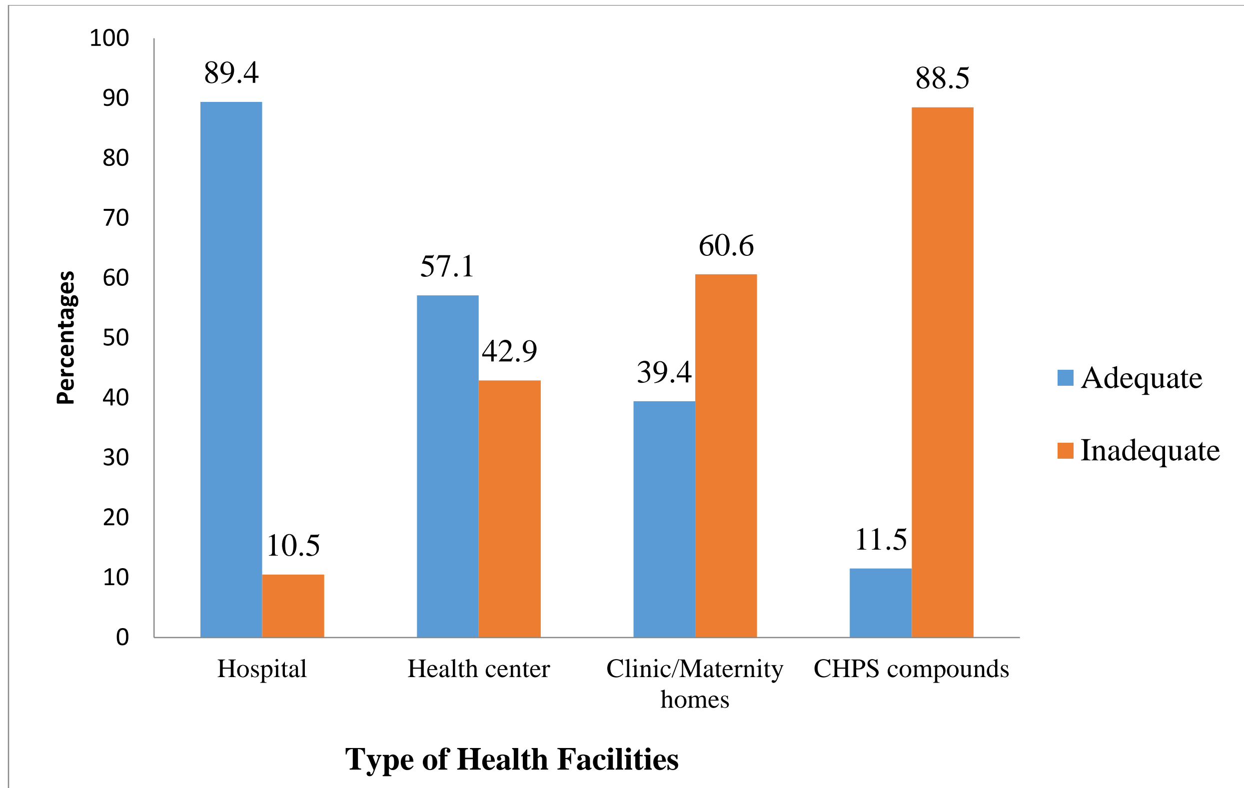

Figure 4. 6: Health facility type and TB protocol availability

4.3.3 Overall Assessment of Logistics Supply and TB protocols availability to Health Facilities to aid TB Case Detection

Figure 4.7 below summarizes the overall assessments of TB logistics supply and TB protocols availability to health facilities for TB case detection. About 33% (55/164) of health facilities said they have adequate logistics supply and available protocols for TB detection, and more than half 52% (85/164) of the health facilities have an inadequate supply of TB logistics and available protocols for cases detection. Also, about 15% (24/164) of the health facilities said to lacked logistics and the available protocols for TB cases detection. Among health facilities which were found to lacked of logistics and the available protocols for TB cases detection were not conducting

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diagnosis and detection of TB cases but anytime they suspect any case of TB, they referred them to other facilities for testing and diagnosis of TB cases.

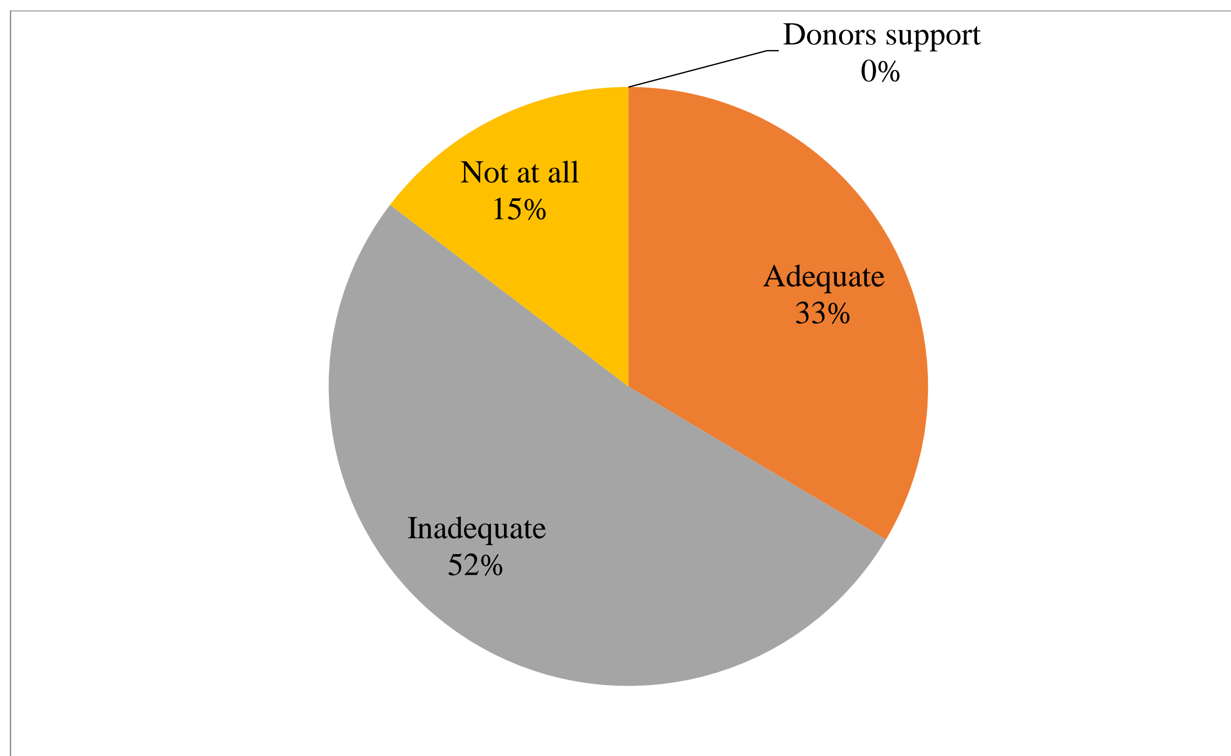

Figure 4. 7: Overall assessment of logistics supply to health facilities for TB cases detection

4.3.4 Overall availability and utilization level of TB cases detection protocols in health facilities to aid TB Case Detection

Table 4.8 below indicates the overall utilization level and availability of TB cases detection protocols in the selected health facilities to aid TB cases detection. Over three-quarters (80.2%) of the health facilities were found to have high utilization and availability of TB cases detection protocols, and only a little less than twentieth (19.8%) of the health facilities had low availability and utilization of TB cases detection protocols, and this thus has influence on the detection and diagnosis of TB cases.

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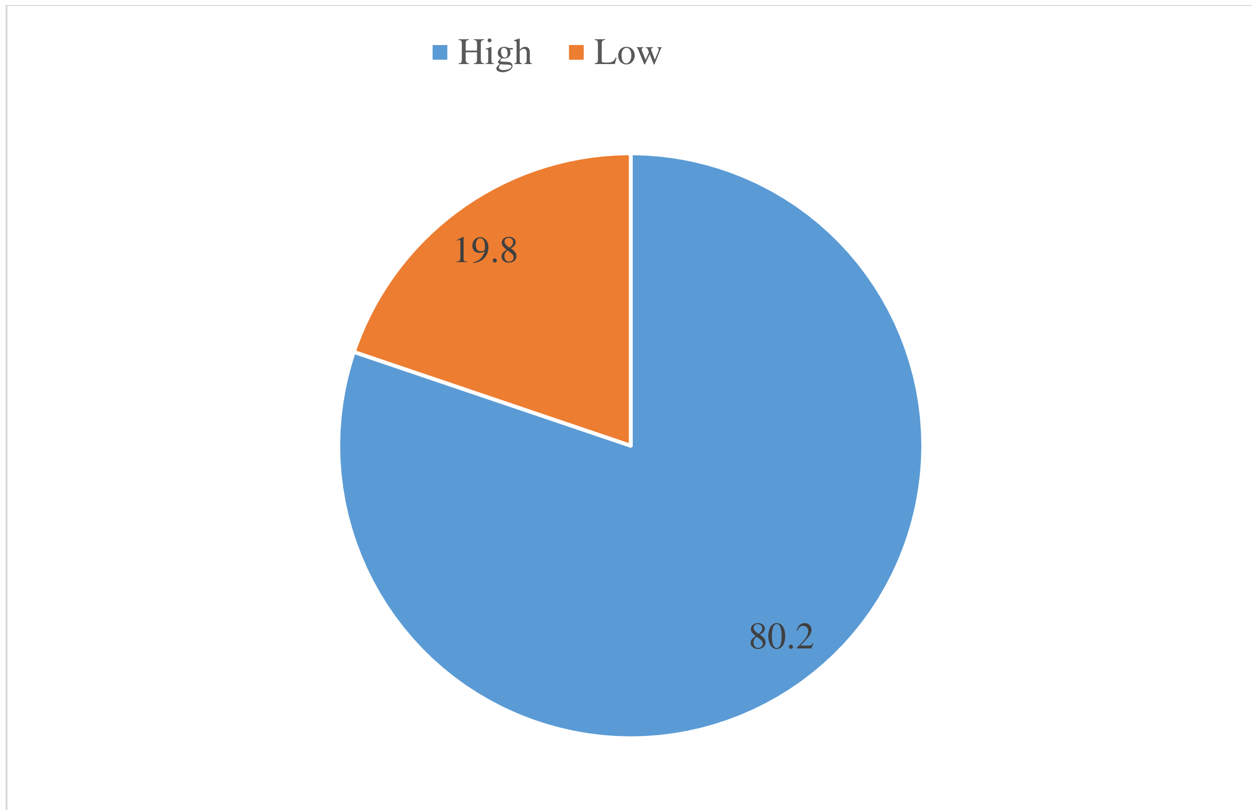

Figure 4. 8: Overall availability and utilization level of TB cases detection protocols

4.4 Healthcare facility factors associated with the knowledge of TB case detection in the Pru district

4.4.1 Health Facility related factors affecting health facilities capacity for TB case Detection

Table 4.3 summarises the health facility related factors affecting health facilities capacity for TB case detection. From the study, the type of health facilities providing TB cases diagnosis and detection in the study area indicate that 10.0% (1/10) were hospitals, 50.0% (5/10) for health centres, 20.0% (2/10) were clinics/maternity homes and 20.0% (2/10) were community-based health planning services (CHPS). A number of respondents at each health facility type conducting TB cases detections show 23.2% (38/164) were at hospitals, more than half 55.5% (91/164) were at health centres and 20.1% (33/164) were at clinics, maternity homes and CHPS compounds.

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Regarding respondents' knowledge level of TB protocol and its availability for TB cases detection shows 61.6% (101/164) had adequate (8-12 scores) knowledge of the TB protocol and TB cases detection, 38.3% (63/164) had inadequate (0-7 scores) knowledge of the TB protocol availability and TB cases detection. In term of health worker's behaviours' or attitudes toward TB clients indicate more than half 57.9% (95/164) were friendly, rude 17.1% (28/164), indifferent 25.0% (41/164), and with logistics supply to the health facilities show 41.5% (68/164) had an adequate supply of TB logistics for cases detection, 32.9% (54/164) had inadequate logistics supply and 25.6% (42/164)of the health facilities were found to lacked logistics supply for TB cases detection, with little above three-quarters 75.6% (124/164) said donors were involved in logistics supply to TB cases detection at the health facility, and 24.4% said donors do not involve in the supply of logistics to the health facility.

Table 4. 3: Health facility-related factors and capacity for TB cases detection

Variables	Frequency (N = 164)	Percentage (%)
Health facility type (N = 10)		
Hospital	1	10.0
Health centres	5	50.0
Clinic/maternity homes	2	20.0
CHPS	2	20.0
Number of respondents at Health facility type		
Hospital	38	23.2
Health centre	91	55.5
Clinics/maternity	33	20.1
CHPS	2	1.2
Knowledge of TB protocol and availability		
Adequate (8-12 scores)	101	61.6
Inadequate (0-7 scores)	63	38.3
Health workers behaviours' toward TB clients		
Friendly	95	57.9
Rude	28	17.1
Indifferent	41	25.0

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Logistics availability for TB case detection		
Adequate (At least 1 & above)	68	41.5
Inadequate (Not having either one of them)	54	32.9
Not available (Not having at all)	42	25.6
Donors involved in the logistics supply		
Yes	124	75.6
No	40	24.4
If no, specify logistics supply (N =40)		
Inadequate information	20	50.0
Inadequate TB programs	20	50.0

Source: Field Data, 2021

4.4.2 Association between Health Facility Related Factors and knowledge of TB Cases Detection

Table 4.4 below presents the association between health facility related factors and front-line health workers knowledge of TB case detection. Results from the chi-square analysis showed that the location of a health facility was found to have a statistically significant relationship with knowedge of TB case detection (Chi2 =13.31; p=0.01) as well as the type of health facility under which TB cases detection or diagnosis was conducted by respondents was equally found to have had a statistically significant association with increased knowledge on TB cases detection (Chi2 = 21.37; p<0.001). Also, health worker's behavior and attitude toward TB clients was found to have had a statistically significant association with high knowledge on TB case detection (Chi2 = 27.25; p<0.001) as well as the availability of logistics supply for TB cases detection was found to have had a significant relationship with increased knowledge on TB case detection (Chi2 = 48.52; p<0.001).

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Table 4. 4: Association between health facilities-related factors and TB cases detection

Variable	Knowledge of TB case detection		P-value	Chi2 value
	Adequate N (%)	Inadequate N (%)		
Health facility location			0.01	13.31
Urban	8 (38.1)	13 (61.9)		
Rural	76 (71.7)	30 (28.3)		
Peri-urban	17 (45.9)	20 (54.1)		
Health workers at health facility type			<0.001	21.37
Hospital	34 (89.5)	4 (10.5)		
Health center	52 (57.1)	39 (42.9)		
Clinics/maternity	13 (39.4)	20 (60.6)		
Health workers behaviors' toward TB clients			<0.001	27.25
Friendly	64 (67.4)	31 (32.6)		
Rude	18 (64.3)	10 (35.7)		
Indifferent	17 (80.9)	4 (19.1)		
Logistics availability for TB case detection			<0.001	48.52
Adequate (At least of 1 & above)	58 (85.3)	10 (14.7)		
Inadequate (Not having either one of them)	35 (64.8)	19 (35.2)		
Not available (Not having at all)	8 (19.1)	34 (80.9)		
Donor involvement in TB cases detection			<0.001	43.46
Yes	94 (75.8)	30 (24.2)		
No	7 (17.5)	33 (82.5)		
Overall assessment of logistics for cases			<0.001	26.17
Adequate (At least of 1 & above)	37 (82.2)	8 (17.8)		
Inadequate (Not having either one of them)	55 (64.7)	30 (35.3)		
Not at all (Not having at all)	9 (26.5)	25 (73.5)		

4.4.3 Association between front-line health workers knowledge of TB and detection of TB Cases in the health facilities

Table 4.5 indicates the relationship between respondents' knowledge of TB and TB case detection rate. From the study, health worker's Knowledge of TB was significantly associated with increased TB cases detection (Chi2 = 6.85; p=0.03) than those with inadequate knowledge of TB as well as knowing the signs and symptoms associated with TB were found to have a statistically significant

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association with increased TB cases detection at the health facility (Chi2 = 30.93; p<0.001) than their counterpart with inadequate knowledge.

However, health worker's knowledge of the mode of transmission of TB was found to show no statistically significant association with TB case detection in the study area (Chi2 = 6.10; p=0.11). Notwithstanding, health worker's knowledge of the duration coughed of a patient to suspect TB was found to have shown a borderline statistically significant association with increased TB cases detection in the selected study health facilities (Chi2 =7.83; p=0.05).

To add, health worker's knowledge of TB been a curable disease was found to have statistically been associated with high TB cases detection in the selected study health facilities in the study area (Chi2 =9.61; p=0.02), than those who lacked knowledge of TB been a curable disease.

Table 4. 5: Association between health workers knowledge of TB and TB cases detection

Variable	**Knowledge on TB cases detection**		**P-value**	**Chi2 value**
	Adequate N (%)	**Inadequate N (%)**		
Knowledge of TB disease			0.03	6.85
Contagious/airborne infection	78 (57.4)	58 (42.7)		
Lung infection	18 (78.3)	5 (21.7)		
Respiratory tract infection	5 (100.0)	0 (0.0)		
Knowledge of TB signs/symptoms			<0.001	30.93
Chronic cough	47 (58.0)	34 (41.9)		
Fever	26 (92.8)	2 (7.1)		
Weight loss	23 (74.2)	8 (25.8)		
Other specify	5 (20.8)	19 (79.2)		

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Mode of transmission of TB			0.11	6.10
Airborne	49 (65.3)	26 (34.7)		
Droplet via contact	30 (69.8)	13 (30.2)		
Through cough sputum	7 (58.3)	5 (41.7)		
Getting contact with infected	15 (44.1)	19 (55.8)		
Duration of cough to suspect TB			0.05	7.83
Within two weeks	91 (62.8)	54 (37.2)		
After one month	2 (22.2)	7 (77.8)		
After six months	2 (100.0)	0 (0.0)		
Other specify	6 (75.0)	2 (25.0)		
Is TB curable			0.02	9.61
Yes	95 (65.9)	49 (34.0)		
No	6 (30.0)	14 (70.0)		

Source: Field Survey, 2019

4.4.4 Logistic Regression of healthcare facility related factors associated with the knowledge of TB case detection

Table 4.6 summarizes the logistic regression of health facilities-related associated factors that influenced TB case detection in the Pru district of the Bono East Region of Ghana. Location of health facility was found to have a significant influence on TB cases detection as respondents with health facilities located in either rural or peri-urban was having an increased chance of TB cases detection as compared to those health facilities located in the urban area (AOR =29.46; 95%CI 4.04-21.46; p=0.002).

Again, the type of health facility was found to have a statistically significant relationship with TB cases detection as respondents who were working in either health centres or maternity homes/clinics had a decreased chance of 88% or a low number of TB cases detections (AOR=0.12; 95%CI 0.02-0.91; p=0.04) as compared to those who were working in the hospitals, and was found

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to have had an increased number of TB cases detection or the high number of TB cases detected in the study area. Respondent's knowledge of the TB signs and symptoms of TB was associated with an increased chance of 22.77 times as those who had adequate knowledge of TB had high TB cases detection as compared to their counterpart who had inadequate knowledge of TB case detection (AOR=22.77; 95%CI 2.91-17.76; p=0.002).

To add, inadequate logistics supply for TB cases detection was found to have had an influence on TB cases detection as those who had an inadequate supply of logistics had a decreased odds of 91% of low TB cases detection as compared to those facilities with adequate logistics supply were found to have had adequate knowledge on TB case detection in the study area (AOR=0.09; 95% CI 0.02-0.41; p<0.001).

Table 4. 6: Logistic Regression of health facilities related factors associated with knowledge on TB cases detection

Variable	**Adequate Knowledge on TB case detection N (%)**	**Unadjusted OR (95% CI)**	**P-value**	**Adjusted OR (95% CI)**	**P-value**
Health facility location					
Urban	8 (38.1)	***Ref***		***Ref***	
Rural	76 (71.7)	4.11(1.54-10.93)	0.01*	29.46(4.04-21.46)	0.002
Peri-urban	17 (45.9)	1.38(0.46-4.12)	0.07	2.06(0.24-17.09)	0.09
Health facility type					
Hospital	34 (89.5)	***Ref***		***Ref***	
Health center	52 (57.1)	0.16(0.05-0.47)	<0.001*	0.12(0.02-0.91)	0.04
Clinics/maternity	13 (39.4)	0.08(0.02-0.27)	0.04	0.05(0.004-0.56)	0.01
Health worker behavior toward clients					
Friendly	64 (67.4)	***Ref***		***Ref***	
Rude	18 (64.3)	0.87(0.36-2.11)	<0.001*	0.29(0.05-1.42)	0.48
Indifferent	17 (80.9)	2.05(0.63-6.63)	0.12	1.15(0.72-18.30)	0.92

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Knowledge of TB signs and symptoms					
Chronic cough	47 (58.0)	***Ref***		***Ref***	
Fever	26 (92.8)	9.40(2.08-4.23)	<0.001*	22.77(2.91-17.76)	0.002
Weight loss	23 (74.2)	2.07(0.83-5.21)	0.011	11.57(2.04-6.56)	0.32
Logistics for TB cases					
Adequate	58 (85.3)	***Ref***		***Ref***	
Inadequate	35 (64.8)	0.32(0.13-0.76)	<0.001*	0.09(0.02-0.41)	<0.001
Not available at all	8 (19.1)	0.04 (0.14-0.11)	0.002	0.007(0.001-0.05)	<0.001
Is TB curable					
Yes	95 (65.9)	***Ref***		***Ref***	
No	6 (30.0)	0.22(0.08-0.61)	0.02*	0.25(0.05-1.17)	0.07

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CHAPTER FIVE

DISCUSSION

5.1 Knowledge of front-line health workers on TB case detection

Knowledge of health workers about TB and the associated signs and symptoms contribute to early detection of TB and an increased number of TB cases detection. From the current study, more than three-quarters of respondents defined tuberculosis as an airborne or contagious infection caused by bacteria known as “Mycobacterium tuberculosis”, 14% defined TB as lung infection and 3.1% said TB was a respiratory infection.

From the findings, health workers were found to have had adequate knowledge of TB and the causative agent of TB, and this could be attributed to the category of respondents used in the study because these were professionals and might have had a lot of education about TB through their professional training and field of practice. This was however found to relate to a study by Amenuvegbe et al (2016) in Ghana who equally found adequate knowledge of health staff on TB and the detection of cases and attributed this to the quality practices and improved TB case detection among health workers.

Again, it was noted from the current study on health worker's knowledge about the mode of transmission of TB to indicate more than a third said TB was transmitted via airborne, nearly a third said through droplets via contact, and through cough sputum and less than a tenth said through contact with an infected person. In terms of duration of cough to suspect TB shows more than three-quarters had adequate knowledge, and said when a person coughed within two weeks or more, and a few said when the person coughed for one month, and more than six months, and was found to relate to studies by Shrestha et al. (2017) and Mondal et al. (2016) which equally cited similar coughing duration as reported by health workers to suspect TB among potential clients.

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Also, the current findings show more than three-quarters said TB was curable and with the same proportion to have said TB can be treated at a health facility and with an herbalist was 1.4%. The current study findings regarding the duration of cough to suspect TB was lower than Amenuvegbe et al. (2016) study in Ghana and Kigozi et al. (2017) study have all cited higher proportions relating to health worker's knowledge on the duration of cough to suspect TB for treatment, and therefore requires sensitization workshops to provide in-service training to health workers on the durations of cough to suspect TB in a potential client.

In addition, health worker's knowledge of the signs and symptoms of TB was less than half as about 49% of health workers attributed TB signs and symptoms to chronic cough, extreme weight loss 19%, and fever 17% which was however found to be inadequate. This was related to Gizaw et al (2015) study which equally found health workers to have had poor knowledge of the signs and symptoms of TB, but was however different from Mondal et al (2016) study which findings showed that health workers had good knowledge on the signs and symptoms of TB in relation to coughing.

5.2 Availability and utilization of TB Case Detection Protocols in the health facilities

The availability of TB case detection protocols contributes to the utilization and effective and efficient case detection among health facilities conducting laboratory investigations into TB case detection. The lack of protocols for the detection of TB cases at various health facilities thus affects the number of TB cases that are detected at the health facility level. From the current study, the type of health facilities investigating TB case detections shows, that more than half of the investigations are conducted at health centres and hospitals and a few of cases detection of TB were done at clinics and maternity homes.

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Knowledge of front-line health workers on TB case detection was however adequate at the health centres because there is only one hospital in the district and when cases are suspected at the health centre through the signs and symptoms are referred to the hospital for laboratory testing and confirmation of suspected case status. Studies such as Gizaw et al., (2015) and Shrestha et al, (2017) cited similar health facilities with the laboratory for TB case detection but said most TB cases detection was done at the hospital.

In addition, regarding respondents' knowledge of TB protocol availability in the current study shows nearly two-thirds have adequate knowledge of the availability and use of the TB protocol for cases detection, and less than a third had inadequate knowledge of the TB protocol availability and 12.1% of the respondents lack knowledge on the availability of TB protocol at their health facilities for the detection of TB cases. This was however related to studies by Shrestha et al. (2017), GHS & USAID, (2010), and Mondal et al. (2016) citing adequate knowledge of health workers on the availability and usage of TB protocol for case detection.

To add, more than half of health workers said health seeking behaviour of TB clients was friendly, and less than a third said clients' health-seeking behaviour was rude and indifferent. Regarding logistics supply to the health, facilities to enable TB case detection shows more than a third said they have adequate logistics supply for cases detection and almost the same proportion said logistics supply was either inadequate or not available at all. Little above three-quarters of the findings showed donor's involvement in logistics supply had a great boost to TB case detection at the health facilities and in the study district. Also, the current study findings show, that nearly two-thirds of health facilities had an adequate supply of TB protocol and 38% of the implementing health facilities had an inadequate supply of TB protocol for cases.

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Availability of TB protocols at the various level of healthcare in TB cases detection shows more than three-quarters of the TB cases were recorded at the hospital where they had an adequate supply of TB protocols and maternity homes and clinics recorded the least number of TB cases because they were having the least supply of TB protocols and logistics. This could be attributed to maternity homes and clinics not being directly known or lacking laboratories for TB cases detection and diagnosis.

From the current study, overall assessments of TB logistics supply and availability of TB case detection protocols to the health facility for TB cases detection indicate less than a third of the health facilities have adequate (that was having at least one or more of the logistics) logistics supply for TB detection, and more than half of the health facilities either have an inadequate supply of TB logistics or lacked logistics supply for TB cases detection at the health facilities level. This could be related to studies by Kigozi et al. (2017) and Amenuvegbe et al (2016) which equally reported inadequate logistics supply at the health facility level for TB case detection. Also, overall utilization and availability of TB case detection protocols were over-three-quarters said to have high utilization level of TB case detection protocols, and notwithstanding a little less than twentieth of the health facilities were found to have low utilization level of TB case detection protocols, and this could be due to challenges with the availability of TB cases detection protocols for detection, diagnosis and management of TB cases in the health facilities in the study district.

5.3 Healthcare facility related factors associated with the knowledge of TB case detection in the study area.

Health facility related factors associated with health worker's knowledge of TB case detection could influence TB case detection load and can lead to either low or high TB cases detection in

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the studied health facilities. In Kigozi et al (2017) study equally indicated that the detection of TB cases could be influenced by a number of factors resulting in either low or high TB cases detection, and these factors were found to include the healthcare facility related factors as well as other contextual factors to have had influenced on the detection of TB cases. The current findings relating to health facility location shared dissimilarities with Kigozi et al (2017) study which identified health facility location and other factors such as health worker's attitudes towards TB, and societal stigma and isolation of TB patients to have had a significant influence on TB cases detection because the study noted stigmatization to have affected suspected patients decision to report to the health facility for testing and diagnosis of TB cases thereby leading to the low number of cases been diagnosed at the health facilities. But the findings were found to shared dissimilarities with other studies conducted by Mondal et al. (2016); Herna et al. (2018) and Ahorlu and Bonsu, (2013) which reported a significant influenced of health workers knowledge on TB and TB cases detection. Another study conducted by Amenuvegbe et al. (2016) shared contrast views on the study fidngings, and however reported inadequate training of key front-line health workers such as medical doctors, physician assistants and technical officers in the TB program as well as Ane-anyangwe et al. (2016) study to have had an influence on the TB cases detection relating to the type of facility, and BCG vaccine status to have a significant influence on TB cases detection. The study cited respondents who had missed their BCG vaccine to have had an increased risk of being diagnosed with TB than those who had received their BCG vaccine.

Also, the current findings show the type of health facility where TB case detection was conducted was found to have had a statistically significant relationship with TB cases detection as respondents who were working in either health centres or maternity homes/clinics had a decreased chance of 88% of low TB cases detections as compared to respondents who were working at the

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hospital. Again, inadequate logistics supply for TB cases detection was found to have had decreased odds of 91% of low TB cases detection as compared to health facilities where there were adequate supply logistics and equipment for TB cases detection and was found to have shared similarities with related studies conducted by Mondal et al. (2016), Herna et al. (2018) and Ahorlu and Bonsu, (2013).

To add, health worker's knowledge of the signs and symptoms of TB was equally found to have had an increased chance of 22.77 times of improved TB cases detection and increased cases load as compared to their counterpart who lack knowledge of the signs and symptoms of TB. This finding was found to have shared similarities with studies conducted by Chowdhury & Howard, (2014); Afoakwa & Taylor (2018); and Taylor, (2018) which equally reported health worker's knowledge of TB signs and symptoms has had a significant influenced on the number of TB cases are recorded at the health facility.

Notwithstanding, other related factors that were found in the current study to have had a significant influence on TB case detection prevalence were; knowledge of TB being a curable disease, knowledge of TB protocol use, mode of transmission of TB, and duration of cough to suspect TB. Health worker knowledge of the mode of TB transmission and duration of cough for one to suspect TB were identified to have contributed significantly to the number of TB cases that are detected or diagnosed at the health facility. This could be attributed to the fact that, knowing the mode of transmission and duration of coughed to suspect cases help in the early identification of TB cases and diagnosis or confirmation at the laboratories of the selected health facilities, and thus increased the prevalence of cases that are diagnosed at a health facility. However, these findings were found to shared similarities with related studies such as Herna et al. (2018), Shrestha et al. (2017), Gizaw et al. (2015) and Amenuvegbe et al. (2016) studied in the Volta region of Ghana, which equally

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cited mode of transmission and duration of coughed to suspect TB to have had significantly influenced on the TB cases detection.

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CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Overall, health worker's knowledge on TB was almost universal 82.9% (136/164) as TB was known as a contagious or airborne infection caused by bacteria known as "Mycobacterium tuberculosis", with almost half 45.7% (7.005/164) knowing TB was an airborne disease and transmitted via droplet via contact and duration of cough to suspect TB showed that more than three-quarters 88.4% (145/164)said it be within the first two weeks or more to enable one or health worker to suspect TB.

Almost 98.6% (144/164) knew TB was curable and can be treated at a health facility and reported signs and symptoms of TB were reported to show 49% (81/164) said chronic coughing, extreme weight loss 19% (31/164), and fever 17% (28/164).of TB.TB case detection was high, at about 62% and low TB case detection was about 38%. Availability of TB protocols and the number of health facilities implementing the TB protocols to aid the detection of TB cases showed more than three-quarters of 89.4% (34/38) of the TB detections and diagnosis was done at the hospital where there was an adequate supply of TB protocols and logistics for TB cases detection. About 27% (45/164) of the health facilities were found to have adequate logistics supply for TB detection and 62% (101/164) have an inadequate supply of TB protocol for TB case detection. Health worker's knowledge of the availability of TB protocol for TB case detection was above average 61.6% (101/164) to have had adequate knowledge of TB. Statistically significant factors associated with health worker's knowledge of TB case detection were; marital status, years of working experience, location of health facility, type of health facility, knowledge of the signs and symptoms of TB and inadequate supply of logistics for TB case detection.

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6.2 Recommendations

The following are suggested recommendations to stakeholders and policymakers to help improve TB cases detection;

6.2.1 Ghana Health Services

1. Logistics supply for TB case detection was vital, and therefore the Ghana Health Service should collaborate with the Ministry of Health and donor partners to support and make available logistics to help increase cases detection, even though TB case detection was about 62%.
2. The Ghana Health Services should also ensure protocols are laminated and pasted on various walls within the health facilities to ensure that front-line health workers have easy access to these protocols and are used in the diagnosis of TB cases because some health facilities were found to have had an inadequate supply of logistics.
3. Again, the location of health facilities and type of health facilities affect TB case detection, and so the Ghana Health Services should collaborate with the Ministry of Health to increase health facilities with modern standard laboratories to aid effective and efficient TB case detection among the health workers.

6.2.2 District Health Directorate

1. The district health management team should intensify health education and in-service training workshops for health workers on the signs and symptoms of TB as well as modalities for TB cases detection to help improve TB cases detection as individual knowledge of the signs and symptoms of TB had a significant influence on TB cases detection.

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2. Also, the district health management team should collaborate with local health partners to support laboratory services and protocol availability at the various health facilities to help improve health worker's knowledge and increase TB case detection.

6.2.3 Individuals/Non-governmental organizations

1. Benevolence individuals and non-governmental organizations should support community education on the signs and symptoms of TB to help in the early reporting and detection of treatment cases.
2. Also, TB clients should be educated on positive health-seeking behaviour during health service as there was rude and indifferent behaviour of health workers has a significant association with TB case detection.

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REFERENCES

Abebe, M., Doherty, M., Wassie, L., Demissie, A., Mihret, A., Engers, H., & Aseffa, A. (2012). Opinion-TB case detection: Can we remain passive while the process is active? *Pan African Medical Journal*, *11*(1), 1-5.

Afoakwa, E., & Taylor, J. (2018). Knowledge of tuberculosis and factors responsible for low case detection in the Amansie Central District, Ghana. *South Sudan Medical Journal*, *11*(1), 8-12.

Ahorlu, C. K., & Bonsu, F. (2013). Factors affecting TB case detection and treatment in the Sissala East District, Ghana. *Journal of Tuberculosis Research*, *1*(03), 29-36. https://doi.org/http://dx.doi.org/10.4236/jtr.2013.13006

Amenuvegbe, G. K., Francis, A., & Fred, B. (2016). Low tuberculosis case detection: a community and health facility based study of contributory factors in the Nkwanta South district of Ghana. *BMC Research Notes*, *9*(1), 330. https://doi.org/10.1186/s13104-016-2136-x

Ane-Anyangwe, I., Fru-Cho, J., Ndukum, J. A., Nota, A. D., Meriki, H. D., Nsongomanyi, F., . . . Titanji, V. P. (2016). Socio-demograhic and environmental factors affecting the prevalence and spread of tuberculosis in South West region of Cameroon. *Int J Trop Dis Health*, *18*, 1-7. https://doi.org/https://doi.org/10.9734/IJTDH/2016/26827

Blok, L., Creswell, J., Stevens, R., Brouwer, M., Ramis, O., Weil, O., . . . Bakker, M. I. (2014). A pragmatic approach to measuring, monitoring and evaluating interventions for improved tuberculosis case detection. *International health*, *6*(3), 181-188. https://doi.org/https://doi.org/10.1093/inthealth/ihu055

Boakye-Yiadom, A., Peprah, N., Malm, K., Sackey, S., Ameme, D., Nyarko, K., & Kenu, E. (2020). Tuberculosis surveillance system evaluation: case of Ga West municipality, Ghana, 2011 to 2016. *Ghana Medical Journal*, *54*(2), 3-10.

Bonsu, F., Addo, K. K., Alebachew, Z., Gyapong, J., Badu-Peprah, A., Gockah, R., . . . Owusu-Dabo, E. (2020). National population-based tuberculosis prevalence survey in Ghana, 2013. *Int J Tuberc Lung Dis*, *24*(3), 321-328. https://doi.org/10.5588/ijtld.19.0163

Collins, D., Hafidz, F., & Mustikawati, D. (2017). The economic burden of tuberculosis in Indonesia. *Int J Tuberc Lung Dis*, *21*(9), 1041-1048. https://doi.org/10.5588/ijtld.16.0898

University of Ghana http://ugspace.ug.edu.gh

de Vries, S. G., Cremers, A. L., Heuvelings, C. C., Greve, P. F., Visser, B. J., Bélard, S., . . . Grobusch, M. P. (2017). Barriers and facilitators to the uptake of tuberculosis diagnostic and treatment services by hard-to-reach populations in countries of low and medium tuberculosis incidence: a systematic review of qualitative literature. *Lancet Infect Dis*, *17*(5), e128-e143. https://doi.org/10.1016/s1473-3099(16)30531-x

Demissie Gizaw, G., Aderaw Alemu, Z., & Kibret, K. T. (2015). Assessment of knowledge and practice of health workers towards tuberculosis infection control and associated factors in public health facilities of Addis Ababa, Ethiopia: A cross-sectional study. *Archives of public health*, *73*(1), 1-9.

Eltayeb, D. (2016). *Factors associated with patient and health system delay in diagnosis and commencement of treatment for pulmonary tuberculosis in the Middle East and North Africa (MENA): systematic review* University of Cape Town].

Garcia, P. J., Hernandez-Cordova, G., Pourjavaheri, P., Gomez-Paredes, H. J., Sudar, S., & Bayer, A. M. (2018). Knowledge, attitudes and practices related to tuberculosis in pharmacy workers in a cross-sectional survey in El Agustino, Peru. *Plos one*, *13*(7), e0196648.

Glaziou, P., Falzon, D., Floyd, K., & Raviglione, M. (2013). Global epidemiology of tuberculosis. *Seminars in respiratory and critical care medicine*, *34*(01), 003-016. https://doi.org/10.1055/s-0032-1333467

Herbert, N., George, A., Sharma, V., Oliver, M., Oxley, A., Raviglione, M., & Zumla, A. I. (2014). World TB Day 2014: finding the missing 3 million. *The Lancet*, *383*(9922), 1016-1018. https://doi.org/https://doi.org/10.1016/S0140-6736(14)60422-0

Huynh, G. H., Klein, D. J., Chin, D. P., Wagner, B. G., Eckhoff, P. A., Liu, R., & Wang, L. (2015). Tuberculosis control strategies to reach the 2035 global targets in China: the role of changing demographics and reactivation disease. *BMC medicine*, *13*(1), 1-17. https://doi.org/https://doi.org/10.1186/s12916-015-0341-4

Jenkins, H. E., Yuen, C. M., Rodriguez, C. A., Nathavitharana, R. R., McLaughlin, M. M., Donald, P., . . . Becerra, M. C. (2017). Mortality in children diagnosed with tuberculosis: a systematic review and meta-analysis. *Lancet Infect Dis*, *17*(3), 285-295. https://doi.org/10.1016/s1473-3099(16)30474-1

University of Ghana http://ugspace.ug.edu.gh

Kigozi, N. G., Heunis, J. C., Engelbrecht, M. C., Janse van Rensburg, A. P., & van Rensburg, H. (2017). Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. *BMC public health*, *17*(1), 1-8. https://doi.org/https://doi.org/10.1186/s12889-017-4825-3

MacNeil, A., Glaziou, P., Sismanidis, C., Date, A., Maloney, S., & Floyd, K. (2020). Global epidemiology of tuberculosis and progress toward meeting global targets—worldwide, 2018. *Morbidity and Mortality Weekly Report*, *69*(11), 281.

Makori, L., Gichana, H., Oyugi, E., Nyale, G., & Ransom, J. (2021). Tuberculosis in an urban hospital setting: Descriptive epidemiology among patients at Kenyatta National Hospital TB clinic, Nairobi, Kenya. *International Journal of Africa Nursing Sciences*, *15*, 100308.

Manyazewal, T. (2017). Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. *Arch Public Health*, *75*, 50. https://doi.org/10.1186/s13690-017-0221-9

Ministry of Health, G. (2010). *Standard Operating Procedures for TB Case Detection for Ghana*. https://www.tbghana.gov.gh/sites/default/files/SOPs%20for%20TB%20Case%20Detection%20March%202010.pdf

Mondal, M., Nazrul, H. M., Chowdhury, M., & Howard, J. (2014). Socio-demographic factors affecting knowledge level of Tuberculosis patients in Rajshahi City, Bangladesh. *African health sciences*, *14*(4), 855-865.

Nezenega, Z. S., Perimal-Lewis, L., & Maeder, A. J. (2020). Factors influencing patient adherence to tuberculosis treatment in ethiopia: A literature review. *International Journal of Environmental Research and Public Health*, *17*(15), 5626.

Ntoumi, F., Kaleebu, P., Macete, E., Mfinanga, S., Chakaya, J., Yeboah-Manu, D., . . . Petersen, E. (2016). Taking forward the world TB day 2016 theme 'unite to end tuberculosis' for the WHO Africa region. *International Journal of Infectious Diseases*, *46*, 34-37. https://doi.org/https://doi.org/10.1016/j.ijid.2016.03.003

Penjor, K., Tshokey, T., & Wangdi, K. (2021). The trend of tuberculosis case notification and predictors of unsuccessful treatment outcomes in Samdrup Jongkhar district, Bhutan: A fourteen-year retrospective study. *Heliyon*, *7*(3), e06573.

University of Ghana http://ugspace.ug.edu.gh

Range, N. (2013). Tuberculosis in Sub-Saharan Africa: present status and immediate challenges. Tropical Medicine & International Health,

Sandhu, G. K. (2011). Tuberculosis: current situation, challenges and overview of its control programs in India. *J Glob Infect Dis*, *3*(2), 143-150. https://doi.org/10.4103/0974-777x.81691

Shah, R. J., Fazili, A. B., Wani, F. A., & Mushtaq, B. (2016). Assessment of knowledge and practices of tuberculosis health care providers under revised national tuberculosis control program in Kashmir valley of Jammu and Kashmir , India. *Global Journal of Medicine and Public Health*, *5*(3), 1-12.

Shrestha, A., Bhattarai, D., Thapa, B., Basel, P., & Wagle, R. R. (2017). Health care workers' knowledge, attitudes and practices on tuberculosis infection control, Nepal. *BMC Infectious Diseases*, *17*(1), 724. https://doi.org/10.1186/s12879-017-2828-4

Tabong, P. T.-N., Akweongo, P., & Adongo, P. B. (2021). Community beliefs about tuberculosis in Ghana: implications for the end tuberculosis global agenda. *Cogent Medicine*, *8*(1), 1870069.

Wang, Z., Jiang, W., Liu, Y., Zhang, L., Zhu, A., Tang, S., & Liu, X. (2019). Transforming tuberculosis (TB) service delivery model in China: issues and challenges for health workforce. *Human Resources for Health*, *17*(1), 83. https://doi.org/10.1186/s12960-019-0420-2

World Health Organization. (2009). Systems thinking for health systems strengthening. In S. D. de & T. Adam (Eds.), *Alliance for Health Policy and Systems Research/WHO*. Alliance for Health Policy and Systems Research.

World Health Organization. (2013). *Global tuberculosis report, 2013*. WHO/HTM/TB/2013.11

World Health Organization. (2020). *Use of high burden country lists for TB by WHO in the post-2015 era*. World Health Organization. https://www.who.int/tb/publications/global_report/high_tb_burdencountrylists2016-2020.pdf

World Health Organization. (2021a). *Tuberculosis deaths rise for the first time in more than a decade due to the COVID-19 pandemic*. https://www.who.int/news/item/14-10-2021-tuberculosis-deaths-rise-for-the-first-time-in-more-than-a-decade-due-to-the-covid-19-pandemic

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World Health Organization. (2021b). *WHO global lists of high burden countries for tuberculosis (TB), TB/HIV and multidrug/rifampicin-resistant TB (MDR/RR-TB), 2021–2025: background document*. World Health Organization. https://apps.who.int/iris/handle/10665/341980

World Health Organization. (2022). *TB mortality*. https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2021/disease-burden/mortality

Zimmer, A. J., Klinton, J. S., Oga-Omenka, C., Heitkamp, P., Nyirenda, C. N., Furin, J., & Pai, M. (2022). Tuberculosis in times of COVID-19. *J Epidemiol Community Health*, *76*(3), 310-316.

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APPENDICES

Appendix A: Consent Form for Study Participants

Study Title: Health worker and facility level factors associated with knowledge in Tuberculosis Case Detection in Pru Districts in the Brong Ahafo Region

Principal Investigator Abraham Num

Address: School of Public Health, University of Ghana, Legon

Greetings, my name is …………………………………………..and I am conducting an interview on behalf of Abraham Num, an MPH student of School of Public Health (University of Ghana). The respondents to be interviewed are made up of clinician and public health staff who are involved in the detection and diagnosis of tuberculosis in the district. It will also include community base volunteers, community members who are seeking health care in health facilities in Pru district.

This study seeks to determine health worker and facility level factors associated with knowledge on tuberculosis case detection in Pru Districts in the Brong Ahafo Region.

You are being invited to participate in the study because I understand you know the importance of health, especially quality health care in health facility.

I would like to request you to be part of the study. If you agree to participate in the study I would ask you few questions centered on tuberculosis. This will take 30 minutes of your time, participation in the study is entirely voluntary. You have the right to refuse to participate and this will not affect your rights in any way, especially to your healthcare. You are also at liberty to withdraw from the study at any stage of your participation. I would be glad to see you participate to the end.

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There are no direct benefit or risk in participating in the study. There is no payment or compensation for participation. However, the results let us better health workers and facility level factor associated with knowledge on tuberculosis case detection in Pru District. The questions are not sensitive. However, if you have any difficulty in answering any of the questions you can choose not to answer them.

Confidentiality will be assured on all information you provided during the interview and the information will be strictly used for the intended purpose and not for any other business. Your identity will be protected by not publishing your name in the report for the information you provided for the study.

The study has undergone and ethical review by Ghana Health Service ethical review committee and an approval is given for the study.

If you have any questions for clarifications you can do so.

However if there are questions that I do not satisfy you by way of meeting your answers you can personally contact Mr. Abraham Num on telephone number: 0208598009 and e-mail address: abrahamnum@yahoo.com, Dr. Ernest Kenu, Department Of Epidemiology and Disease Control, School of Public Health on Tel. 0244952122 or e-mail: ernest_kenu@yahoo.com

Hanna Frimpong (GHS-ERC Administrator): Mobile: 0243235225 or 0507041223, e-mail: Hannah.Frimpong@ghsmail.org.

Participants Consent

I have been adequately informed about the study, its procedure, benefits and potential risk of the study. I have the opportunity to ask questions that were bothering me and all questions were

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answered to my satisfaction I also know that I can refuse to participate in this study without any loss of benefits for which I would be entitled to. I also understand that I can drop out at any point in time even though I have agreed to participate. In withdrawing from the study, I would no lost any benefits or services to which I am entitled. I also understand that the information collected will be treated confidential and will be used only for intended purpose. I know that findings from the research will assist us in policy formulation.

I freely agreed to participate in the study.

ID No, of participant……………………………………..

Signature or Right Thumbprint of Participant ………………………………………

Date……………………………………..

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Appendix B: Questionnaire

QUESTIONNAIRE AND CHECKLIST ON HEALTH WORKERS AND FACILITY LEVEL FACTORS ASSOCIATED WITH TUBERCULOSIS CASE DETECTION IN PRU DISTRICT

I am Abraham Num, a postgraduate student of University Ghana, and conduction a study on the topic "Health workers and facility level factors associated with knowledge on tuberculosis case detection in Pru District"

Your participation in the study is very important as your information provided may contribute to better understanding of Tuberculosis case detection. You are kindly requested to be honest in your responses.

Thank you very much for your participation and kind responsis.

Date…………………… **Telephone No…………………………….**

ID number of respondents……………………………….

A. SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERSTICS

1. What is your age in complete years…………………………

2. Sex of respondent a. Male b. Female

3. Education Level

a. No education b. Basic education (JHS/middle school)

d. Secondary (SHS/SSS) e. Tertiary education

4. Marital status

a. Single b. Married c. Co-habitation d. Divorces/widowed

5. Religion a. Traditionalist b. Islam c. Christian

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d. Others...............................

6. Ethnic group of respondents' a. Akan b. Ewe c. Ga-Adangbe

d. Mole-Dagbone. Other specify ……………………..

7. Place of facility location a. urban b. Rural c. Peri-urban

8. Occupation a. Doctor b. Nurse c. Public health officer

d. Biomedical scientist (Laboratory) g. Others.........................

B. HEALTH FACILITY CAPACITY

9. Health facility type a. Hospital b. Health center c. Clinics/maternity

d. Other specify ……………………….

10. Respondents knowledge of TB protocol availability a. Good b. Average c. Poor

11. Health workers behaviors/attitude toward TB clients' a. Friendly b. Rude c. Indifferentd. Other specify …………………………….

12. Logistics (e.g. drugs & other supplies) for TB case detection a. Adequate b. Inadequate

c. Not available

13 Do program donors involved in logistics (drugs, protocol & other suppliers) supply a. Yes b. No c. If no, specify …………………………………………………………………………….

14. How is your overall assessment of donors support a. Adequate b. Inadequate c. Not at all

C. SYMPTOMS, VULNERABILITY, SEVERITY UNDERSTANDING AND ACTION

11. What do you know about TB? ……………………………………………………...................

…………………………………………………………………………………………………

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12. What are the signs and symptom of TBa. chronic cough b. Fever c. Weight loss

d. Others (specify)..

13. What is the mode of transmission of TB? ………………………………………………

……………………………………………………………………………………………..

14. At what duration of cough should one suspect TB? a. Within two weeks or more

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

15. Is TB curable? a. Yes b. No

If No to question 15 skip question 16

16. If yes to question 15, where is one supposed to seek treatment when suspected of TB?

a. Herbalist b. Prayer camp c. Chemical shop

d. Health facility e. Others (specify)..

17. If no to question 15, what should one do when you suspected of TB? …………………

…………………………………………………………………………………………………

D.CHECKLIST FOR PROTOCOLS OF TUBERCULOSIS SURVEILLANCE

Are there available of the following at the appropriate levels		Yes	No
OPD/CONSULTING ROOM			
1	Task shifting Officer		
2	Poster		
3	TB suspect registers		
4	Screening forms		

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5	TB algorithms		
6	Laboratory request forms		
7	TB screening tools		
LABORATORY			
8	Microscope		
9	Gen Xpert machine		
10	TB reagents		
11	Laboratory TB register		
12	Sputum request forms		
13	Sputum container		
14	X-ray machine		
15	Are there quality control measures available eg. Reexamination of slides		
16	Availability of CBSV register		
17	Recent training/orientation for CBVS for the past six months		
18	Any referral for the past three months		
19	Evidence of monthly submission of reports to health facilities		
20	Evidence of contact tracing		

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21	Are the CBVS monitored and supervised		
22	Who monitored and supervised the CBVS ………………………………………..		
23	How often are the CBVS monitored and supervised ………………………………		
24	How will you describe overall TB case detection in the district? a. Good b. Average c. Poor		

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Appendix C: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com
16th April, 2018

MyRef. GHS/RDD/ERC/Admin/App 118/049
Your Ref. No.

Abraham Num
University of Ghana
School of Public Health
Legon, Accra

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

GHS-ERC Number	**GHS-ERC: 89/12/18**
Project Title	Factors Influencing Tuberculosis Case Detection in Pru District in the Brong Ahafo Region
Approval Date	16th April, 2018
Expiry Date	15th April, 2019
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

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

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

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

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

SIGNED..
PROFESSOR MOSES AIKINS
(GHS-ERC VICE-CHAIRPERSON)

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