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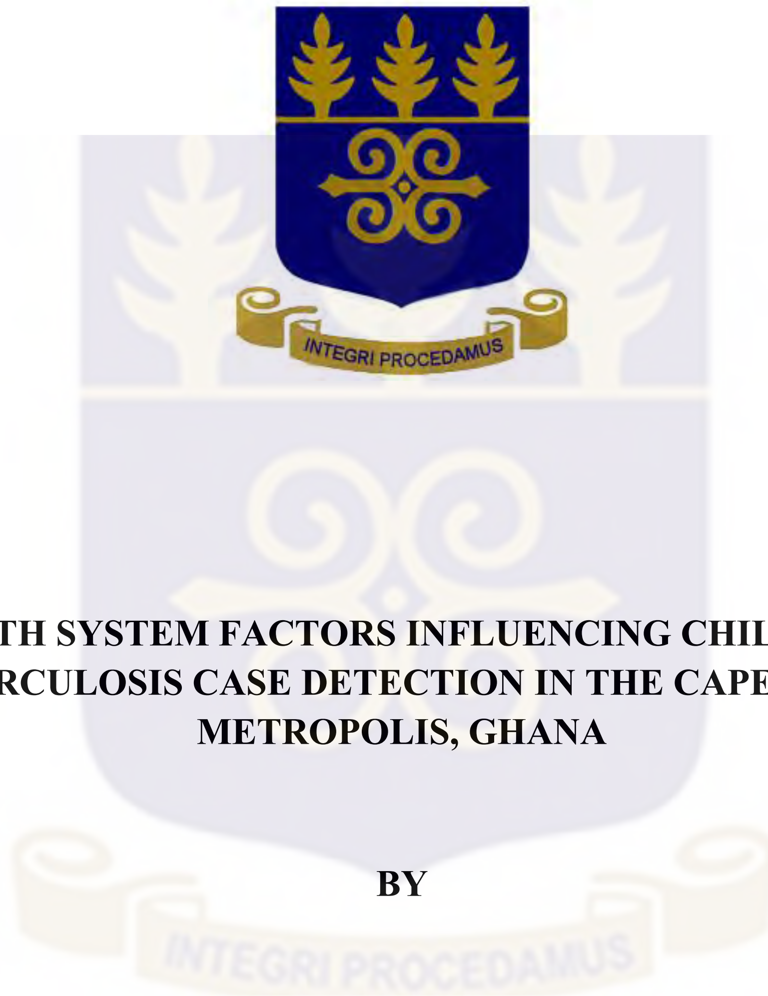

HEALTH SYSTEM FACTORS INFLUENCING CHILDHOOD TUBERCULOSIS CASE DETECTION IN THE CAPE COAST METROPOLIS, GHANA

BY

GIDEON DUODU

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BY

GIDEON DUODU

(10598288)

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE

JULY, 2017

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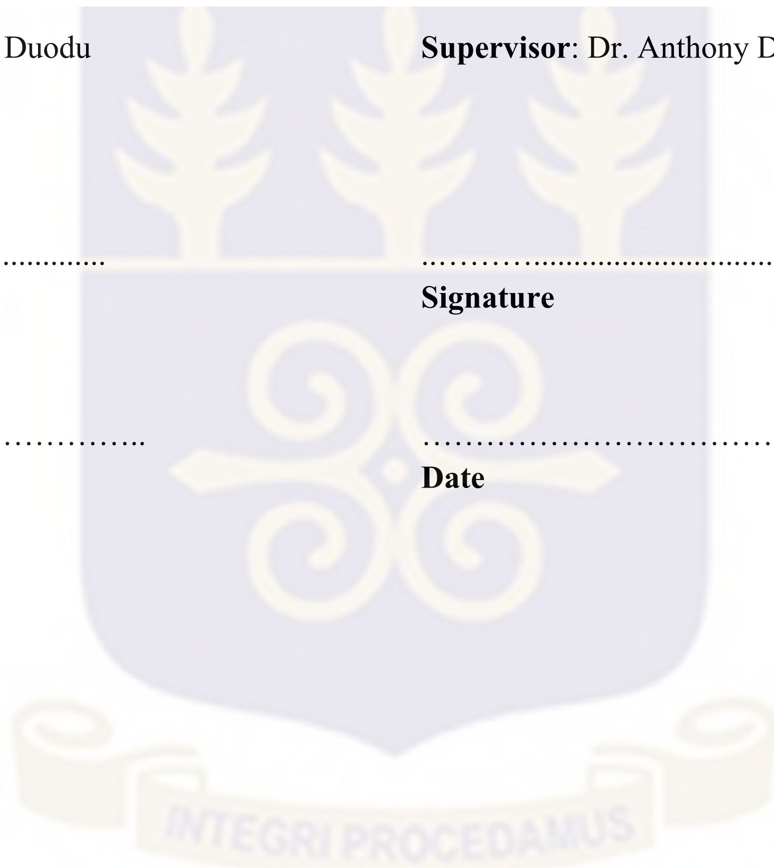
DECLARATION

I, Gideon Duodu, declare that this thesis is my original work and has not been presented for a degree in any other University. All the material cited in this write up which are not mine have been duly acknowledged.



Student: Gideon Duodu

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Signature

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Date

Supervisor: Dr. Anthony Danso-Appiah

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Signature

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Date

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DEDICATION

To Reverend Dr Peter Q. Sackey, for believing in me

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ACKNOWLEDGEMENT

To the Lord God Almighty, to whom I owe my very existence. Many Thanks!

I am very grateful to my supervisor, Dr. Anthony Danso-Appiah for his invaluable coaching in the development of my thesis and training in research writing and presentation. Getting to know you taught me some great lessons in life. You are a great teacher and role model.

The Central Regional Director of Health Services, Dr. Samuel Quarshie, the Metropolitan Director of Health Services and the Metropolitan Disease Control officer were of great assistance in getting the needed cooperation of the various health facilities.

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Also to my mother, Elizabeth Regina Boafoa who was always keen to know what I was doing and how I was proceeding, even when she did not understand the details. Your encouragement and prayers are greatly appreciated.

I am grateful to my awesome wife and daughter, Dorcas and Isabella, who were very supportive and understanding through the period of the masters' programme even when I had to be away sometimes.

Thanks for all your encouragement!

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ABSTRACT

Background: Tuberculosis in children has historically been neglected by clinicians, policy makers, academics, and advocates due to several factors though it is significant contributor to child morbidity and mortality. In Ghana, the proportion of notified childhood TB cases among all cases gradually declined from about 6% in 2010 to 5% in 2015 after a steadily rising trend from 2.4% in 2008 to 5.9% in 2010 in spite of various interventions rolled out, with the expected figure pegged at 10%.

Objective: This study sought to assess health system factors influencing childhood TB case detection in the Cape Coast metropolis.

Methods: A quantitative cross sectional study based on the World Health Organization's *Childhood TB training toolkit*, the *Standard Operating Procedures for TB Case Detection for Ghana, March 2010* and the *Toolkit to Address Timely TB Case Detection and Treatment (CARE II was conducted).* Self-administered questionnaires were used to extract data from healthcare workers in the Cape Coast Metropolis who attend to children in their line of duty. The results were analysed to assess the knowledge levels of the healthcare workers, to describe their attitudes and practices, and reported views of healthcare workers on selected health system factors that influence the performance of healthcare workers.

Results: The mean knowledge score was 49.6% (95%CI: 45.4-53.1) with 34.6% (37/107) of participants having adequate knowledge about childhood tuberculosis. Participation in childhood TB workshops was not associated with adequate knowledge level. Only 2.8% (3/107) of respondents knew the child TB control strategies.. 4.7% of the participants indicated that children with TB were discriminated against in health facilities and 29.9% were uncomfortable attending to children with TB. Frequency of childhood TB contact tracing and parental education

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varied across the different health facilities. Children were also not routinely screened for TB, and the symptom-based screening form was not used among children. Supervision was generally poor and practices of healthcare workers mostly at variance with the standard operating procedures. The health facilities also did not have copies of TB guidelines. The only TB reference guide available in the facilities was the TB Training Manual specifically at the Teaching Hospital and Metropolitan health directorate.

Conclusion: Knowledge level of healthcare workers about childhood TB was generally inadequate. Negative attitudes to children with TB exist in health facilities and present a challenge to TB control. Diagnostic aids in the form of manuals and the standard operating procedures for TB case detection were generally lacking in the health facilities.

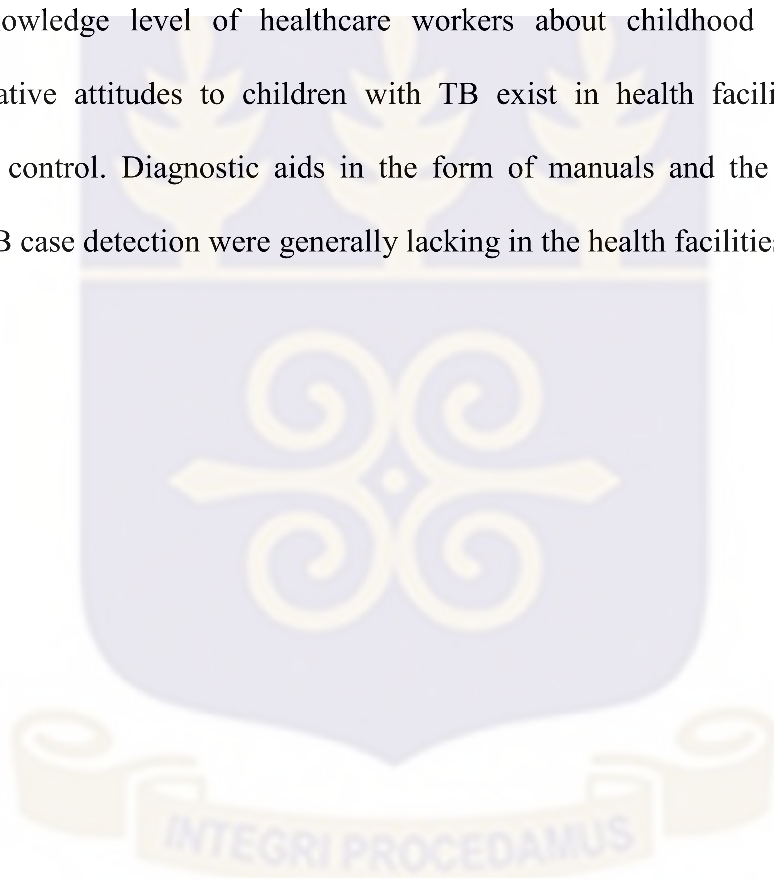

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Table of Contents

DECLARATION i

DEDICATION ii

ACKNOWLEDGEMENT iii

ABSTRACT iv

LIST OF TABLES ix

LIST OF FIGURES xi

LIST OF ABBREVIATIONS xii

CHAPTER 1 1

1.1 Introduction 1

1.2 Problem Statement 6

1.3 Conceptual Framework 9

1.4 Narrative Of Conceptual Framework 10

1.5 Justification For Study 11

1.6 Study Objectives 13

CHAPTER 2 14

LITERATURE REVIEW 14

CHAPTER 3 22

METHODS 22

3.1 Study Design 22

3.2 Duration Of Study 22

3.3 Study Area 22

3.4 Health Delivery System 25

3.5 Study Variables 26

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3.6 Sample Size Determination 27

3.7 Sampling Method 28

3.8 Data Collection Approach 29

3.9 Data Collection Technique 30

3.10 Data Collection Tool 30

3.11 Data Processing 31

3.12 Data Analysis 31

3.13 Quality Control 32

3.14 Ethical Clearance 33

CHAPTER 4 36

RESULTS 36

4.1 Socio-Demographic Characteristics 36

4.2 Knowledge Of Cause, High Risk Age Group Of Children, Signs And Symptoms, Transmission, Diagnosis And The Control Strategy For Tuberculosis In Children 38

4.3 Perceptions, Attitudes And Practices Of Healthcare Workers 46

4.4 Supervision At The Various Health Facilities 57

4.5 Availability Of Diagnostic Aids And Guidelines 61

4.5 Effect Of Health System On Ability Of Healthcare Workers To Diagnose TB In Children 64

CHAPTER 5 65

DISCUSSION 65

CHAPTER 6 74

CONCLUSION AND RECOMMENDATIONS 74

6.1 Conclusion 74

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

6.2 Recommendations 75

References 75

APPENDICES 81

Appendix II. Consent Form 82

Appendix III. Survey Questionnaire 84

Appendix IV. Interview Checklist administered to Head of TB unit 94

Appendix V. Algorithm for Childhood TB Case Detection 96

Appendix VI. Algorithm for TB Contact Tracing 97

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LIST OF TABLES

Table 1: Dependent variables 26

Table 2: Independent variables 27

Table 3: Demographic characteristics of study participant 37

Table 4: Respondents' knowledge of the age at which most cases of childhood TB occur 40

Table 5: Mean percentage knowledge scores of study participants 42

Table 6: Knowledge levels of study participants 43

Table 7: Association between adequate knowledge level and demographic characteristics 45

Table 8: Perceptions of respondents about the referral system 49

Table 9: Perceptions of respondents about their work conditions 50

Table 10: Perceptions of respondents about the level of supervision in their health facilities 51

Table 11: Frequency of contact tracing by various health facilities 53

Table 12: Frequency of education of parents by respondents about childhood TB 53

Table 13: Routine screening of children presenting at various health facilities for TB 54

Table 14: Respondent reported use of TB symptom-based screening tool on children in their health facilities 56

Table 15: Respondent reported logging of TB-related activities in their health facilities 56

Table 16: Frequency of supervision received by respondents from TB coordinator on childhood TB 57

Table 17: Supervised clusters of TB-related activities in health facilities 58

Table 18: Frequency of refresher trainings on Standard Operating Procedures (SOPs) for TB case detection in health facilities 59

Table 19: Provision of targets for number of suspected childhood TB cases by TB coordinators 59

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

Table 20: Frequency of performance assessment at various health facilities in relation to childhood TB 60

Table 21: Respondent reported proximity of X-ray services to their health facilities 62

Table 22: TB documents available at the various health facilities 63

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

LIST OF FIGURES

Figure 1: Conceptual Framework of Health System Factors that influence childhood TB case detection ... 9

Figure 2: Map of the Cape Coast district ... 24

Figure 3: Percentage of respondents who knew the aetiological cause of TB in children ... 38

Figure 4: Respondents' knowledge of the age at which most cases of childhood TB occur ... 39

Figure 5: Frequency distribution of percentage knowledge scores of respondents ... 41

Figure 6: Summary of knowledge of respondents about childhood TB ... 46

Figure 7: Respondents' perceptions about how common childhood TB is ... 47

Figure 8: Respondents' perceptions about childhood TB as a problem in Ghana ... 48

Figure 9: Respondents' perception about whether or not the NTP gives childhood TB the needed attention ... 49

Figure 10: Respondents' perception of discrimination against children infected with TB by healthcare workers ... 51

Figure 11: Level of comfort of healthcare workers with attending to children infected with TB 52

Figure 12: Frequency at which respondents sought assistance from colleagues or superiors in the diagnosis or suspicion of TB in children ... 55

Figure 13: Incentives received by respondents for their TB-related work ... 60

Figure 14: Respondent reported effect of health system on their ability to diagnose TB in children ... 64

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANOVA	Analysis of variance
CHPS	Community Health Planning and Services
CHWs	Community Health Workers
CIDA	Canadian International Development Agency
CPD	Continuous professional development
GHS	Ghana Health Service
HCWs	Healthcare workers
HFTT	Health facility tuberculosis team
HIV	Human immunodeficiency virus
IMCI	Integrated Management of Childhood Illnesses
ITC	Institutional Tuberculosis Coordinator
NTP	National Tuberculosis Programme
OPD	Out Patients' Department
ORID	Office of Research, Innovation and Development
PLHIV	People Living with HIV
SDG	Sustainable Development Goal
SOPs	Standard Operating Procedures
TB	Tuberculosis
TDR	Tropical Disease Research
WHO	World Health Organization

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CHAPTER 1

1.1 INTRODUCTION

Tuberculosis (TB) is a chronic infection caused by one of the different bacteria forming the *Mycobacterium tuberculosis complex*. *Mycobacterium tuberculosis* and *Mycobacterium africanum* have been identified as the cause of majority of TB cases in Africa (Kalu et al., 2015). It represents a significant public health problem globally that was captured among the Sustainable Development Goals (SDGs) to end the epidemic by the year 2030 (WHO, 2016).

In 2015, TB was identified as one of the top 10 causes of death worldwide, being responsible for more deaths than HIV and malaria (WHO, 2016). There were also an estimated 10.4 million new TB cases worldwide of which 1 million (about 10%) were children from which number 0.2 million died. Of the new TB cases reported in 2015, 61% occurred in Asia, 26% in the WHO African Region, 7% in the Eastern Mediterranean Region, 3% in the European Region and 3% in the Americas. The disease burden was however concentrated in thirty (30) countries that accounted for 87% of all estimated new cases globally. Among these countries, six stood out as contributing a combined 60% of the global new tuberculosis cases, with Nigeria ranking fourth. This has implications for Ghana which is located in the same economic sub-region (WHO, 2016).

The incidence of TB was also diverse among countries from less than 10 per 100,000 population in high income countries to 150-300 per 100,000 in most of the 30 high burden TB countries, and over 500 per 100,000 in Lesotho, Mozambique and South Africa. Notably, about 11% of the new cases were among people living with HIV (WHO, 2016).

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In Ghana, a national tuberculosis prevalence survey conducted in 2013 showed that the national prevalence was 290 per 100,000 population which was four times higher than the World Health Organization (WHO) estimate for that year and the national case detection rate found to be 20.7% (Ministry of Health, 2014). The districts with high incidence of TB included the Greater Accra, Central, Western, Ashanti, Eastern, Volta and the Upper East Regions.

It is remarkable, however, that TB cases among children aged less than 15 years was not included in the prevalence survey raising concerns about the importance attributed to childhood TB, especially when the childhood TB burden represents recent and ongoing transmission in the community in question.

Tuberculosis in children, according to Seddon & Shingadia (2014) has "*historically been neglected by clinicians, policy makers, academics, and advocates"* due to factors such as the awareness of the rarely infectious nature of the disease in children, the perception that severe tuberculosis disease seldom occurs in children, as well as lack of prioritization of child health in many countries. Childhood tuberculosis is, however, a significant contributor to child morbidity and mortality.

Beyond the clinical need to "*identify, diagnose, and treat children for a disease that is curable*", neglecting childhood tuberculosis hinders progress in tuberculosis control as infected children act as a potential reservoir of the bacteria and possibly become infectious cases in the future that perpetuate the tuberculosis disease in at-risk groups in the population (Seddon & Shingadia, 2014).

Fortunately, childhood tuberculosis has received attention over the past few years besides efforts to address child morbidity and mortality, with a number of organizations collaborating to create

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awareness about it and ultimately improve care for affected children. In the same vein, the World Health Organization (WHO) in 2006 published a guide for national tuberculosis control programmes on the management of tuberculosis in children that was updated in 2014 (Goosby, 2015). Besides this, the WHO in 2012 incorporated an estimate for childhood TB in annual tuberculosis report, and made childhood tuberculosis the focus of World TB Day that year (Seddon & Shingadia, 2014), which confirms the increasing importance being attributed to childhood tuberculosis.

Transmission of TB

Children are mostly infected through inhalation of droplets containing the bacteria that are released into the air from infected individuals as they talk, cough or sneeze. And most of these infectious individuals are adults, though older children could potentially infect other children. Once infected with the bacteria, individuals remain potentially infective until they are successfully treated. This is particularly noteworthy on account of the ability of adults with active disease to infect up to 15 individuals in a year (WHO, 2010). The major factors associated with childhood TB in an endemic area, therefore, include the prevalence of tuberculosis in adults, as well as the proportion of these cases that have smear-positive disease. Children may also be infected by ingestion of infected milk products that are not well pasteurized.

People in different age groups have varying degrees of susceptibility to disease following infection. In children, about 50% of infants are likely to develop the disease following infection, reducing to about 25% in the 1–5 year age group (López Ávalos & Prado Montes De Oca, 2012). Among infants, TB is associated with high morbidity and mortality rates, with most cases of disseminated TB and central nervous system TB occurring within this age group. Substantial TB-related morbidity and mortality have also been documented among children aged 1–4 years. The

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age bracket of 5-10 years is associated with the least morbidity level in relation to TB (Donald, Maher, & Qazi, 2007).

Signs of symptoms of tuberculosis

The tuberculosis causing bacteria can live in the body without causing sickness, which is known as latent TB infection. This is a result of the body's immune system being able to fight the bacteria to stop them from growing. People with latent TB, therefore, do not have any symptoms, and cannot spread TB bacteria to others. It is when the bacteria become active in the body and start multiplying that the infected individual develops symptoms and move from the latent to active disease when they are also able to transmit the infection to others.

The TB bacilli most commonly grow in the lungs, although they can infect any part of the body, and can cause symptoms such as: persistent cough that lasts 2 weeks or longer, chest pain, coughing up blood in sputum, weakness or fatigue, weight loss, loss of appetite, chills, fever and night sweats.

Diagnosis of TB

The *International Standards for Tuberculosis Care* (TB CARE I, 2014) provides guidelines of internationally accepted standards for the diagnosis of TB among all affected people based on suggestive signs and symptoms, laboratory investigation and abnormal X-ray findings consistent with TB infection. The WHO-approved diagnostic tests listed were *sputum smear microscopy*, *Nucleic acid amplification tests*, *Xpert MTB/RIF*, and *Automated liquid cultures and rapid MPT64-based species identification test*. In the Ghanaian context, however, there is generally limited access to laboratory and X-ray services at various levels of healthcare delivery. In total 325 TB laboratories were identified in the whole of the country, with 33 located in the Central

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Region where this study was conducted. Moreover, access to more advanced and better laboratory tests such as Gene Xpert is not as readily accessible (Ministry of Health, 2014), and presents a great challenge to childhood TB diagnosis in Ghana.

At the health facility level, diagnostic algorithms and management policies are also been made available by the National Tuberculosis Programme (NTP) to standardize approaches to case detection among various categories of people including adults (15 years and over), people living with HIV, and children (less than 15 years) in accordance with the set TB control strategies.

Childhood TB control strategies

The World Health Organization in its Childhood TB Training Toolkit, 2013, outlines the intervention strategies to control childhood TB which defines a general framework for addressing childhood TB globally. These strategies include: *Intensified Case Finding, Isoniazid Prevention Treatment (IPT), Infection Control, and Integration of TB/HIV including maternal TB/HIV of other health services such as maternal and child health (IMCI)*(WHO, 2014b). The implementation of the first three of these strategies fall under the purview of the healthcare workers by adopting appropriate practices which include case finding strategies at health facilities and in the community; information, education and communication programmes. Complementing these strategies is the need for supervision and improved reporting of detected childhood TB cases to have a better picture of the burden of the disease. The challenge with the control of childhood TB has therefore been due to gaps in the implementation of these strategies in endemic areas.

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1.2 PROBLEM STATEMENT

In Ghana, the control of tuberculosis has been integrated into the health system at all levels from the primary through the secondary to the tertiary level with the adoption of an integrated approach to delivery of health interventions (Ministry of Health, 2014). It was however found that health system and patient delays presented challenges to the implementation of the integrated approach to the delivery of health interventions, with the estimated health system delay for TB diagnosis being 1.7 weeks and patient delays being 1.9 weeks (Ministry of Health, 2014). These delays present a concern for TB control as they increase the risk of exposure of people to infectious individuals in the community who are yet to be detected.

The National Tuberculosis Programme (NTP) in its Strategic Plan for 2015-2020, identified key programmatic gaps which include *low case detection, insufficient laboratory capacity to bacteriologically confirm TB cases and, adverse treatment outcomes*. And these gaps need to be bridged to optimize efforts to meeting the TB targets identified in the Sustainable Development Goals (SDG).

The strategic plan further states that, the case detection rate was 20.7% based on estimates from the national prevalence survey in 2013 and the proportion of childhood TB cases that were notified declining at 5% as against the NTP's acceptable target of 8-10%. A trend analysis conducted by the NTP showed an upward trend of the percentage of notified childhood TB cases from 2.4% in 2008 to 5.9% in 2010, but started falling thereafter to 5.0% in 2013, pointing to the need to investigate possible causes for the sudden turn around.

This is especially a disturbing picture in that childhood TB is a marker for ongoing infection in the community and is an important indicator of the extent of adult TB control within the population and more so, when there are available, proven interventions rolled out by the NTP

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which notably includes the *Standard Operating Procedures for TB Case Detection for Ghana, March 2010* handbook detailing specific activities to pick up TB cases in health facilities and by community health workers, TB training manuals, symptom-based screening form, algorithm for diagnosis of TB in children, algorithm for TB contact tracing, and specialized childhood TB workshops (Ministry of Health, 2014; Ghana Health Service, 2010; Ghana Health Service, 2015).

The picture for the Cape Coast Metropolis, where this study was conducted, was no different from the national picture, where data obtained from the Metropolitan Health Directorate for the period of 2014 to 2016 showed the notified childhood TB cases remaining consistently less than 8%. There is therefore the need to look into the possible factors accounting for these negative trends.

The research priority areas of the NTP in relation to childhood tuberculosis which were detailed in Annex 2 of the Ghana Health Sector TB Strategic Plan for Ghana 2015-2020 captures this need as well. The identified research areas are: (1) *Inventory of status of childhood TB: What is staff knowledge on childhood TB? Are the guidelines being practiced? Which activities results in detection of cases? What are barriers to the implementation of the guidelines? A study like this can help guide further implementation of the roadmap for childhood TB.* (2) *Investigation of the sensitivity of childhood TB diagnosis. Does access to chest X-ray enhance case finding? (Comparative study with Gene Xpert and current situation as comparative arms),* and (3) *Investigate the reasons for the declining trends in the proportion of TB cases among children in Ghana*.

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This study, therefore sought to address the challenges with childhood TB case detection from the health system point of view based on concepts from the *Toolkit to Address Timely TB Case Detection and Treatment (TB CARE II)* (Holschneider, Silvia; Insua, Maria; Smith-Arthur, Alisha; Kak, Neeraj; Matji, 2013).It assessed the knowledge of healthcare workers about childhood tuberculosis based on the childhood TB training toolkit (WHO, 2014b), their perceptions about childhood TB, their attitudes toward children diagnosed of TB, the availability and use of available interventions, and supervision in health facilities specifically in relation to childhood TB considering them under three of the six building blocks of a health system as listed below:

1. Health workforce
    a) Knowledge about childhood TB
    b) Attitudes and practices of healthcare workers in relation to childhood TB
2. Leadership and governance
    a) Provision of diagnostic policies
    b) Supervision of childhood TB related activities
    c) Motivation of healthcare workers
    d) Performance assessment in relation to childhood TB
    e) The referral system
3. Access to essential medicines, technologies, diagnostic aids
    a) Availability of X-ray services
    b) Availability of TB policies and guidelines: TB management desk Aide, SOPs for TB Case Detection for Ghana March 2010, NTP Training manual January 2012
    c) Availability of symptom-based screening form

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1.3 CONCEPTUAL FRAMEWORK

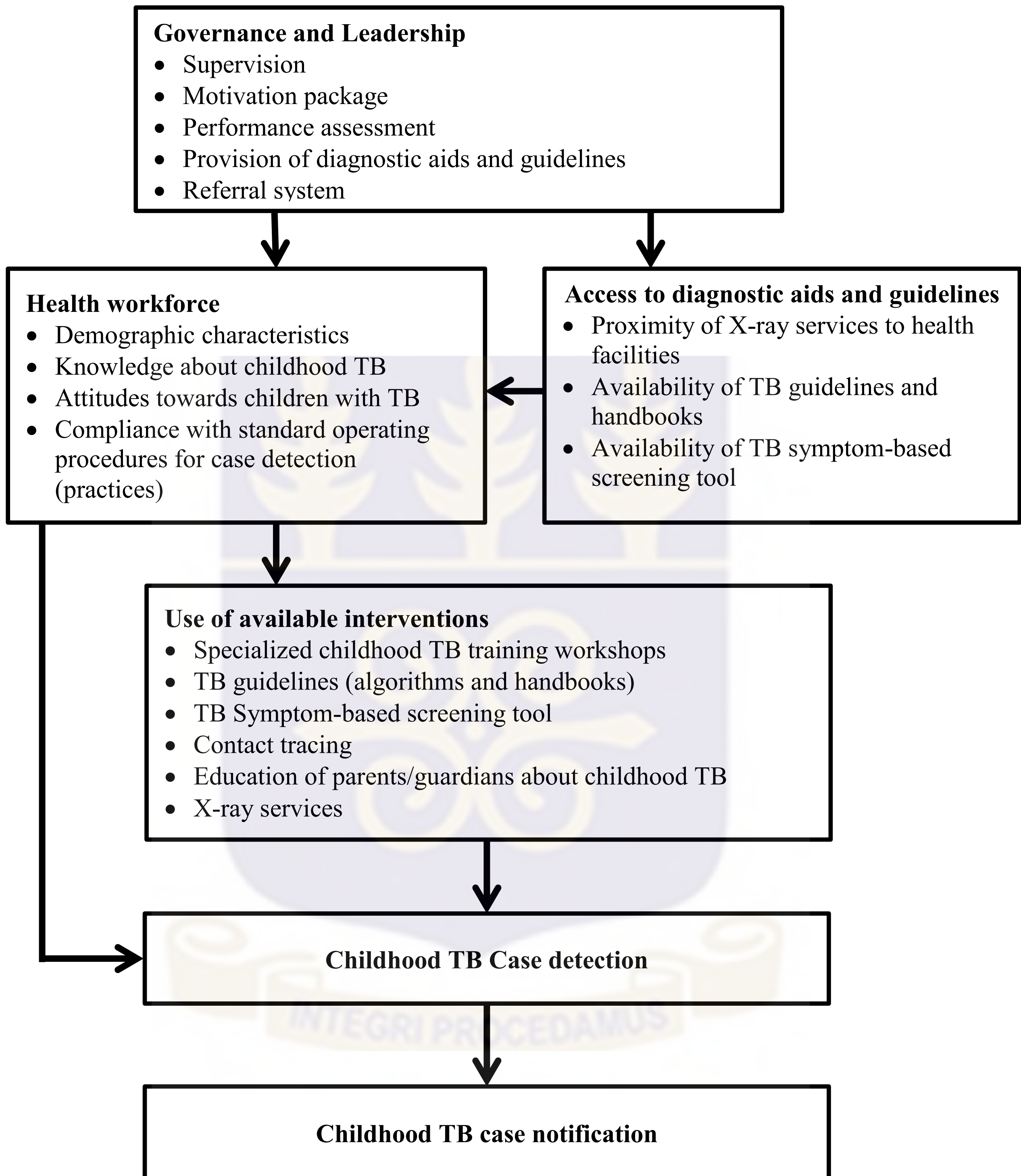

Figure 1: Conceptual Framework of Health System Factors that influence childhood TB case detection

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1.4 NARRATIVE OF CONCEPTUAL FRAMEWORK

The factors associated with the ability of the health system to detect childhood TB cases were grouped under the six building blocks of health system. This study however focused on three of the building blocks which are: Governance and Leadership, Health workforce, and Medical technologies and diagnostic aids, based on classification in the *Toolkit to Address Timely TB Case Detection and Treatment (TB CARE II)* (Holschneider et al., 2013)

The National Tuberculosis Programme (NTP) through the metropolitan disease control officer and the health facility tuberculosis teams (HFTTs) provides leadership for TB control at the health facility levels by way of policy guidelines on the diagnosis, investigation, contact tracing, and reporting of TB cases. It also provides diagnostic aids in the form of diagnostic algorithms and handbooks, and specialized diagnostic technologies such as Gene Xpert machines and mobile X-ray machines at health facilities. These influence the perceptions, knowledge and attitudes and practices of the healthcare workers about all types of TB cases by increasing the capacity of the health workforce to be able to detect cases. The various levels of supervision from the national level, through the regional to district and health facility levels by way of the reporting timelines and reports also serve as a motivating factor for healthcare workers to meet defined targets.

The provision of the necessary logistics and guidelines to health facilities creates supportive environments in the districts and health facilities to be able to detect TB cases by filling in the gaps that exist in the health system that act as barriers to TB case detection. The availability of these also motivates health workers and thus improves the performance of the health system in general in its ability to detect TB cases as they use the available tools and guidelines. This can influence their attitudes to TB in general by making them more interested in it.

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The capacity of the health workforce and the availability of diagnostic aids and guidelines work together to influence the use of available TB control interventions that go on to increase childhood TB case detection which is notified according to the available health information management system for TB.

1.5 JUSTIFICATION FOR STUDY

The estimated health system delay for TB diagnosis of 1.7 weeks and the declining proportion of notified TB cases occurring among children in Ghana which falls short of the national target of 8-10% represents a significant gap in TB control efforts in Ghana. This warrants investigation since proven interventions have been rolled out by the National TB Programme (NTP) to address various identified barriers. These include specialized childhood TB courses, algorithms for case detection and contact tracing, and policies and guidelines for TB case detection and treatment, all with the intention of improving diagnostic numbers (GHS, 2015). The question arises then as to what could possibly be accounting for the downward trend in the proportion notified TB cases occurring among children in spite strides being made in the implementation of proven TB control interventions in Ghana. This question can be looked at in three ways: (1) *Are childhood TB cases diagnosed but not reported?* (2) *Do children with TB seek care but not diagnosed?* Or (3) *Do children with TB seek care?*

A report by WHO-CIDA (2012) on Ghana stated that a great percentage of people with TB presented at health facilities, but many were missed due to poor screening for TB, the need for stronger links between hospitals and the national TB programme, and the weak adherence of healthcare workers to national diagnosis and treatment guidelines, which could be a contributor to the health system delay in TB case detection. Specifically in relation to childhood tuberculosis, Goosby (2015) indicated that *"...children with TB can be found wherever there are*

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adults with TB… among children who suffer from other illnesses… among those living in poverty. Unfortunately, all too often, no one is looking" painting a glummer picture of the attention given to childhood tuberculosis in health facilities.

Following the signing on to implement the Abuja Declaration on HIV/AIDS, TB, Malaria and other Infectious Diseases, Ghana is scaling up the Community Health Planning Services (CHPS) strategy where the community health workers are expected to provide essential health services which include TB control (Ministry of Health, 2014). It is implied therefore that this category of healthcare workers would have adequate knowledge about TB control both in adults and children to suspect cases and act effectively in accordance with TB protocols. This intervention also calls for the study of the extent to which various levels of the healthcare delivery system influence delay in childhood TB case detection and the linkage between the various levels of healthcare delivery in terms of referral.

An intervention study conducted in Accra by the NTP to address the low TB case finding by the health system (Ministry of Health, 2014) found only the hospital-based interventions exceeding the targets by 219.8%, with the potential of all the cases detected from the interventions being missed in the absence of the interventions. This provides evidence about the importance of role played by healthcare workers in TB case detection, especially, childhood TB. The targets for the other interventions were however not attained.

As a follow up, this study sought to assess the health system factors associated withchildhood TB case detection in the Cape Coast Metropolis, looking specifically at the knowledge level of healthcare workers about childhood TB, factors associated with adequate knowledge level, stigmatization of children with TB in health facilities, information-education-communication on

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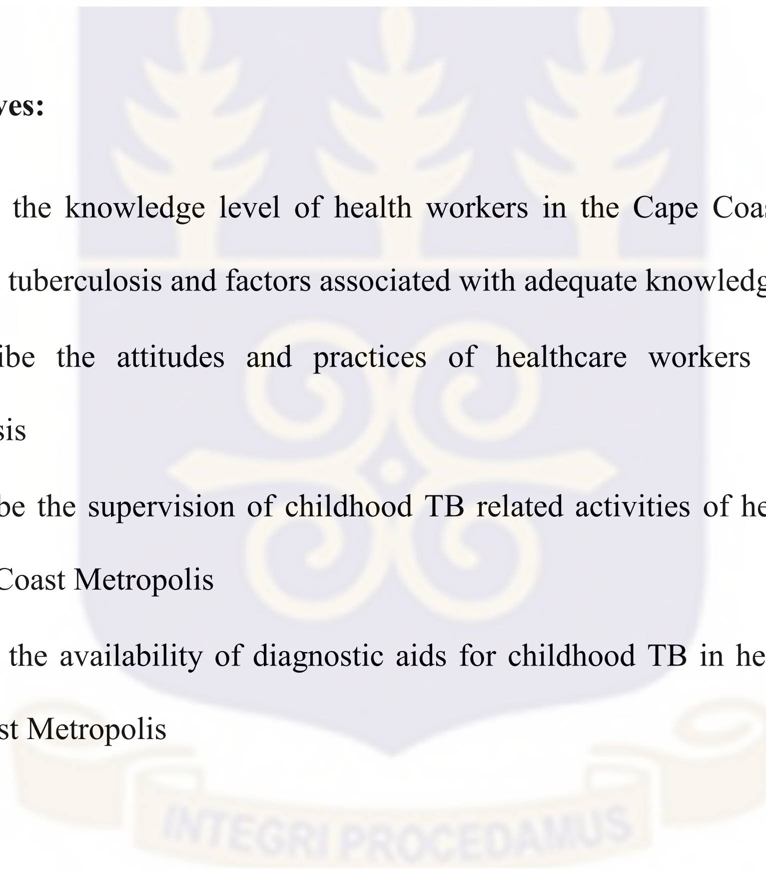
childhood TB, supervision of childhood TB activities, availability of diagnostic protocols/guidelines, contact tracing, use of the TB symptom-based screening tool among children, and the referral system.

1.6 STUDY OBJECTIVES

General Objective:

To assess the health system factors associated with childhood TB case detection in the Cape Coast Metropolis



Specific Objectives:

- To assess the knowledge level of health workers in the Cape Coast Metropolis about childhood tuberculosis and factors associated with adequate knowledge level
- To describe the attitudes and practices of healthcare workers towards childhood tuberculosis
- To describe the supervision of childhood TB related activities of healthcare workers in the Cape Coast Metropolis
- To assess the availability of diagnostic aids for childhood TB in health facilities in the Cape Coast Metropolis

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CHAPTER 2

LITERATURE REVIEW

Tuberculosis in children has "*historically been neglected by clinicians, policy makers, academics, and advocates"* (Seddon & Shingadia, 2014) in many counties due to factors such as the awareness of the rarely infectious nature of the disease in children, the perception that severe tuberculosis disease seldom occurs in children, and lack of prioritization of child healthin many countries. It is only until in recent years that it has received attention as a public health problem as well as in the tuberculosis control. Children were generally dealt with outside the boundaries of National Tuberculosis control Programme activities with little attention given to children in tuberculosis, and children being primarily left to child health programmes though it is a significant contributor to child morbidity and mortality.

Beyond the clinical need to "*identify, diagnose, and treat children for a disease that is curable*", neglecting childhood tuberculosis hinders progress in tuberculosis control as infected children act as a potential reservoir of the bacteria and possibly become infectious cases in the future that perpetuate the tuberculosis disease in at-risk groups in the population (Seddon & Shingadia, 2014).

Fortunately, childhood TB has received attention over the past few years against with a number of organizations collaborating to create awareness about it and ultimately improve care for affected children. In the same vein, the World Health Organization (WHO) in 2006 published a guide for national tuberculosis control programmes on the management of tuberculosis in children that was updated in 2014 (Goosby, 2015). In 2012, WHO incorporated an estimate for childhood TB in the annual tuberculosis report, as well as made childhood tuberculosis the focus

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of World TB Day that year (Seddon & Shingadia, 2014), which confirms the increasing importance being attributed to childhood tuberculosis.

With the perception of the apparent need to define a clear direction and framework for addressing tuberculosis in children the *Roadmap for Childhood Tuberculosis* was developed in 2013 which contained comprehensive and practical action points to engage a range of stakeholders over the next decade (Graham et al., 2015). One of the ten points key action points in the roadmap was the need to "*develop training and reference materials on childhood tuberculosis for health care workers*" (WHO, 2013) which was a recognition of an apparent gap in the knowledge of health workers about childhood tuberculosis. The training was to be targeted at "*health workers in the primary and secondary levels of care where the majority of children with suspected tuberculosis or that are close contacts of tuberculosis cases will present and be managed*" (Graham et al., 2015). Primary and secondary health workers are, therefore, the groups of health workers with the greatest chances of picking childhood tuberculosis cases.

A study conducted in Peru with the objective of identifying the barriers to childhood TB diagnosis using qualitative methods among National Tuberculosis Control Programme administrators and five pulmonologists specializing in TB and primary care providers, community health workers (CHWs), and parents and/or guardians of paediatric TB patients (Chiang et al., 2015) identified five main barriers which include: *"ignorance and stigma among the community, insufficient contact investigation, limited access to diagnostic tests, inadequately trained health centre staff, and provider shortages"*. The barriers identified can be grouped into community factors (ignorance and stigma among the community members), health worker factors (insufficient contact investigation, inadequately trained health staff) and health system factors (limited access to diagnostic tests and provider shortages).

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The mix of these factors suggests the need to develop a framework to deal with the problem of tuberculosis in children. The Roadmap for Childhood Tuberculosis has action points that deal with all these barriers. Due to contextual differences, however, the impact of these action points (interventions) may not be the same. There is a need to evaluate the impact of each intervention especially in Ghana as well as identify factors that are limiting the degree of success of the interventions.

Knowledge level of healthcare workers about childhood Tuberculosis

A study conducted in Tanzania to assess the knowledge and practices of health workers (those providing both general and specialized care to children) 1 year after specialized training in childhood tuberculosis, presents evidence to the effect that specialized childhood TB training programmes has a positive impact on knowledge and practices of health workers (Kiros et al., 2014). Knowledge about childhood TB was found to be generally high with most of the health workers, regardless of training history suggesting good baseline knowledge among all health workers. There were however deficits in knowledge about specific types of TB such as miliary TB and TB meningitis (Kiros et al., 2014).

Attitudes and practices of healthcare workers in relation to childhood tuberculosis

Besides the apparent knowledge deficit about childhood tuberculosis among health workers, primary health workers have many misconceptions about the management and prevention of tuberculosis in children that potentially affect their attitude to childhood tuberculosis and ultimately their practices to pick up cases (Graham et al., 2015).

In a qualitative study conducted in Tanzania, Bjerrum et al. (2012a) explored public health workers' understanding and perceptions of childhood TB as well as their perceived challenges and needs in identifying children with TB. It was discovered that the perceived prevalence of

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childhood TB combined with the severity of the presenting signs and symptoms in a child had a significant influence on whether or not primary health workers would suspect TB. The health workers perceived childhood TB to be rare and expected children with the disease to present with obvious signs and symptoms together with known contact history, and this was recognized by the researchers as a major barrier to childhood TB case detection. None of the health workers perceived childhood TB as a significant problem in the community, albeit admitting adult TB to be common. Participants in the study also agreed that most of the children presenting at the health facilities suffered from illnesses that resolved spontaneously or were cured by short course treatments. This study suggests that perception plays in the level of suspicion of TB in children. At the primary health level, therefore, detection of TB cases is likely to be delayed in spite of knowledge level, if wrong perceptions about the disease are not addressed.

This is true also for Ghana where the primary health facilities are an important component of the health system in efforts towards universal health coverage. Specifically to do which childhood TB, primary health workers are also "*responsible for identifying children with symptoms suggestive of TB, and referring them to secondary health care level for confirmation of diagnosis and treatment"* (Bjerrum et al., 2012a; Ministry of Health, 2014).

With regards to practices most of the health workers, regardless of whether they received training, reported attempts at sputum collection among children aged less than 5 years. These reports were however thought to be subject to desirability bias.

A second action point identified in the Roadmap for Childhood Tuberculosis was the importance of not missing "*critical opportunities for intervention*" including the use of strategies such as intensified case-finding, contact tracing and preventive therapy (Graham et al., 2015). This

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action point was recognition of the gap in the practices of health workers regarding childhood tuberculosis.

In a quantitative study conducted in Nigeria with the objective of assessing the current practices of management of childhood TB among clinicians in Nigeria almost all the participants perceived diagnosis of childhood TB as a challenge, with 64.2% (68) of the participants found to have good knowledge of childhood TB, and only 7.5% (8) of participants found to have adopted appropriate practices regarding childhood TB care despite the high proportion of participants with good knowledge level (Chukwu et al., 2016).

This line of evidence suggests that adequate knowledge on its own does not necessarily translate into good practice. Hence the need to consider the health system context within which this knowledge is to be applied. Among these health system factors are the availability of guidelines and perceptions about their use.

Findings from a study on why clinicians adhere more consistently to guidelines for the Integrated Management of Childhood Illness (IMCI) provide some insights into the barriers to adherence to guidelines. This mixed methods study conducted in Tanzania identified five main issues: (1) a know-do gap, (2) weak belief in the importance of adhering to IMCI guidelines, (3) inadequate intrinsic and extrinsic motivation, (4) time pressure and physical overload, and (5) cognitive distraction or mental overload (Lange, Mwisongo, & Mæstad, 2014).

The study concluded based on the findings to the effect that measures need to be put in place to ensure that health workers have adequate depth of knowledge about the medical significance of guidelines as intervention tools. The intrinsic motivation of the health workers was identified as needing to be "*nurtured more strongly than it has been in the past*" and the implementation of

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decent salary levels being valuable. A more holistic approach to improved health worker motivation was also cited to improving adherence to child health guidelines.

Children with tuberculosis usually have nonspecific symptoms so tend to present at health facilities with general child health services, which are the agents through which the National Tuberculosis Programme becomes aware of childhood TB cases. The strengths and weakness in the health system therefore plays a crucial role in childhood tuberculosis case detection in various ways.

The main goal of interventions is case detection which can be passive or active. In and an important aspect of case detection is contact tracing, which is the responsibility of healthcare workers in collaboration with community volunteers in some settings. In a study by Lebapotswe et al. (2016) factors that influenced contact tracing by health care workers include their knowledge, attitudes and practices, personal factors including decreased motivation and lack of commitment. Other factors cited included patient factors such as living further away from the clinic, unknown residential address and high rates of migration and mobility, as well as administrative factors which included staff shortages, lack of transport, poor reporting of TB cases and poor medical infrastructure e.g. suboptimal laboratory services.

The health worker and health system factors are therefore important players that have the potential of enhancing or hindering the degree to which proven interventions are likely to succeed in a particular context.

Supervision of childhood TB-related activities of healthcare workers

Bjerrum et al. (2012a) in their study among primary healthcare staff in Tanzania found that respondents in the study felt inadequately equipped for identifying children suspected of TB, and

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cited lack of training and diagnostic tools as the most important barrier to identifying children suspected of TB. Staff training was also perceived to be the most important intervention to improve the performance at the primary health level. Support and supervision was also perceived to be inadequate, presenting a "*missed opportunity for education, continuous training and for motivating the health staff*".

A study conducted in Ghana to describe the health worker motivation and associations with quality care and patient safety identified that the motivation of health workers is strongly associated with quality of care, so would definitely limit the success of proven interventions in the control of childhood TB among other child health issues (Alhassan et al., 2013a). More specifically, quality care and patient safety standards were found to be inadequate in the 64 surveyed primary healthcare facilities, and the level of satisfaction with working conditions reportedly low especially in terms of financial incentives and career development prospects. Health workers in private and urban facilities were found to be more motivated by their working conditions than those in public and rural facilities. In general the motivation level and working conditions of health workers were found to be positively correlated with the quality care and patient standards, "*suggesting the need to integrate staff motivation strategies into health facilities quality improvement plans*".

It is evident, therefore that as much as interventions to increase the knowledge of health workers and informing their perceptions about childhood TB are invaluable in the control of childhood TB, other factors associated with the health system play an important role in determining the degree of success of the proven interventions.

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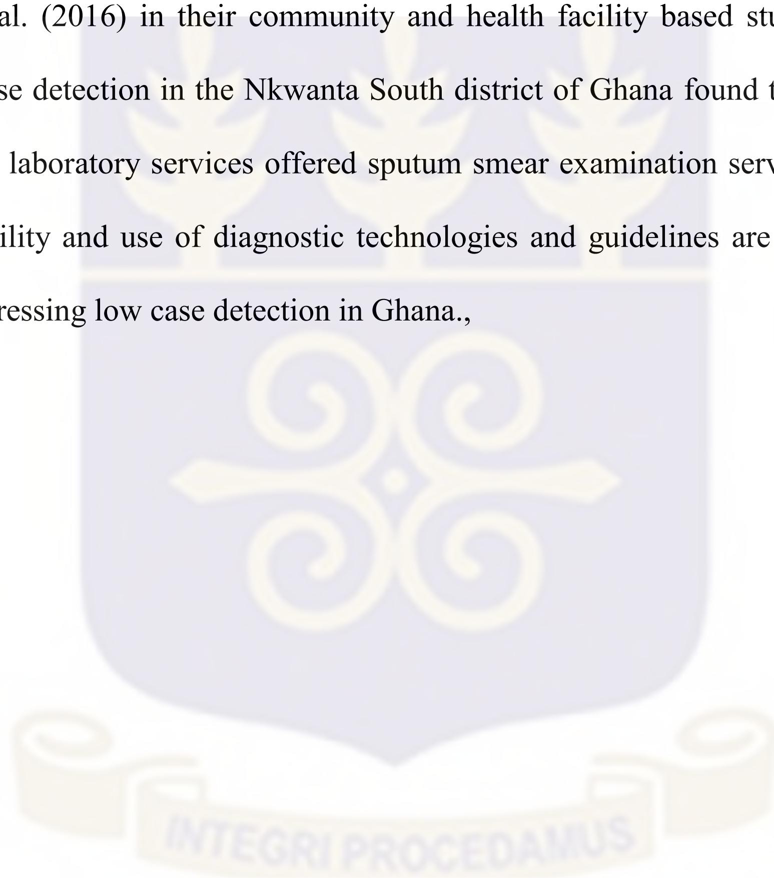
Diagnostic aids and Guidelines

Tuberculosis is a global health concern which has received attention through efforts to standardize approach to diagnosis and control. Among the interventions provided include guidelines in the form of policies, algorithms, and medical technologies in the form of X-ray and laboratory services. The availability of these resources and their use therefore potentially impact the level of case TB detection.

Amenuvegbe et al. (2016) in their community and health facility based study of contributory factors to low case detection in the Nkwanta South district of Ghana found that only two of the 10 facilities with laboratory services offered sputum smear examination services. This suggests that both availability and use of diagnostic technologies and guidelines are necessary to guide efforts in the addressing low case detection in Ghana.,



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CHAPTER 3

METHODS

3.1 STUDY DESIGN

A community and health facility based cross-sectional quantitative design was used to collect the data from the consenting healthcare workers employed in health facilities in the Cape Coast Metropolitan area who attended to children in their line of duty at the waiting area of the out patients' department through the consulting room to the laboratory.

3.2 DURATION OF STUDY

The study was conducted over a period of three months from April 2017 to June 2017.

3.3 STUDY AREA

The study was conducted in the Cape Coast Municipality which is in the Central Region of Ghana. It was selected on account of being one of the top five regions in Ghana with the highest tuberculosis burden (GHS, 2015) and it having primary, secondary and tertiary healthcare facilities in the same municipality to provide the same contextual background for the study.

According to the 2010 Ghana Population and Housing Census Report (Ghana Statistical Service, 2013), the population of the municipality was 169,894, which formed about 7.7% of the total Central Regional population. Three-quarters of this population lived in urban areas with children aged less than 15 years (the age definition for childhood tuberculosis), constituting 28.4% (48,240) of total municipal population.

Three-quarters (30,354) of the total households in the municipality (40,386) reside in urban areas with the rest in rural settlements. The average household size was 3.5 persons as compared with 4 persons per household in the Central Region with more households in each house in Cape

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Coast (2.3) than in the region (1.5) on average giving an idea about the degree of crowding and chances of infectious disease transmission.

The following is a map the Cape Coast Metropolis showing some of the towns adapted from the 2010 Population and Housing Census: District Analytical Report (Ghana Statistical Service, 2013).

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Figure 2: Map of the Cape Coast district

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3.4 HEALTH DELIVERY SYSTEM

The health service delivery system in Ghana is made up of both public and private service providers, where the Ghana Health Service and the Teaching Hospitals run the public health sector. The private service providers consist of for-profit and faith-based facilities and play important roles in filling in health service delivery gaps in many parts of the country.

The Ghana Health Service is structured into three levels namely the primary, secondary and tertiary. At the primary health level, the district hospital is headed by a medical doctor, the health centres by a physician assistant, and the Community Health Planning & Services (CHPS) zones by community health officers who work with community volunteers to increase access to health care.

The secondary level of care is made up of the regional hospitals which are responsible for receiving referrals from the primary healthcare facilities. The tertiary level constitutes the teaching hospitals which receives specialized cases from the secondary healthcare facilities and is also involved in training of healthcare workers.

With the health sector having adopted an integrated approach to the delivery of health interventions (Ministry of Health, 2014), the linkages between these levels of healthcare is important in the delivery of preventive, clinical and emergency services if interventions rolled out by the NTP are going to be successful.

In the Cape Coast district, there are 23 health facility which is includes 7 CHPS compounds, 2 Health centres, 4 private health centres, 5 clinics, 1 polyclinic and 4 hospitals.

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3.5 STUDY VARIABLES

The dependent variables of interest in this study that are influenced by the interventions were the knowledge of healthcare workers, their attitudes to children infected with tuberculosis, and their TB-related practices. Table 1 provides details of the operational definition and scale of measurement of the variables.

Table 1: Dependent variables

	CONCEPTUAL DEFINITION	OPERATIONAL DEFINITION	SCALE OF MEASUREMENT
1	Knowledge level about childhood TB	Percentage of correctly answered questions under knowledge section	Ordinal: adequate knowledge (≥60% correct answers), inadequate knowledge (<60% correct answers)
2	Attitudes to childhood TB	Beliefs, feelings and dispositions which characterize the way participants think about TB in children (as reported by participants)	Nominal
3	Practices in relation to childhood TB	As reported by respondents on questionnaire: contact tracing, education of parents about TB in children, routine screening of children for TB, seeking assistance with diagnosis of TB in children	Nominal

The independent variables of interest in this study based on literature review were sex, age of healthcare worker, facility they are employed in, professional qualification, professional experience, exposure to specialized childhood TB workshops and their perceptions about

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selected components of the health system. Table 2 provides details of the operational definition and scale of measurement of the variables

Table 2: Independent variables

	CONCEPTUAL DEFINITION	OPERATIONAL DEFINITION	SCALE OF MEASUREMENT
1	Sex	Sex of participant as reported	Nominal: male; female
2	Age	Age at last birthday	Discrete numerical data (ratio scale)
3	Type of healthcare facility	Category of health facility	Ordinal: CHPS compound, Health centre, Polyclinic, Municipal Hospital, University Hospital, Teaching Hospital
4	Professional qualification	Current professional designation	Ordinal: Community health nurse, public health nurse, physician assistant, house officer, medical officer, specialist
5	Professional experience	Years of work post-highest professional training	Ratio: continuous variable in years and months
6	Exposure to childhood TB training workshop	Whether or not participant participated in any childhood TB workshop over the past 12 months (as reported by participant)	Nominal: Yes; No
7	Perceptions about selected components of the health system	As reported by respondents on questionnaire	Nominal; Ordinal

3.6 SAMPLE SIZE DETERMINATION

The sample included all the health workers at the selected health facilities who are listed in the *Standard Operating Procedures for TB case Detection for Ghana, March* 2010 document who were present at the various health facilities during the data collection period that consented to participate in the study. These healthcare workers included healthcare workers at the waiting areas of the Out Patients' Department (OPD), the consulting rooms, emergency units, wards,

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laboratory staff and the community health workers who come into contact with paediatric patients in their line of duty.

3.7 SAMPLING METHOD

The total population of healthcare workers who come into contact with children aged less than 15 years in their line of duty were targeted in all the consenting public health facilities, and one private health facility with its own medical staff in the Cape Coast Metropolis. One private health facility was selected because almost all the other private health facilities are run by clinical staff from the public health facilities on part-time basis so excluded to avoid duplication of responses. All the targeted healthcare workers who consented to participate in the study were included.

A letter requesting permission to conduct the study in the Metropolitan area was presented to the Regional Health Directorate, from where a letter was served to the Metropolitan Health Directorate from where the final permission was granted.

At each of the health facilities, the administrative head was engaged on the details of the study and consulted for details of the category of health workers who attended to children presenting to the various health facilities. The administrative heads of the various facilities that consented for their facilities to participate in the study arranged specific days for the study to be conducted, when the healthcare workers had already been informed about the study.

On the identified days when health workers were available, the health facilities were visited and their consent formally sought to participate in the study, and those who consented were included in the study. Where some of the specified healthcare workers were not available, samples of the

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questionnaires were left with the departmental head to be administered to them and left at the office to be picked up by the research assistants.

The inclusion criterion was all healthcare workers at the selected healthcare facilities who dealt with children less than 15 years in their line of duty at the various health facilities. Sample size calculation was therefore not done.

3.8 DATA COLLECTION APPROACH

Self-administered questionnaires were used to collect data from participants on their knowledge of childhood TB, attitudes towards childhood infected with TB, their practices in relation to childhood TB, and their perceptions about selected health system factors that could potentially influence their attitudes and practices in relation to childhood TB.

Their knowledge levels were assessed based on the transmission, signs and symptoms of childhood TB, and the diagnosis of the disease in children. The percentage score was computed for each person and classified as adequate if it was greater than or equal to 60% and inadequate if it was less than 60%. This cut-off percentage was chosen in agreement with a similar study conducted in Nigeria (Chukwu et al., 2016).

The attitudes of health workers to childhood infected with TB were assessed based on literature findings in other studies on the identified attitudes of healthcare workers to TB patients. Respondents had to choose which options best described their approach to TB in children under their current circumstances of work.

Similarly, the participants had pre-coded options and had to select the ones that best describe their childhood TB related activities.

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3.9 DATA COLLECTION TECHNIQUE

Semi-structured questionnaires were distributed to the consenting healthcare workers at the various healthcare facilities on the agreed days for data collection. Each participant was allowed to read consent form to understand what the study is about and their rights as regards their participating. Any questions that potential participants had were addressed and those who consent to participate in the study were asked to sign the consent form and proceed to complete the questionnaire. Participants were expected to be able to complete the questionnaire within thirty minutes, but this was not possible for most of them due to work demands so they had to take them away to be picked up on a later day. These participants were followed up by phone calls and at the various health facilities until completed surveys were retrieved

The completed questionnaires were gathered together into separate envelops for each facility and labelled with the name of the particular health facility for the purposes of validating details provided in the questionnaire regarding the health facility category. The person in charge of coordinating TB activities in each facility was also interviewed using a checklist to obtain information to validate some responses provided by the healthcare workers regarding their practices.

3.10 DATA COLLECTION TOOL

A self-administered questionnaire was used to collect data from healthcare workers. The questionnaire had four sections. The first section focused on the demographic characteristics of study participants, the second section on perceptions and knowledge of participants on childhood tuberculosis, the third section on the attitudes and practices of healthcare workers towards childhood TB, and the fourth section on the practices of participants in relation to childhood TB, and the fifth section on the health system factors. The section on the knowledge about childhood

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TB was based on information from the WHO's *Childhood TB training toolkit* (WHO, 2014a) and the remaining questions guided by the survey tool provided in the *Toolkit to Address Timely TB Case Detection and Treatment* (CARE II) (Holschneider et al., 2013) and details provided in the *Standard Operating Procedures for TB Case Detection for Ghana, March 2010* document.

3.11 DATA PROCESSING

The completed self-administered questionnaires were packaged into sealed envelopes and each questionnaire examined for completeness. The questionnaires that are not completely filled were excluded from the final sample for analysis if significant sections were not completed. The knowledge section was marked and scored over 31 and the percentage score computed for each participant. The data in the questionnaires were coded and entered into a pre-designed spreadsheet (Microsoft Excel) template to be organized for analysis. The data were then imported into Stata 14.1 statistical software and the completeness of the data verified, and where errors were identified the specified questionnaires were re-examined and the necessary corrections made.

3.12 DATA ANALYSIS

The data was entered into Microsoft Excel 2016 and subsequently imported into Stata version 14.1 statistical software, for analysis. Frequency tables and graphs were used to describe the knowledge, attitudes and practices of health workers about childhood TB, as well as their perceptions of health workers about the health system in which they work. Fisher exact test was used to assess the homogeneity of knowledge among the different categories of healthcare workers and for the health facility categories with a significance level of p=0.05. In this analysis, knowledge was classified as adequate if participants scored greater than or equal to (≥) 60% and

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inadequate if participants scored less than (<) 60% in the knowledge section. This criteria was chosen based on a similar study conducted in Nigeria (Chukwu et al., 2016).

T-test was run to compare the difference in average percentage scores for sex and participation in childhood TB workshop. Analysis of variance (ANOVA) test was used to compare the difference in the average percentage knowledge scores for the various categories of healthcare workers, level of healthcare, and experience.

Logistic regression analysis was then done to measure the strength of association between level of knowledge, and the demographic characteristics which included age, sex, level of healthcare, profession of participant, professional experience, and participation in childhood TB training workshop. Variables were selected based on which of them had statistically significant differences on the Fisher exact test.

3.13 QUALITY CONTROL

Trained research assistants were used to collect the data from the participants. A one day training session was organized for the research assistants, giving them orientation about the purpose of the study and the nature of the study. The data collection tool was shown to them, and what each section sought to achieve clarified to them. The targeted participants of the study were also clearly defined to them, and the selected health facilities distributed among the research assistants. They were categorically instructed not to coerce any of the health workers to participate in the study but respectfully encourage them all to participate on account of the usefulness of the findings to influence the control of childhood tuberculosis as well as other neglected childhood health issues.

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The questionnaire was pre-tested among health workers at the Pantang Hospital in the Adentan Municipality. The questionnaire was then revised based on the responses provided by the respondents to better address the objectives of the study.

After the data collection, the completed questionnaires were entered into pre-designed Microsoft Excel 2016 data entry templates by the research assistants, and subsequently reviewed by the principal investigator for completeness and errors which could be corrected using the specific identification number on the questionnaires, done. The separate entries were then combined into one Excel data set to be analysed.

3.14 ETHICAL CLEARANCE

Ethical approving body

Ethical clearance was obtained from the Ghana Health Service Ethical Review Committee since all the health facilities with the exception of the Sanford Medical Centre are under the management of the Ghana Health Service.

Study area approval

Permission was sought from Regional Health Directorate with the ethical approval from the Ghana Health Service Ethical Review Committee prior to engaging administrative heads of health facilities about the intent of the study on the health workers in the selected health facilities.

Subjects involved in the study

The subjects involved in the study were health workers at CHPS compounds, Polyclinics, health centres, metropolitan hospital, and Teaching Hospital, whose duties involved attending to childhood presenting at the various health facilities.

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Potential risks/ benefits of the study

There were no perceived risks of participation in the study. Participants were made aware that the study will provided evidence to improve childhood TB control in the Metropolitan area and perspectives for other parts of Ghana. It will ascertain the perceived deficit in the knowledge of healthcare workers about childhood TB that necessitated the implementation of specialized childhood TB courses, and the consistency of practices of healthcare workers with the defined standard operating procedures for TB case detection in Ghana.

Consenting process

Healthcare workers were free to join or leave study as they desired, but were encouraged to participate in the study and to complete the self-administered questionnaire. Each participant was also required to sign the consent form before proceeding to complete the questionnaire.

Privacy/ confidentiality

Each questionnaire was given a unique code so that no questionnaire could be traced to a particular health worker. Data was analysed based on health facilities and healthcare worker categories to give meaning to the findings in terms of addressing challenges identified.

Data storage/security and usage

The completed questionnaires have been stored away in sealed envelopes pending final destruction after thesis submission and publication. The collated softcopy have been stored away under password and backed up on an external hard disk with only the principal investigator having access to them. The data is being used solely for the purposes of this thesis and possible publication of the study findings based on recommendations by academic supervisor.

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Compensation

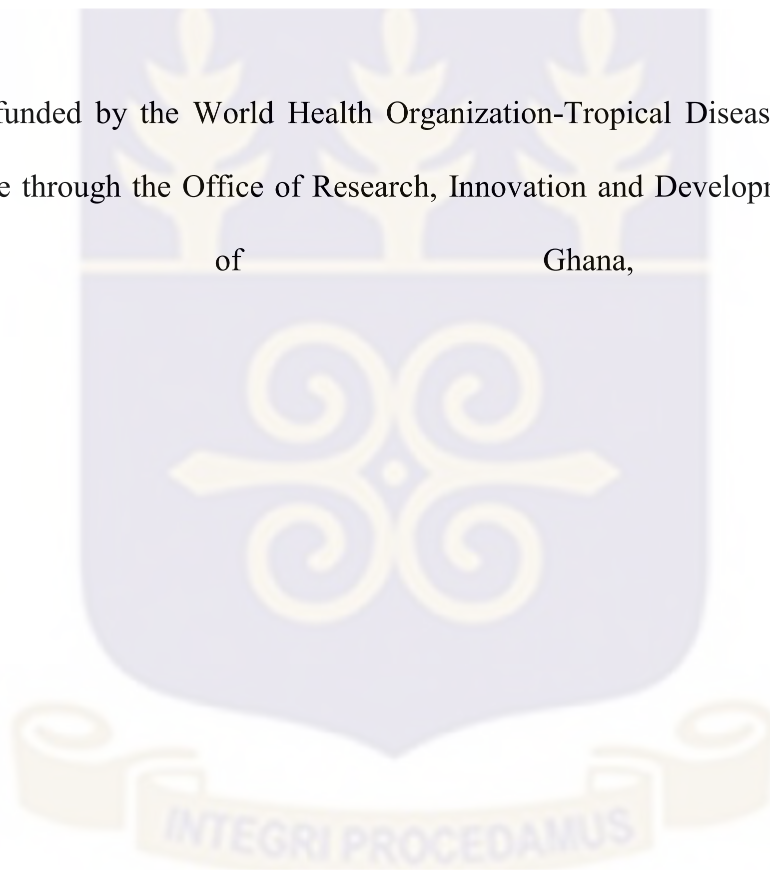
There will was no compensation for study participants. The participants at the primary healthcare levels were however given honoraria in the form of GH₵5 worth of phone credits based on recommendations by key informants in the district to encourage their participation in the study.

Conflict of Interest

The principal investigator had no conflict of interest

Funding:

This study was funded by the World Health Organization-Tropical Disease Research (WHO-TDR) programme through the Office of Research, Innovation and Development (ORID) of the University of Ghana, Legon.



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CHAPTER 4

RESULTS

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS

A total of 107 healthcare workers completed the questionnaire out of the 150 who received questionnaires at the 13 health facilities out of the 23 in the metropolis that granted permission for the study to be carried out among their staff. This gave a response rate of 71.3%. As can be seen in Table 3, only the professional experience was statistically significant in relation to the different levels of healthcare. It was also found that 10.3% of the respondents indicated having participated in a childhood TB workshop over the past 2 years.

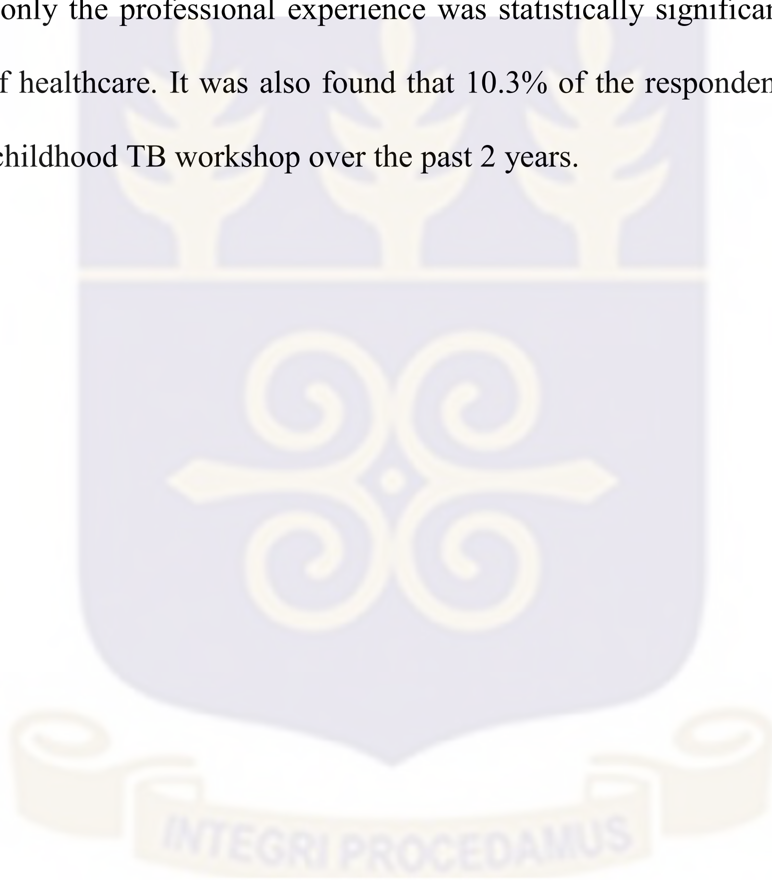

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Table 3: Demographic characteristics of study participant

DEMOGRAPHIC CHARACTERISTIC	LEVEL OF HEALTHCARE/ n (%)					p-value
	TOTAL	Primary (public)	Primary (private)	Secondary	Tertiary	
TOTAL	107	54	14	7	32	
Sex						
Male	40 (37.4)	16 (29.6)	7 (50.0)	5 (71.4)	12 (37.5)	0.119
Female	67 (62.6)	38 (70.4)	7 (50.0)	2 (28.6)	20 (62.5)	
Age						
21 - 25 years	19 (17.8)	9 (16.7)	2 (14.3)	2 (28.6)	6 (18.8)	0.867
26 - 30 years	59 (55.1)	31 (57.4)	7 (50.0)	3 (42.9)	18 (56.3)	
31 - 35 years	17 (15.9)	9 (16.7)	3 (21.4)	0 (0.0)	5 (15.6)	
> 35 years	12 (11.2)	5 (9.3)	2 (14.3)	2 (28.6)	3 (9.4)	
Health worker						
Community health nurse	44 (41.1)	34 (63.0)	2 (14.3)	4 (57.1)	4 (12.5)	**
Public health nurse	1 (0.9)	1 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	
Physician assistant	3 (2.8)	1 (1.9)	1 (7.1)	0 (0.0)	1 (3.1)	
House officer	11 (10.3)	0 (0.0)	0 (0.0)	0 (0.0)	11 (34.4)	
Medical officer	5 (4.7)	1 (1.9)	3 (21.4)	0 (0.0)	1 (3.1)	
TB coordinator	1 (0.9)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	
Enrolled nurse	16 (15.0)	11 (20.4)	3 (21.4)	0 (0.0)	2 (6.3)	
Laboratory technician	2 (1.9)	1 (1.9)	1 (7.1)	0 (0.0)	0 (0.0)	
Registered nurse	21 (19.6)	3 (5.6)	4 (28.6)	1 (14.3)	13 (40.6)	
Clinical health assistant	1 (0.9)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	
Laboratory assistant	1 (0.9)	1 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	
Principal health assistant	1 (0.9)	1 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	
Experience						
< 1 year	13 (12.1)	1 (1.9)	2 (14.3)	2 (28.6)	8 (25.0)	0.024*
1 - 3 years	66 (61.7)	37 (68.5)	7 (50.0)	3 (42.9)	19 (59.4)	
4 -6 years	20 (18.7)	12 (22.2)	4 (28.6)	1 (14.3)	3 (9.4)	
7 - 10 years	8 (7.5)	4 (7.4)	1 (7.1)	1 (14.3)	2 (6.3)	
Participation in childhood TB workshop						
No	96 (89.7)	50 (92.6)	12 (85.7)	7 (100.0)	27 (84.4)	0.502
Yes	11 (10.3)	4 (7.4)	2 (14.3)	0 (0.0)	5 (15.6)	

*Statistically significant (Fisher exact test at 0.05 significance level)

**p-value could not be generated due to the large number of categories

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4.2 KNOWLEDGE OF CAUSE, HIGH RISK AGE GROUP OF CHILDREN, SIGNS AND SYMPTOMS, TRANSMISSION, DIAGNOSIS AND THE CONTROL STRATEGY FOR TUBERCULOSIS IN CHILDREN

4.2.1 Knowledge of the aetiological cause of tuberculosis in children

A little over a quarter of the respondents did not know that *Mycobacterium tuberculosis* was the aetiological cause of the infection in children as shown by Figure 3 below.

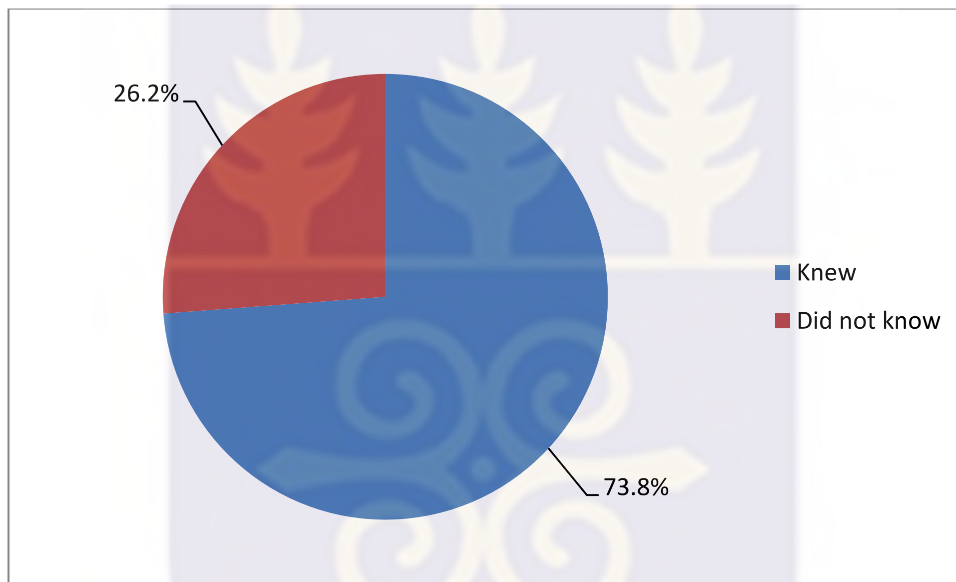

Figure 3: Percentage of respondents who knew the aetiological cause of TB in children

Of the 26.2% (28) of respondents who did not know the aetiological cause of TB in children, 57.1% (16) were Community health nurses, 25% (7) Enrolled nurses, 14.3% (4) Registered nurses and 3.6% (1) were Principal health assistants. Among the 73.8% of respondents who knew the aetiological cause, Community health nurses made up 35.4% (28), Enrolled nurses 11.4% (7), and Registered nurses 21.5% (17).

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4.2.2 Knowledge of age group of children at which most cases of tuberculosis occurs

About 30% (32) of respondents knew the highest age of occurrence of most childhood tuberculosis cases to occur at less than 5 years of age, with 34.6% (37) indicating outright that they did not know the age range (Figure 4).

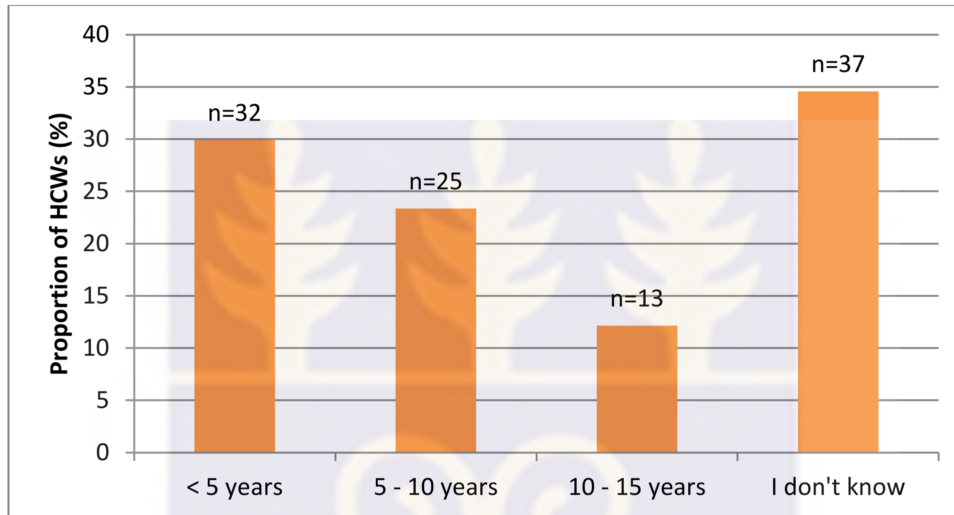

Figure 4: Respondents' knowledge of the age at which most cases of childhood TB occur

Disaggregation of these results into the various healthcare workers (Table 4) shows that all categories of the respondents had less than 50% of their participating population choosing the age range of "less than 5 years".

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Table 4: Respondents' knowledge of the age at which most cases of childhood TB occur (χ^2=50.6, p=0.026)

	AGE AT WHICH MOST CASES OCCUR				
HEALTH WORKER	**< 5 years n (%)**	**5 - 10 years n (%)**	**10 - 15 years n (%)**	**Did not know n (%)**	**Total**
Community health nurse	16 (36.4)	7 (15.9)	3 (6.8)	18 (40.9)	44
Public health nurse	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1
Physician assistant	0 (0.0)	0 (0.0)	2 (66.7)	1 (33.3)	3
House officer	4 (36.4)	6 (54.5)	0 (0.0)	1 (9.1)	11
Medical officer	1 (20.0)	2 (40.0)	1 (20.0)	1 (20.0)	5
TB coordinator	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1
Enrolled nurse	6 (37.5)	1 (6.3)	2 (12.5)	7 (43.8)	16
Laboratory Technician	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	2
Registered nurse	5 (23.8)	5 (23.8)	3 (14.3)	8 (38.1)	21
Clinical health assistant	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1
Laboratory Assistant	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1
Principal health assistant	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1
TOTAL	**32 (29.9)**	**25 (23.4)**	**13 (12.1)**	**37 (34.6)**	**107**

4.2.3 Knowledge of signs and symptoms, transmission and diagnosis of tuberculosis in children

As can be seen from Figure 5, the mean percentage knowledge scores of respondents on the signs and symptoms, transmission and diagnosis of TB in children was skewed to the left with a mean of 49.6 (95%CI: 45.4, 53.7), a median score of 51.6% and modal score of 58.1%.

On disaggregation of the mean scores by the various demographic characteristics (Table 5), the three that showed statistically significant differences in the mean scores in subcategories were the healthcare worker category, health facility and level of experience, which was expected. The mean score for those who participated in childhood TB workshops was, however, not significantly different from those who did not participate in the workshop.

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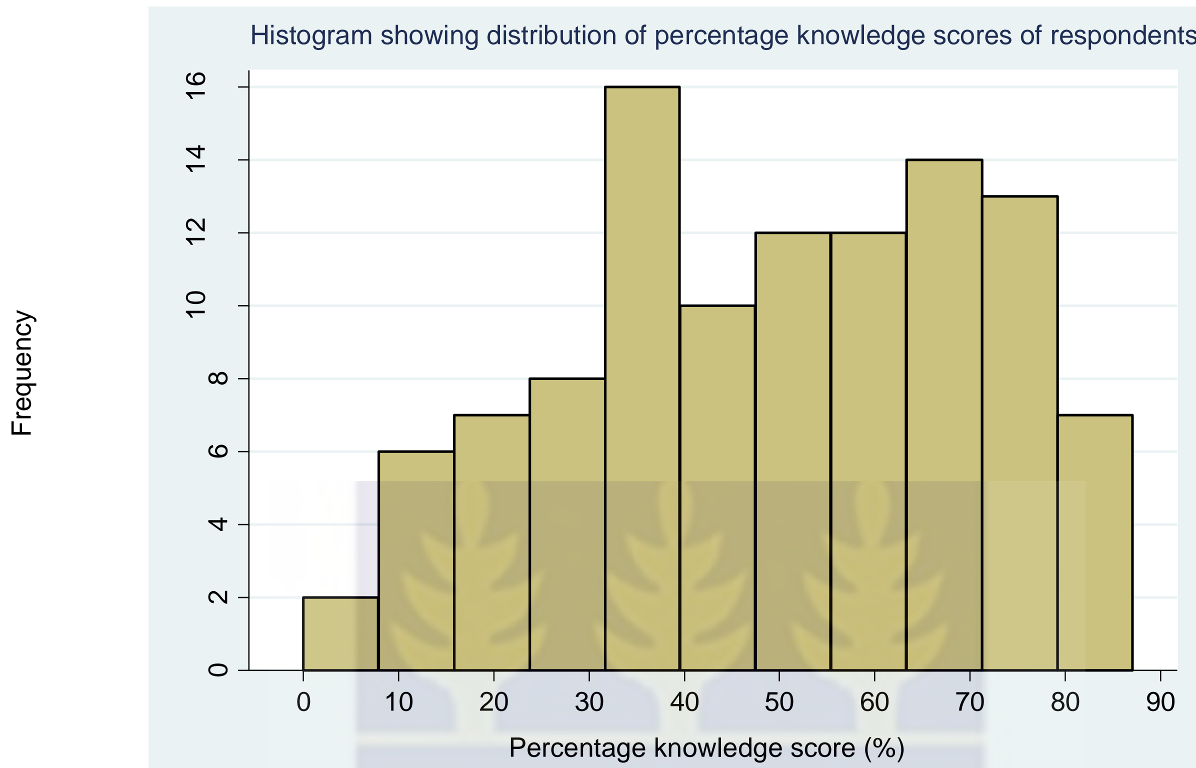

Figure 5: Frequency distribution of percentage knowledge scores of respondents

Under the healthcare worker category, the significant difference in mean scores was between community health nurses and house officers ($p<0.0001$), medical officers ($p=0.001$) and registered nurses ($p<0.0001$) respectively using Turkey post hoc test. Under the health facility category the significant difference in mean scores was between CHPS compound and Teaching hospital ($p<0.0001$), CHPS compound and Private health centre ($p<0.0001$), Health centre and Teaching hospital ($p<0.0001$), Health centre and Private health centre ($p<0.0001$), Polyclinic and Teaching hospital ($p<0.0001$), Polyclinic and Private health centre ($p<0.0001$), Metropolitan hospital and Teaching hospital ($p=0.016$), Metropolitan hospital and Private health clinic ($p=0.049$), and between Technical university clinic and private health centre ($p=0.03$). Under the level of experience category, the significant difference in mean scores occurred between <1year and 4-6years ($p=0.033$), and between <1year and 7-10years ($p=0.030$).

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Table 5: Mean percentage knowledge scores of study participants

DEMOGRAPHIC CHARACTERISTIC	Frequency (n)	Mean percentage score (%)	Standard Deviation	p-value
ALL	107	49.56	21.64	-
Sex				
Male	40	52.98	23.42	0.2078†
Female	67	47.52	20.41	
Age				
21 - 25 years	19	51.78	14.76	0.7147*
26 - 30 years	59	47.73	22.90	
31 - 35 years	17	54.08	22.91	
≥ 35 years	12	48.66	23.80	
Healthcare worker description				
Community health nurse	44	37.98	15.49	<0.0001*
Public health nurse	1	58.06	0.00	
Physician assistant	3	58.06	19.35	
House officer	11	73.31	8.55	
Medical officer	5	73.55	10.30	
TB coordinator	1	64.52	0.00	
Enrolled nurse	16	39.11	25.31	
Lab technician	2	45.16	13.69	
Registered nurse	21	62.67	15.79	
Clinical health assistant	1	74.19	0.00	
Lab assistant	1	35.48	0.00	
Principal health assistant	1	19.35	0.00	
Level of Healthcare				
Primary (public)	13	36.32	17.17	<0.0001*
Primary (private)	11	65.90	10.71	
Secondary	27	43.86	28.29	
Tertiary	7	66.23	13.06	
Experience				
< 1 year	13	65.51	17.14	0.0173*
1 - 3 years	66	49.12	20.35	
4 - 6 years	20	44.84	25.29	
7 - 10 years	8	39.11	18.45	
Participation in workshop				
Yes	11	48.45	21.57	0.1179†
No	96	59.24	20.67	

*ANOVA test (Significance level of p=0.05)
†t test (Significance level of p=0.05)

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On application of the adequacy of knowledge cut-off of 60% less than half of the respondents—34.6% (37)—had adequate knowledge.

Table 6: Knowledge levels of study participants

	PERCENTAGE KNOWLEDGE SCORE n (%)				KNOWLEDGE LEVEL/ n (%)		
VARIABLE	**≤25%**	**26 – 50%**	**51 – 75%**	**>75%**	**Adequate knowledge**	**Inadequate knowledge**	**p-value**
TOTAL	15 (14.0)	36 (33.6)	43 (40.2)	13 (12.2)	37 (34.6)	70 (65.4)	-
Sex							
Male	5 (4.7)	12 (11.2)	15 (14.0)	8 (7.5)	16 (15.0)	24 (22.4)	0.405
Female	10 (9.4)	24 (22.4)	28 (26.2)	5 (4.7)	21 ((19.6)	46 (43.0)	
Age							
21 – 25 years	1 (0.9)	7 (6.5)	10 (9.4)	1 (0.9)	7 (6.5)	12 (11.2)	0.648
26 – 30 years	10 (9.4)	21 (19.6)	21 (19.6)	7 (6.5)	18 (16.8)	41 (38.3)	
31 – 35 years	1 (0.9)	6 (5.6)	6 (5.6)	4 (3.7)	8 (7.5)	9 (8.4)	
≥ 35 years	3 (2.8)	2 (1.9)	6 (5.6)	1 (0.9)	4 (3.7)	8 (7.5)	
Healthcare worker description							
Community health nurse	8 (7.5)	26 (24.3)	9 (8.4)	1 (0.9)	3 (2.8)	41 (38.3)	**
Public health nurse	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	1 (0.9)	
Physician assistant	0 (0.0)	1 (0.9)	1 (0.9)	1 (0.9)	1 (0.9)	2 (1.9)	
House officer	0 (0.0)	0 (0.0)	7 (6.5)	4 (3.7)	10 (9.4)	1 (0.9)	
Medical officer	0 (0.0)	0 (0.0)	4 (3.7)	1 (0.9)	4 (3.7)	1 (0.9)	
TB coordinator	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.9)	0 (0.0)	
Enrolled nurse	5 (4.7)	4 (3.7)	6 (5.6)	1 (0.9)	3 (2.8)	13 (12.2)	
Lab technician	0 (0.0)	1 (0.9)	1 (0.9)	0 (0.0)	0 (0.0)	2 (1.9)	
Registered nurse	1 (0.9)	3 (2.8)	12 (11.2)	5 (4.7)	14 (13.1)	7 (6.5)	
Clinical health assistant	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.9)	0 (0.0)	
Lab assistant	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	
Principal health assistant	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	
Level of healthcare							
Primary (public)	13	30 (83.3)	10 (23.3)	1 (7.7)	4 (10.8)	50 (71.4)	<0.0001*

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	(86.7)						
Primary (private)	0 (0.0)	0 (0.0)	11 (25.6)	3 (23.1)	8 (21.6)	6 (8.6)	
Secondary	2 (13.3)	2 (5.6)	3 (7.0)	0 (0.0)	3 (8.1)	4 (5.7)	
Tertiary	0 (0.0)	4 (11.1)	19 (44.2)	9 (69.2)	22 (59.5)	10 (14.3)	
Experience							
< 1 year	1 (0.9)	0 (0.0)	9 (8.4)	3 (2.8)	11 (10.3)	2 (1.9)	<0.0001*
1 - 3 years	7 (6.5)	26 (24.3)	26 (24.3)	7 (6.5)	18 (16.8)	48 (44.9)	
4 - 6 years	6 (5.6)	6 (5.6)	5 (4.7)	3 (2.8)	8 (7.5)	12 (11.2)	
7 - 10 years	1 (0.9)	4 (3.7)	3 (2.8)	0 (0.0)	0 (0.0)	8 (7.5)	
Participation in childhood TB workshop							
Yes	1 (0.9)	1 (0.9)	6 (5.6)	3(2.8)	4 (3.7)	7 (6.5)	0.502
No	14 (13.1)	35 (32.7)	37 (34.6)	10 (9.4)	33 (30.8)	63 (58.9)	

*Statistically significant (Fisher exact test at 0.05 confidence level)
**p-value could not be generated due to the large number of categories

Table 7 below shows the strength of association between adequate knowledge level and the demographic characteristics of respondents. Participation in childhood TB workshop was not significantly associated with adequate knowledge level in this study, though it was found in other studies to increase knowledge level of healthcare workers.

A notable finding was that the odds of having adequate knowledge among those who had a professional experience less than a year was 8.25 times as high as that for those who had 7 to 10 years of experience. Due to the small sample size obtained for the study the odds ratios cannot be emphasized as accurate depictions of the strength of association between adequate knowledge level and the demographic characteristics.

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Table 7: Association between adequate knowledge level and demographic characteristics

Variable	Odds ratio	Std. Err.	95% Conf. Interval	
Participation in childhood TB workshop				
No (reference)	1.00	-	-	-
Yes	1.10	0.72	0.30	4.00
Health worker description				
CHN (Reference)	1.00	-	-	-
Public health nurse	1.00	-	-	-
Physician assistant	6.80	9.30	0.47	98.81
House officer	136.70	165.00	12.82	1456.7
Medical officer	54.70	69.30	4.55	656.16
TB coordinator	1.00	-	-	-
Enrolled nurse	3.20	2.80	0.57	17.57
Laboratory technician	1.00	-	-	-
Registered nurse	27.30	20.70	6.21	120.36
Clinical health assistant	1.00	-	-	-
Laboratory assistant	1.00	-	-	-
Principal health assistant	1.00	-	-	-
Level of healthcare				
Primary-public (Reference)	1.00	-	-	-
Primary-private	16.67	12.49	3.84	72.41
Secondary	9.37	8.66	1.53	57.31
Tertiary	27.50	17.73	7.77	97.27
Professional experience				
7 - 10 years (Reference)	1.00	-	-	-
< 1 year	8.25	7.38	1.43	47.58
1 - 3 years	0.56	0.30	0.20	1.60
4 - 6 years	1	-	-	-

4.2.4 Knowledge of the childhood TB control strategies

Only 2.8% (3) of the 107 the respondents knew the childhood TB control strategies and were each able to list all the strategies and the remaining respondents either providing wrong answers or leaving the section unanswered.

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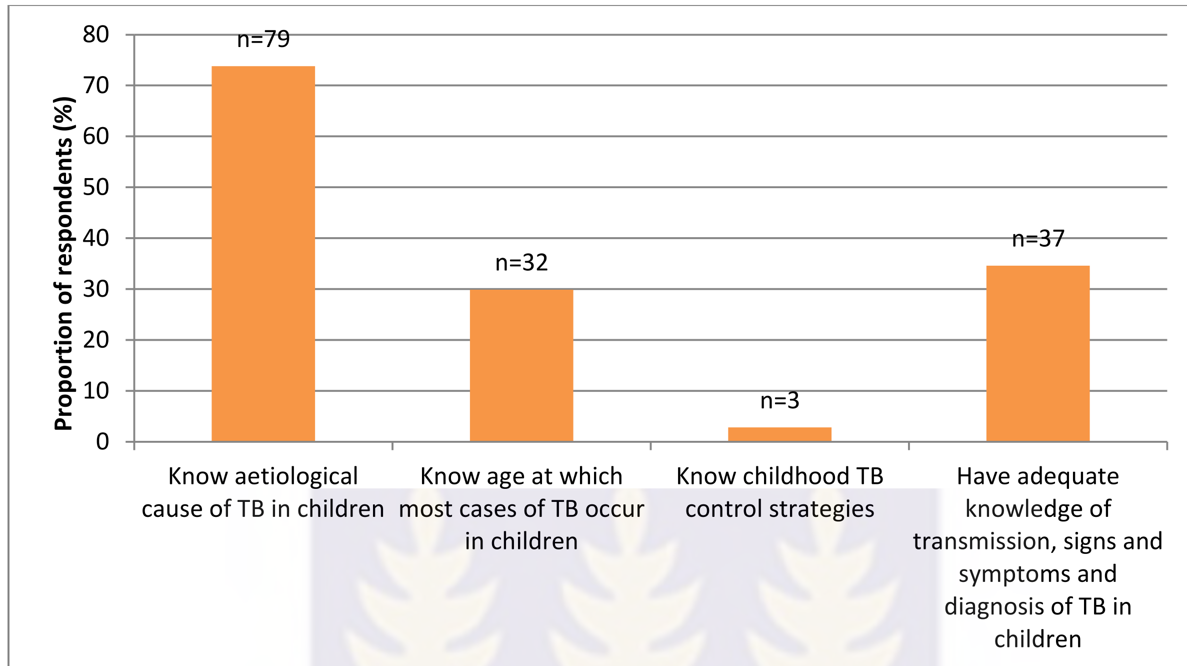

Figure 6: Summary of knowledge of respondents about childhood TB

In summary, Figure 6 shows that a significant proportion of respondents knew the aetiological cause of TB but small proportions have adequate knowledge relevant to pick up TB cases among children, especially the childhood TB control strategies.

4.3 PERCEPTIONS, ATTITUDES AND PRACTICES OF HEALTHCARE WORKERS

4.3.1 Perceptions about childhood tuberculosis

Figure 7 shows that in all the health facilities the majority of its participating respondents in the study held the view that childhood TB is not common.

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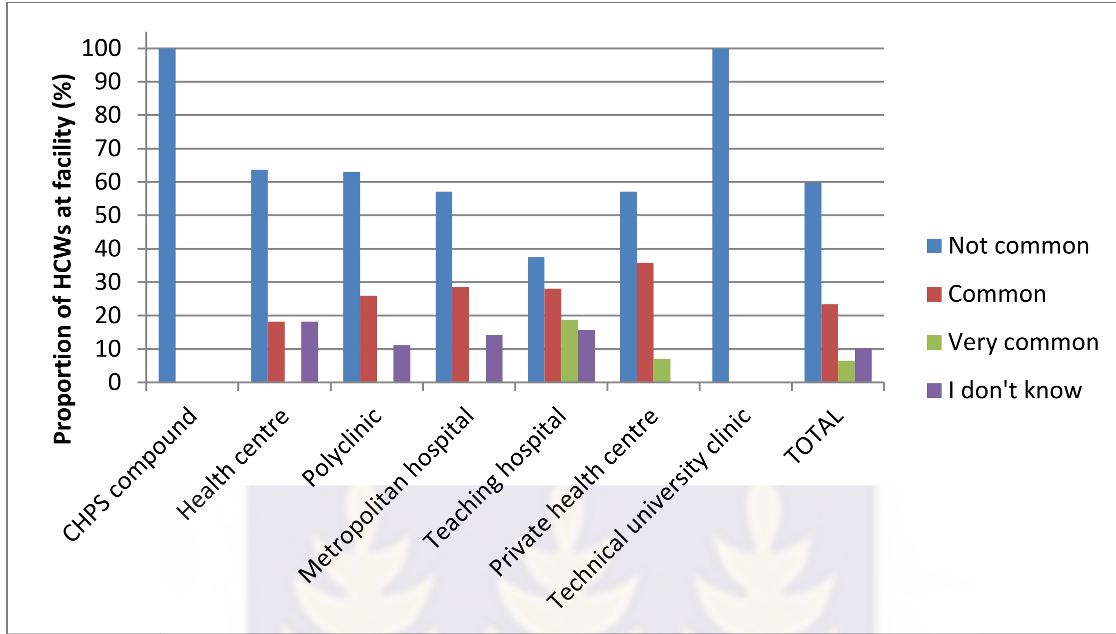

Figure 7: Respondents' perceptions about how common childhood TB is *(χ^2=28.4, p=0.056)*

The perceptions of the respondents about childhood TB as a problem in Ghana, however, showed a mixed picture across the different health facilities with more of the respondents from health centre, polyclinic and the technical university clinic holding the view that childhood tuberculosis is not a problem in Ghana as compared to those who held the view that it was a problem. Notably also, the predominant number of respondents at the health centre did not know if childhood TB was a problem in Ghana. Figure 8 below show details of the responses from the various health facilities.

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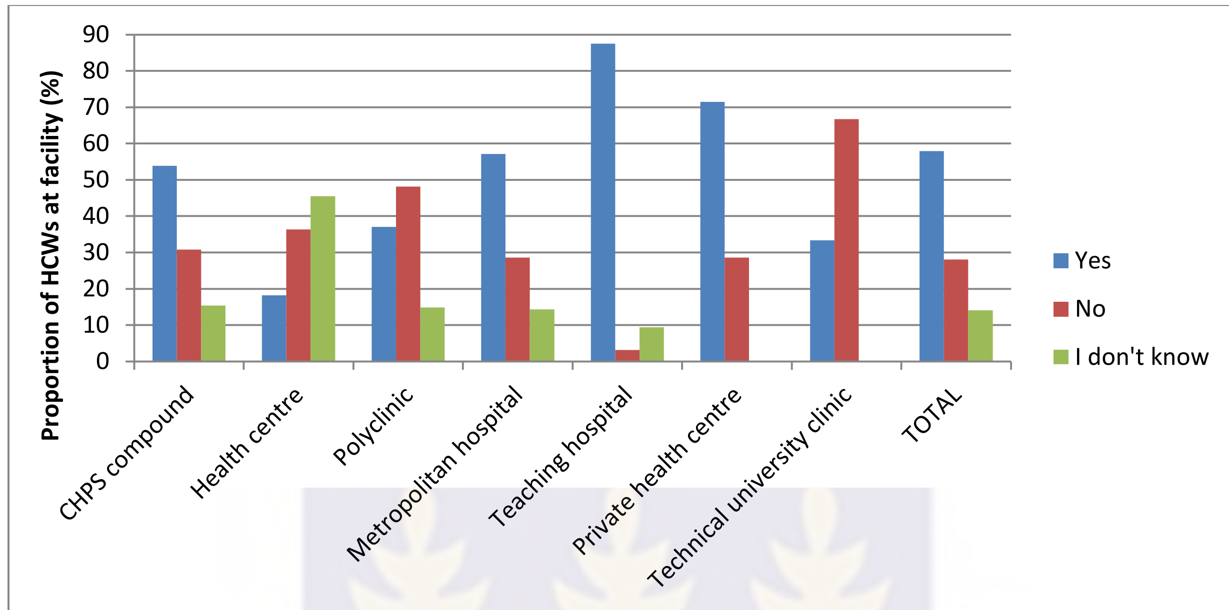

Figure 8: Respondents' perceptions about childhood TB as a problem in Ghana *(χ^2=34.2, p=001)*

With regards to the perceptions of respondents about the level of risk to a child of being infected with TB by an infected mother, a combined percentage of 87.9% (94) thought it to be high or very high with 7.5% (8) expressing ignorance of the risk level. A combined percentage of 4.6% (5) were of the view that the risk was either low or no risk.

4.3.2 Perceptions about attention given to childhood tuberculosis by the National Tuberculosis Control Programme (NTP)

A little over a quarter of the respondents were of the view that childhood TB is not receiving the needed attention from the National Tuberculosis Control Programme (NTP) with about a fifth of them having no idea about the level of attention childhood TB is receiving from the NTP (Figure 9).

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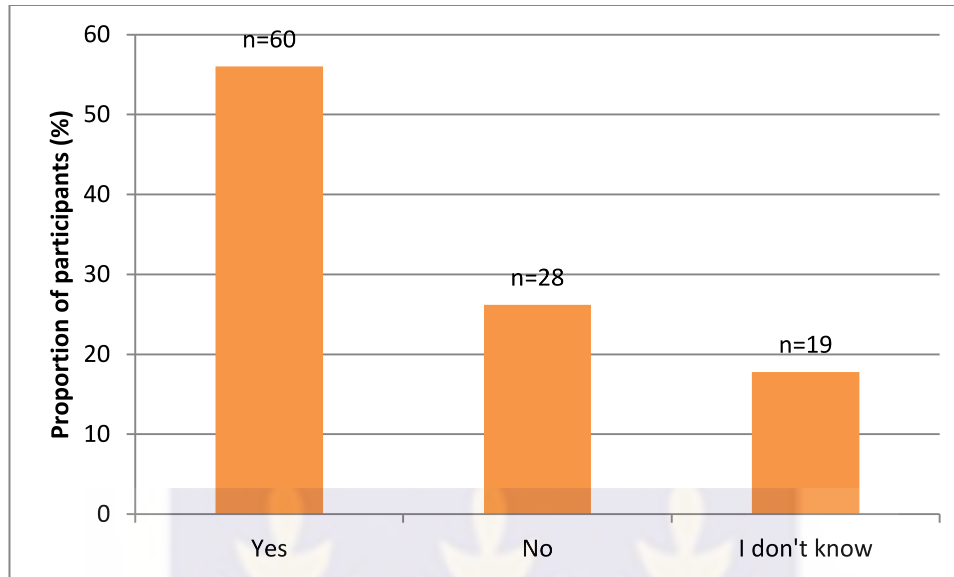

Figure 9: Respondents' perception about whether or not the NTP gives childhood TB the needed attention

4.3.3 Perceptions about the health system

A combined percentage of 30.8% (33) of the respondents perceived the referral system to be poor or very poor. This percentage was constituted by significant proportions of respondents at the CHPS compound, and the teaching hospital. This is a significant finding to the effect that healthcare workers at the primary health level and the tertiary level hold similar views of the referral system. Table 8 shows the details of the percentages for each health facility.

Table 8: Perceptions of respondents about the referral system (χ^2=43.9, p-value=0.001)

	PERCEPTIONS ABOUT THE REFERRAL SYSTEM n (%)				
HEALTH FACILITY	**Very good**	**Good**	**Poor**	**Very poor**	**Total**
CHPS compound	3 (23.1)	5 (38.5)	5 (38.5)	0 (0.0)	13
Health centre	4 (36.4)	5 (45.5)	1 (9.1)	1 (9.1)	11
Polyclinic	2 (7.4)	22 (81.5)	3 (11.1)	0 (0.0)	27
Metropolitan hospital	0 (0.0)	5 (71.4)	1 (14.3)	1 (14.3)	7
Teaching hospital	0 (0.0)	16 (50.0)	14 (43.8)	2 (6.3)	32
Private health centre	6 (42.9)	5 (35.7)	1 (7.1)	2 (14.3)	14
Technical university clinic	0 (0.0)	1 (33.3)	2 (66.7)	0 (0.0)	3
TOTAL	**15 (14.0)**	**59 (55.1)**	**27 (25.2)**	**6 (5.6)**	**107**

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The responses of the participants about their work conditions revealed that most of them had positive perceptions of the conditions under which they work. The differences in the perceptions across the various health facility categories were also found to be statistically significant when the chi-square test was run on the responses. Table 9 shows the percentages of the perceptions among the respondents from each health facility category.

Table 9: Perceptions of respondents about their work conditions (χ^2=42.8, p-value=0.001)

	PERCEPTIONS ABOUT WORK CONDITIONS n (%)				
HEALTH FACILITY	**Very good**	**Good**	**Poor**	**Very poor**	**Total**
CHPS compound	4 (30.8)	7 (53.9)	1 (7.7)	1 (7.7)	13
Health centre	2 (18.2)	4 (36.4)	3 (27.3)	2 (18.2)	11
Polyclinic	1 (3.7)	24 (88.9)	2 (7.4)	0 (0.0)	27
Metropolitan hospital	0 (0.0)	5 (71.4)	1 (14.3)	1 (14.3)	7
Teaching hospital	1 (3.1)	17 (53.1)	13 (40.6)	1 (3.1)	32
Private health centre	3 (21.4)	10 (71.4)	1 (7.1)	0 (0.0)	14
Technical university clinic	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	3
TOTAL	**13 (12.2)**	**68 (63.6)**	**21 (19.6)**	**5 (4.7)**	**107**

With regards to the level of supervision at the various health facility categories about 65% (70) of the respondents indicated that the supervision at their health facility was average, with all the health facility categories having the highest proportion of its respondents holding this same view of the level of supervision. This has great implication on the compliance with standard operation procedures in the facility to all conditions including tuberculosis in children. Table 10 shows the details of the distribution of responses.

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Table 10: Perceptions of respondents about the level of supervision in their health facilities (χ^2=38.5, p-value=0.003)

	PERCEPTIONS ABOUT THE LEVEL OF SUPERVISION / n (%)				
HEALTH FACILITY	**High**	**Average**	**Low**	**No supervision**	**Total**
CHPS compound	5 (38.5)	7 (53.9)	1 (7.7)	0 (0.0)	13
Health centre	0 (0.0)	7 (63.6)	4 (36.4)	0 (0.0)	11
Polyclinic	2 (7.4)	20 (74.1)	5 (18.5)	0 (0.0)	27
Metropolitan hospital	0 (0.0)	6 (85.7)	1 (14.3)	0 (0.0)	7
Teaching hospital	7 (21.9)	20 (62.5)	4 (12.5)	1 (3.1)	32
Private health centre	6 (42.9)	8 (57.1)	0 (0.0)	0 (0.0)	14
Technical university clinic	1 (33.3)	1 (33.3)	0 (0.0)	1 (33.3)	3
TOTAL	**21 (19.6)**	**69 (64.49)**	**15 (14.0)**	**2 (1.87)**	**107**

4.3.4 Attitudes towards children with TB

About 5% of the respondents perceived that children were discriminated against in their health facilities as shown in Figure 10.

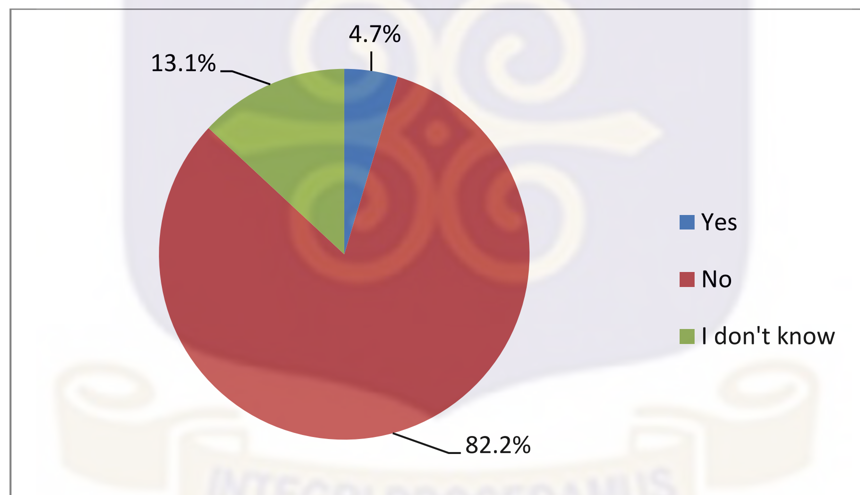

Figure 10: Respondents' perception of discrimination against children infected with TB by healthcare workers

Figure 11 shows that 29.9% (32) of the respondents were uncomfortable attending to children with tuberculosis. The 32.7% who indicated that they have not attended to a child with TB before potentially include those who may be uncomfortable attending to children with TB.

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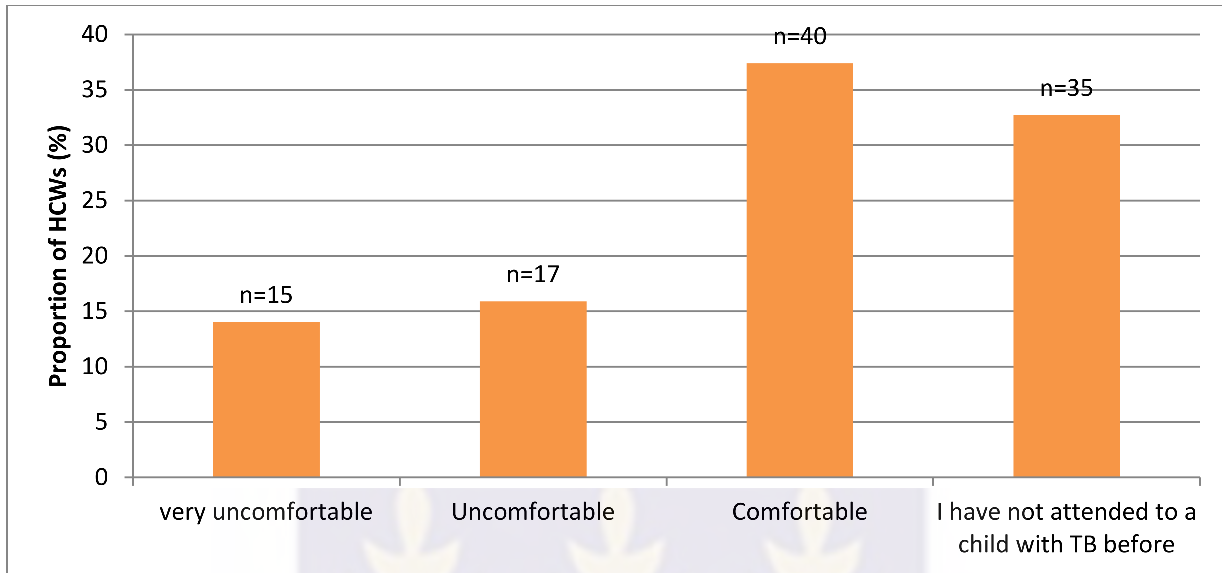

Figure 11: Level of comfort of healthcare workers with attending to children infected with TB

4.3.5 TB-related activities in health facilities

Table 11 below illustrates that contact tracing is more frequently conducted by the CHPS compounds than all the other facilities. The difference in proportions relative to the health facilities was however not statistically significant. The high total percentages of 31.8%, 40.2% for Never and Sometimes respectively indicate that a large number of cases are not contact traced.

Education is an important component of TB control at the health facility level as detailed in the Standard Operating Procedures guide for Ghana. Table 12 shows, however, that close to a quarter of the respondents did not provide any form of education to parents.

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Table 11: Frequency of contact tracing by various health facilities (χ^2=33.2, p-value=0.314)

HEALTH FACILITY	FREQUENCY OF CONTACT TRACING FOR CHILDREN DIAGNOSED OF TB / n (%)]					Total
	Never	Sometimes	Often	Always	I don't know	
CHPS compound	4 (30.8)	2 (15.4)	3 (23.1)	4 (30.8)	0 (0.0)	13
Health centre	2 (18.2)	8 (72.7)	0 (0.0)	1 (9.1)	0 (0.0)	11
Polyclinic	7 (25.9)	13 (48.2)	6 (22.2)	1 (3.7)	0 (0.0)	27
Metropolitan hospital	2 (28.6)	4 (57.1)	1 (14.3)	0 (0.0)	0 (0.0)	7
Teaching hospital	11 (34.4)	11 (34.4)	6 (18.8)	3 (9.4)	1 (3.1)	32
Private health centre	6 (42.9)	4 (28.6)	0 (0.0)	2 (14.3)	2 (14.3)	14
Technical university clinic	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	3
TOTAL	**34 (31.8)**	**43 (40.2)**	**16 (15.0)**	**11 (10.3)**	**3 (2.8)**	**107**

Table 12: Frequency of education of parents by respondents about childhood TB *(χ^2=52.1, p=0.019)*

Healthcare worker	Frequency of Education of Parents on childhood TB / n (%)				Total
	Never	Sometimes	Often	Always	
Community Health Nurse	3 (6.8)	14 (31.8)	14 (31.8)	13 (29.5)	**44**
Public Health nurse	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	**1**
Physician assistant	0 (0.0)	3 (100.0)	0 (0.0)	0 (0.0)	**3**
House officer	4 (36.4)	3 (27.3)	4 (36.4)	0 (0.0)	**11**
Medical officer	1 (20.0)	3 (60.0)	0 (0.0)	1 (20.0)	**5**
TB coordinator	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	**1**
Enrolled nurse	6 (37.5)	6 (37.5)	2 (12.5)	2 (12.5)	**16**
Laboratory technician	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	**2**
Registered nurse	10 (47.6)	7 (33.3)	2 (9.5)	2 (9.5)	**21**
Clinical health assistant	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	**1**
Laboratory assistant	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	**1**
Principal health assistant	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	**1**
TOTAL	**25 (23.4)**	**37 (34.6)**	**23 (21.5)**	**22 (20.6)**	**107**

Table 13 shows the responses of participants concerning routine screening of children for TB in their various health facilities. It was observed that all but the metropolitan hospital did not routinely screen children for TB from the feedback of the head of the public health units yet about 30% of the respondents indicated that children are routinely screened. Even for the

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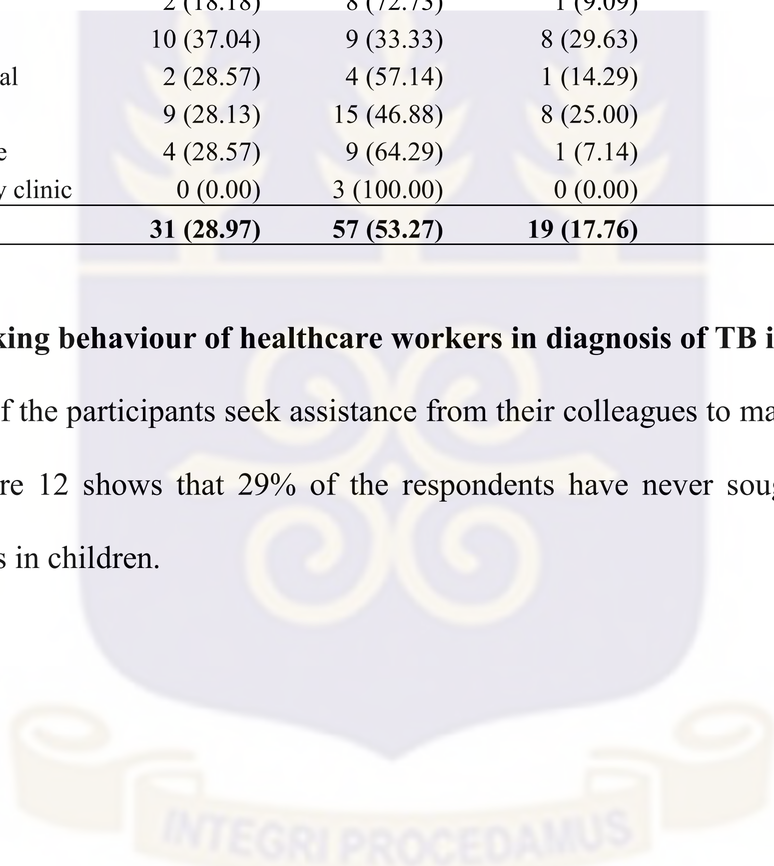
metropolitan hospital where routine screening was said to be done the minority of 2 out of 7 respondents indicated that children were routinely screened.

Table 13: Routine screening of children presenting at various health facilities for TB

	Healthcare worker reported routine screening of children for TB / n (%)			
HEALTH FACILITY	**Yes**	**No**	**I don't know**	**Health facility TB coordinator reported screening of children for TB**
CHPS compound	4 (30.77)	9 (69.23)	0 (0.00)	No
Health centre	2 (18.18)	8 (72.73)	1 (9.09)	No
Polyclinic	10 (37.04)	9 (33.33)	8 (29.63)	No
Metropolitan hospital	2 (28.57)	4 (57.14)	1 (14.29)	Yes
Teaching hospital	9 (28.13)	15 (46.88)	8 (25.00)	No
Private health centre	4 (28.57)	9 (64.29)	1 (7.14)	No
Technical university clinic	0 (0.00)	3 (100.00)	0 (0.00)	No
TOTAL	**31 (28.97)**	**57 (53.27)**	**19 (17.76)**	-



4.3.6 Help-seeking behaviour of healthcare workers in diagnosis of TB in children

In general most of the participants seek assistance from their colleagues to make diagnosis of TB in children. Figure 12 shows that 29% of the respondents have never sought assistance with diagnosis of cases in children.

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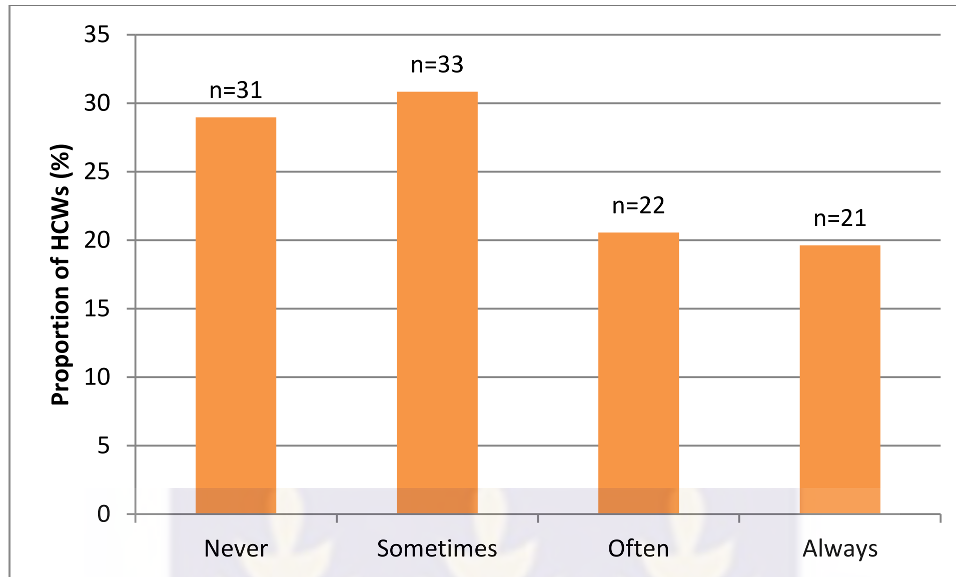

Figure 12: Frequency at which respondents sought assistance from colleagues or superiors in the diagnosis or suspicion of TB in children

4.3.7 Use of TB symptom-based screening tool in the health facility to screen children for TB

Among the interventions put in place to increase TB case detection among people who present at health facilities is the symptom-based screening tool (checklist), and from the study less than a third of the respondents indicated that children are screened with it. Table 14 shows the details of responses where 1 unit head of out of the total of 13 who participated in the study indicated that the screening tool was used to screen children in their health facility. The 42.1% of respondents who did not know about the screening tool also represents a gap in implementation of interventions.

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Table 14: Respondent reported use of TB symptom-based screening tool on children in their health facilities

HEALTH FACILITY	Healthcare worker reported screening of children with symptom-based screening tool / n (%)			Health facility TB coordinator reported use of screening tool for children
	Yes	No (But I know about it)	I don't know anything about it	
CHPS compound	5 (38.5)	5 (38.5)	3 (23.1)	No
Health centre	3 (27.3)	3 (27.3)	5 (45.5)	No
Polyclinic	10 (37.0)	6 (22.2)	11 (40.7)	No
Metropolitan hospital	2 (28.6)	4 (57.1)	1 (14.3)	Yes
Teaching hospital	10 (31.3)	3 (9.4)	19 (59.4)	No
Private health centre	3 (21.4)	6 (42.9)	5 (35.7)	No
Technical university clinic	1 (33.3)	1 (33.3)	1 (33.3)	No
TOTAL	**34 (31.8)**	**28 (26.2)**	**45 (42.1)**	-

Table 15: Respondent reported logging of TB-related activities in their health facilities

HEALTH FACILITY	LOGGING OF TB-RELATED ACTIVITIES IN HEALTH FACILITIES n (%)			Verified logging of activities
	Yes	No	I don't know	
CHPS compound	0 (0.0)	13 (100.0)	0 (0.0)	No
Health centre	7 (63.6)	4 (36.4)	0 (0.0)	No
Polyclinic	9 (33.3)	15 (55.6)	3 (11.1)	No
Metropolitan hospital	4 (57.1)	3 (42.9)	0 (0.0)	No
Teaching hospital	19 (59.4)	10 (31.3)	3 (9.4)	No
Private health centre	5 (35.7)	6 (42.9)	3 (21.4)	No
Technical university clinic	2 (66.7)	1 (33.3)	0 (0.0)	No
TOTAL	**46 (43.0)**	**52 (48.6)**	**9 (8.41)**	-

An important part of monitoring and evaluation of a system is documentation of activities or interventions. Though the SOP guide does not specifically demand this, it requires the Health facility TB teams (HFTT) to perform various functions such as sensitizing healthcare workers on SOPs for TB case detection, assess TB case detection activities in their health facilities, meet at least once monthly to monitor progress of TB case detection and review weekly reports from the

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Institutional TB Coordinator (ITC). In the study however, all the public health unit heads indicated that they did not have a logbook to that intent and were unable to provide evidence of logged TB-related activities, meaning that there was no way of assessing the oversight performance of the HFTT. As table 16 shows, only the CHPS compounds provided a 100% response consistent with the verification feedback from the unit heads.

4.4 SUPERVISION AT THE VARIOUS HEALTH FACILITIES

In this study, the respondent reported frequency of supervision summarized in Table 16 shows that more than a half of the respondents receive no supervision from their TB coordinators on childhood TB. This is revealing of a deficiency in the approach to childhood TB control as it is expected that there would be more supervision if more attention is being given to it. The statistically insignificant difference in the proportions across the various health facility categories supports the notion that the limited supervision is a pervasive problem and most likely, systemic.

Table 16: Frequency of supervision received by respondents from TB coordinator on childhood TB (χ^2=35.5, p-value=0.061)

	FREQUENCY OF SUPERVISION / n (%)					
HEALTH FACILITY	**No supervision**	**Once a week**	**Once a month**	**Once in 3 months**	**Once a year**	**Total**
CHPS compound	5 (38.5)	0 (0.0)	0 (0.0)	7 (53.8)	1 (7.7)	13
Health centre	6 (54.5)	0 (0.0)	1 (9.1)	4 (36.4)	0 (0.0)	11
Polyclinic	10 (37.0)	0 (0.0)	7 (25.9)	6 (22.2)	4 (14.8)	27
Metropolitan hospital	5 (71.4)	0 (0.0)	0 (0.0)	2 (28.6)	0 (0.0)	7
Teaching hospital	23 (71.9)	2 (6.3)	4 (12.5)	2 (6.3)	1 (3.1)	32
Private health centre	8 (57.1)	0 (0.0)	0 (0.0)	4 (28.6)	2 (14.3)	14
Technical university clinic	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
TOTAL	**60 (56.1)**	**2 (1.9)**	**12 (11.2)**	**25 (23.4)**	**8 (7.5)**	**107**

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Along the same line 39.3% of the respondents indicated that they received no supervision (Table 17) which is less than the 56.1% in Table 16. Furthermore, Table 17 shows that only 35.4% of the respondents received supervision in case detection.

In the domain of supervision is the organization of refresher trainings on the Standard Operating Procedures (SOPs) for TB case detection, respondents provided information regarding the frequency of refresher trainings for TB at their various health facilities. The results are summarized in Table 18 and show that 70% of the respondents had not experienced any refresher training on the standard operating procedures for TB case detection.

Table 17: Supervised clusters of TB-related activities in health facilities

SUPERVISED CLUSTERS OF ACTIVITIES AT HEALTH FACILITIES	Frequency	Percentage (%)
Case detection	12	11.2
Case detection, contact tracing, reporting	2	1.9
Case detection, contact tracing, reporting, data validation	1	0.9
Case detection, registration of cases	1	0.9
Case detection, registration of cases, contact tracing, reporting	1	0.9
Case detection, registration of cases, contact tracing, reporting, data validation	20	18.7
Case detection, registration of cases, reporting, data validation	1	0.9
Contact tracing	6	5.6
Contact tracing, data validation	1	0.9
Data validation	1	0.9
Reporting	3	2.8
Reporting, data validation	5	4.7
Registration of cases	3	2.8
Registration of cases, contact tracing, reporting	2	1.9
Registration of cases, contact tracing, reporting, data validation	3	2.8
Registration of cases, data validation	1	0.9
Registration of cases, reporting	1	0.9
Registration of cases, reporting, data validation	1	0.9
No supervision	42	39.3
TOTAL	**107**	**100.0**

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Table 18: Frequency of refresher trainings on Standard Operating Procedures (SOPs) for TB case detection in health facilities (χ^2=24.8, p-value=0.414)

	Frequency of SOP Refresher Trainings / n (%)					
Health facility	**No Refresher trainings**	**Once a month**	**Once in 3 months**	**Twice in a year**	**Once a year**	**Total**
CHPS compound	5 (38.5)	0 (0.0)	4 (30.1)	1 (7.7)	3 (23.1)	13
Health centre	5 (45.5)	1 (9.1)	3 (27.3)	1 (9.1)	1 (9.1)	11
Polyclinic	19 (70.4)	0 (0.0)	5 (18.5)	1 (3.7)	2 (7.4)	27
Metropolitan hospital	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	7
Teaching hospital	27 (84.4)	1 (3.1)	2 (6.3)	0 (0.0)	2 (6.3)	32
Private health centre	10 (71.4)	0 (0.0)	1 (7.1)	1 (7.1)	2 (14.3)	14
Technical university clinic	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
TOTAL	**76 (71.0)**	**2 (1.9)**	**15 (14.0)**	**4 (3.7)**	**10 (9.4)**	**107**

Table 19 shows the feedback provided by the respondents with close to 90% of them indicating that they are given targets by their TB coordinators/disease control officers when in actual fact their disease control officers/TB coordinators indicated that they gave no targets for the number of cases to pick up in a month.

Table 19: Provision of targets for number of suspected childhood TB cases by TB coordinators

	Suspected Childhood TB targets given / n (%)			
Health facility	**Yes**	**No**	**Total**	**Verified Provision of targets**
CHPS compound	10 (76.9)	3 (23.1)	13 (100)	No
Health centre	8 (72.7)	3 (27.3)	11 (100)	No
Polyclinic	26 (96.3)	1 (3.7)	27 (100)	No
Metropolitan hospital	6 (85.7)	1 (14.3)	7 (100)	No
Teaching hospital	29 (90.6)	3 (9.4)	32 (100)	No
Private health centre	13 (92.9)	1 (7.1)	14 (100)	No
Technical university clinic	3 (100.0)	0 (0.0)	3 (100)	No
TOTAL	**95 (88.8)**	**12 (11.2)**	**107 (100.00)**	**-**

Furthermore, the study sought to find out how often performance assessment was conducted in health facilities. And just like the other practices, the responses were not unanimous for each health facility but for the technical university clinic. Notwithstanding, majority of the

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respondents at each facility category indicated that no performance was done in relation to childhood TB. Table 20 shows the distribution of responses by health facility categories. To verify the general impression, 8 public health unit heads out of the 13 in the participating facilities stated that no performance assessment was done in their facilities.

Table 20: Frequency of performance assessment at various health facilities in relation to childhood TB (χ^2=45.6, p-value=0.034)

	FREQUENCY OF PERFORMANCE ASSESSMENT						
HEALTH FACILITY	**None**	**Weekly**	**Monthly**	**Quarterly**	**Yearly**	**Biannually**	**Total**
CHPS compounds	7 (53.8)	0 (0.0)	1 (7.7)	3 (23.1)	2 (15.4)	0 (0.0)	13
Health centre	5 (45.5)	1 (9.1)	2 (18.2)	3 (27.3)	0 (0.0)	0 (0.0)	11
Polyclinic	21 (77.8)	0 (0.0)	2 (7.4)	3 (11.1)	1 (3.7)	0 (0.0)	27
Metropolitan hospital	3 (42.9)	0 (0.0)	0 (0.0)	1 (14.3)	2 (28.6)	1 (14.3)	7
Teaching hospital	28 (87.5)	0 (0.0)	2 (6.3)	1 (3.1)	1 (3.1)	0 (0.0)	32
Private health centre	8 (57.1)	0 (0.0)	0 (0.0)	1 (7.1)	4 (28.6)	1 (7.1)	14
Technical university clinic	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3
TOTAL	**75 (70.1)**	**1 (0.9)**	**7 (6.5)**	**12 (11.2)**	**10 (9.3)**	**2 (1.9)**	**107**

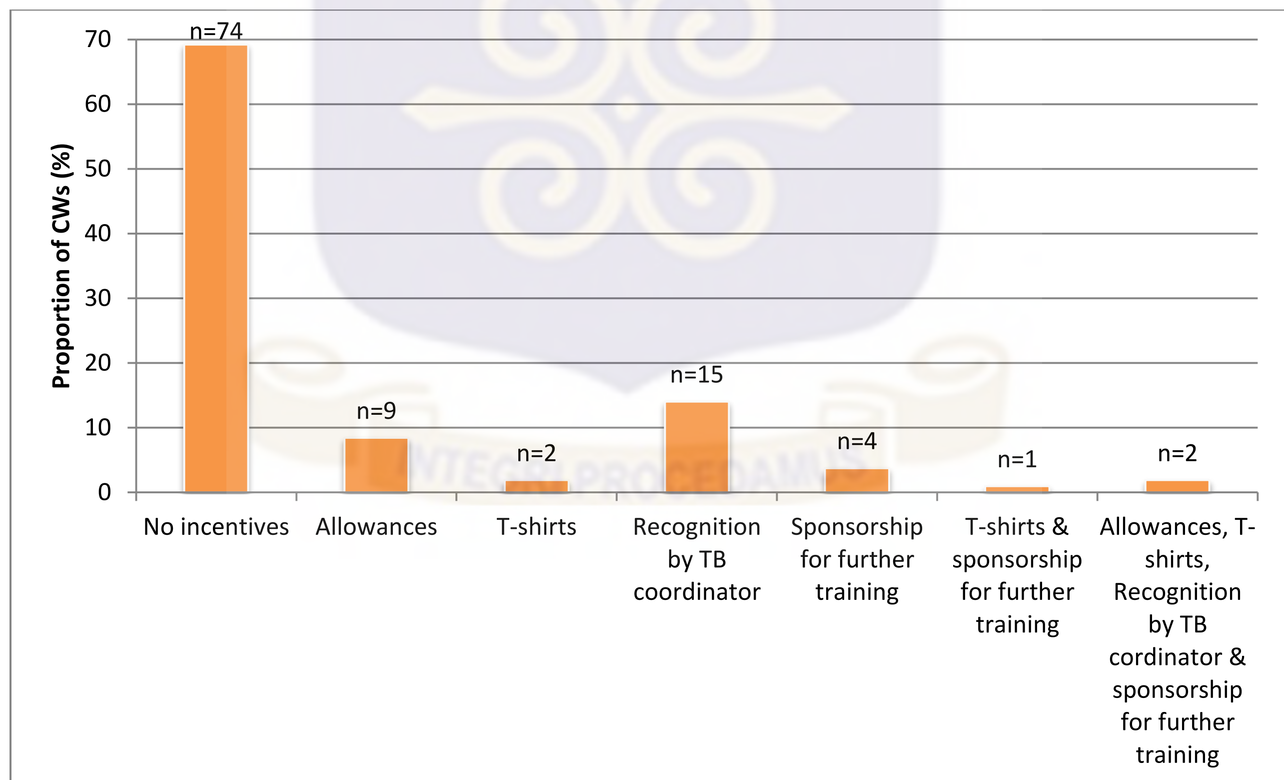

Figure 13: Incentives received by respondents for their TB-related work

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By way of incentives received by healthcare workers for their work in relation to TB in general, 69.2% (74) of the respondents indicated that they receive no incentives as illustrated by Figure 13.

4.5 AVAILABILITY OF DIAGNOSTIC AIDS AND GUIDELINES

The National TB Control Programme has rolled out some TB-related documents over the years to influence the knowledge, attitudes and practices of healthcare workers towards tuberculosis. The documents listed in the *Standard Operating Procedures for TB Case Detection in Ghana, March 2010* are *TB Workbook, TB Desk Aide,* and *TB training manual*. The study enquired about respondents' awareness of the availability of these documents at their health facilities. As shown in Table 23 below, 79.4% (85) of the respondents indicated that they had none of the documents in their health facilities. Upon visual verification from the head of the public health unit of each of the facilities the only document seen was the TB training manual at the Teaching Hospital alone. The disease control officer at the Metropolitan Health Directorate also had a copy of only the TB training manual and was not aware of the existence of the *Standard Operating Procedures for TB Case Detection in Ghana, March 2010.*

Pulmonary tuberculosis being the commonest form of TB in general, it is expected that X-ray services would be readily accessible to aid healthcare workers pick up TB cases in children. However, more than half of the respondents indicated that X-ray services are far from their facility. Table 21 shows that it was only at the teaching hospital that majority of the respondents indicated that the X-ray service is available in their health facility.

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Table 21: Respondent reported proximity of X-ray services to their health facilities (χ^2=99.0, p-value <0.0001)

HEALTH FACILITY	PROXIMITY OF X-RAY SERVICES / n (%)			Total
	Available in this facility	**Close to this facility**	**Far from this facility**	
CHPS compound	0 (0.0)	1 (7.7)	12 (92.3)	13
Health centre	0 (0.0)	6 (54.5)	5 (45.5)	11
Polyclinic	1 (3.7)	4 (14.8)	22 (81.5)	27
Metropolitan hospital	2 (28.6)	2 (28.6)	3 (42.9)	7
Teaching hospital	30 (93.8)	1 (3.1)	1 (3.1)	32
Private health centre	1 (7.1)	2 (14.3)	11 (78.6)	14
Technical university clinic	0 (0.0)	0 (0.0)	3 (100.0)	3
TOTAL	**34 (31.8)**	**16 (15.0)**	**57 (53.3)**	**107**

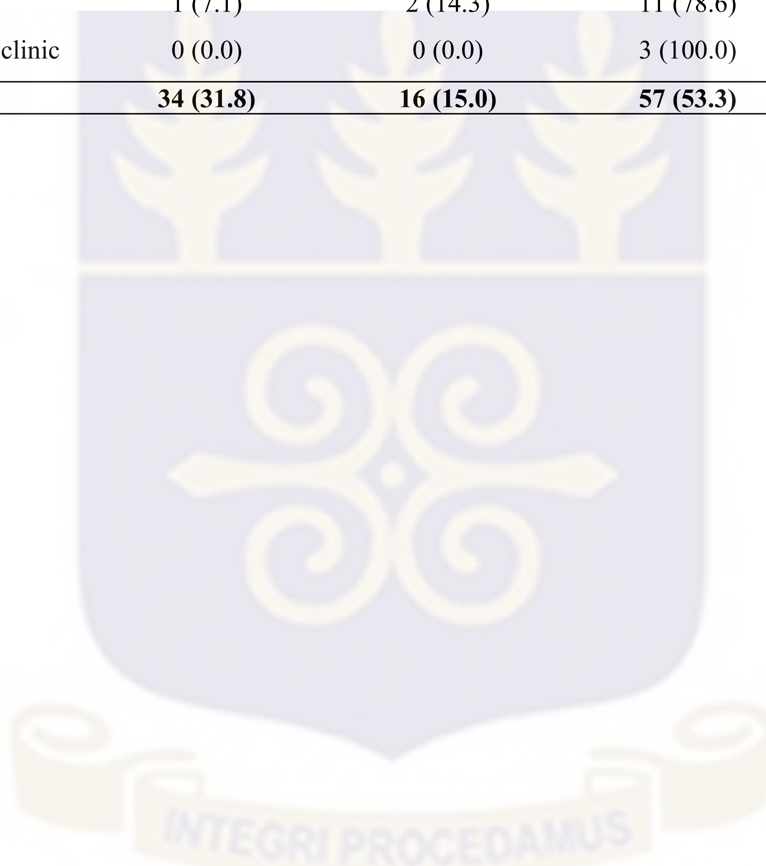

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Table 22: TB documents available at the various health facilities

	TB DOCUMENT / n (%)									
Health facility	**None**	**TB workbook**	**TB Desk Aide**	**TB Training manual**	**TB workbook & TB Desk Aide**	**TB workbook & TB training manual**	**TB desk aide & TB training manual**	**TB workbook, TB Desk Aide & TB Training manual**	**I don't know**	**Visually verified TB Documents in health facility**
CHPS compound	11 (84.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (15.3)	0 (0.0)	0 (0.0)	**None**
Health centre	8 (72.7)	1 (9.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (18.2)	0 (0.0)	0 (0.0)	0 (0.0)	**None**
Polyclinic	25 (92.6)	1 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	**None**
Metropolitan hospital	7 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	**None**
Teaching hospital	21 (65.6)	2 (6.3)	2 (6.3)	2 (6.3)	0 (0.0)	2 (6.3)	0 (0.0)	1 (3.1)	2 (6.3)	**TB training manual**
Private health centre	10 (71.4)	0 (0.0)	1 (7.1)	0 (0.0)	1 (7.1)	1 (7.1)	0 (0.0)	1 (7.1)	0 (0.0)	**None**
Technical university clinic	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	**None**
TOTAL	**85 (79.4)**	**4 (3.7)**	**3 (2.8)**	**2 (1.9)**	**1 (0.9)**	**6 (5.6)**	**2 (1.9)**	**2 (1.9)**	**2 (1.9)**	**-**
Metropolitan health directorate	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**TB training manual**

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4.5 EFFECT OF HEALTH SYSTEM ON ABILITY OF HEALTHCARE WORKERS TO DIAGNOSE TB IN CHILDREN

The ultimate intent of the various interventions and structure of the health system is to create an effective a system as possible to diagnose and manage various conditions. The effect that the health system has on the ability of healthcare workers to diagnose TB in children is worth considering especially with the diagnosis of childhood TB already being challenging. Figure 5.1 shows that the present nature of the health system made it difficult for majority of respondents to diagnose TB in children.

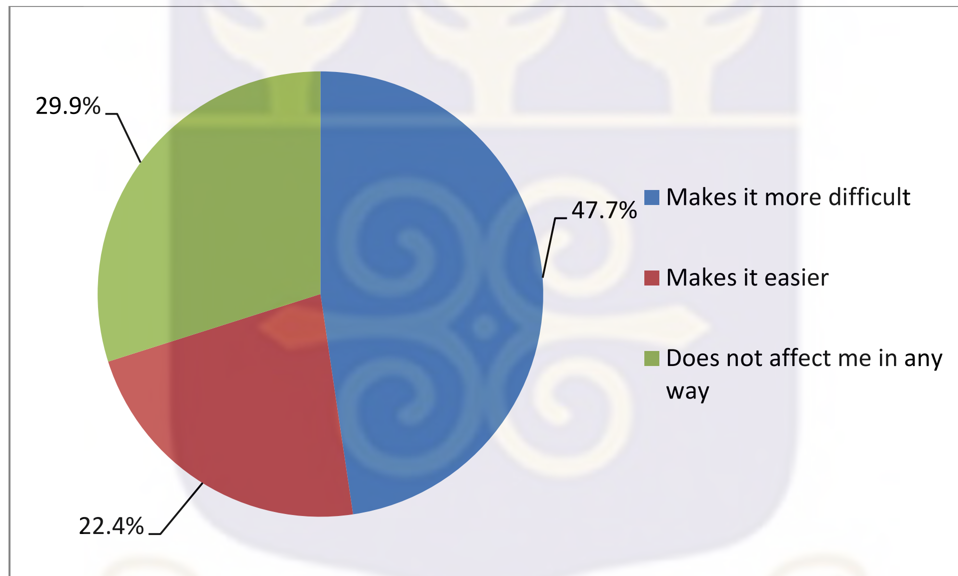

Figure 14: Respondent reported effect of health system on their ability to diagnose TB in children

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CHAPTER 5

DISCUSSION

The study describes that multiple factors contribute to the low TB case detection rate in the Cape Coast Metropolis. For healthcare workers, factors identified included low knowledge level about childhood TB, poor attitudes towards children diagnosed of TB, and TB-related practices that are at variance with the standard protocols for childhood TB case detection. The leadership factors included poor supervision at the facility level in relation to childhood TB, and limited motivation of staff. Unavailability of diagnostic aids in the form of TB guides and proximity of X-ray services were also identified as challenges.

In general, the knowledge level of healthcare workers about childhood tuberculosis was inadequate with over a quarter of the respondents not knowing the aetiological cause of TB in children, and points to a general deficit in basic knowledge about TB. This was surprising especially because of several TB educational campaigns over the years with healthcare workers being active stakeholders. . Furthermore, less than a third of the healthcare workers knowing the age range at which most case of childhood TB occur and suggests that most of the healthcare workers are likely to miss most of the TB cases in children even when they present at the health facilities as they are not paying enough attention to the most at risk age group.

The finding that only 3 of the respondents knew the childhood TB control strategies further support, the perception about inadequate knowledge level about childhood TB as well as the approach to dealing with it. It is noteworthy that the three were all employed at the private health centre and included a community health nurse, a medical officer and a laboratory technician. With the three forming less than 25% of the 14 respondents from the private health centre including a community health nurse and a laboratory technician, it suggests as expected that all

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healthcare workers could have adequate knowledge of strategies in the control of childhood TB. The lack of knowledge in majority of respondents of the control strategies provides another piece of information for the low TB case detection in the district since the strategies dictate the approach and practices of healthcare workers with regard to childhood TB control.

Unfortunately, participation in childhood TB workshops had no significant association with adequate knowledge level with the mean score for those who participated being less than those who did not participate (48.5% and 59.2% respectively). This was contrary to expectations based on findings in other studies (Islam, Sanin, & Ahmed, 2017; Kiros et al., 2014). The disagreement could be multifactorial, from the motivation of the participants to the quality of the training. It may also have been due to the small sample size obtained for the study.

Furthermore, it was found that community health nurses who run the CHPS compounds had the lowest mean knowledge scores. This has negative implications for childhood TB control in that they play gate-keeper roles in the health system to pick up suspected cases and refer them appropriately. And where they lack arguably the most important capacity to pick up cases, case detection in the district would remain low with late case detection despite it agreeing with findings in Malawi (Banda, 2014).

It was notable that having adequate knowledge level was significantly associated with being a doctor or a registered nurse, working in the teaching hospital or private health centre, and having a professional experience between 1 and 6 years such that the odds of having adequate knowledge was less than that for those who had been working for less than a year. This could be due to lack of refresher trainings on childhood TB following completion of professional training that may not be limited to childhood TB alone.

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The finding that only three (2.8%) of the healthcare workers, all at the private health centre, knew the childhood TB control strategies highlights the level of attention given to childhood TB. Lack of knowledge possibly plays into the low case detection and notification of cases.

The study also explored the perceptions of healthcare workers' perceptions about childhood TB with the findings agreeing with the findings of studies conducted in Tanzania among primary healthcare workers to the effect that childhood TB was uncommon (Bjerrum et al., 2012b). In the study about 60% of the respondents indicated specifically that childhood TB was not common with community health nurses forming 53% of that proportion. And this is detrimental to suspicion and referral of children with TB to bigger facilities adequately staffed and equipped to diagnose and manage them. While this may reflect a truly low burden of childhood TB in the district, it conflicts with evidence about the growing burden of the disease among children with the burden suggested to be higher than thought to be (Marais et al., 2006). Besides, the 10% expected childhood TB target was not arbitrarily selected, giving importance to possible reasons why it was being missed. As per general principle held in clinical practice of formulating differential diagnosis the diseases that are perceived to be common are the ones investigated for and treated as a priority. The implication therefore is that the healthcare workers do not consider TB high on their differential diagnosis list hence low propensity to screen children for TB.

Similarly, approximately 60% of the respondents held the perception that childhood TB is a problem in Ghana which conflicts to some degree with the perception that it is not common since effective treatment is available under the perceived situation of the disease being uncommon. On the other hand, it provides useful information about the healthcare workers to the effect that they recognize the impact of TB on infected children and on the society, and a possible awareness of the diagnostic challenge. This suggests that given the needed orientation and training, great

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strides could be made in the fight to control TB in children. The variable predominant response of healthcare workers across the different health institutions suggests variable levels of interest in childhood TB contrary to what is expected for disease under control programmes, where a uniform view and attitude towards the disease is maintained.

Furthermore, majority (87.9%) of the respondents considered the level of risk to children of being infected with TB from infective mothers to be high, showing that they were aware of the contagious nature of TB though the general knowledge level was low.

The perception was held by a considerable percentage of respondents that the National TB Control Programme (NTP) is not giving childhood TB the needed attention or had no idea about the level attention it received from the NTP. This is noteworthy as the TB control strategies are carried out by the healthcare workers. This could imply therefore that the healthcare workers feel they are not engaged enough with regard to childhood TB control specifically though they recognize it as a problem in Ghana.

The referral system plays a significant role in childhood TB diagnosis (Holschneider et al., 2013) in transitioning suspected cases from the primary healthcare facilities such as the CHPS compounds, health centres, and polyclinics to the secondary and tertiary facilities which are better resourced in terms of equipment and expertise of health personnel. Along this line, 30.8% of healthcare workers considered the referral system to be bad and about 50% of this group were from the Teaching Hospital. This picture was expected as those at the Teaching hospital receive the referred cases so are in a good position to give an opinion of the referral system based on the means and condition in which referred cases reach their facility from time of onset of the symptoms. The opinion of respondents from the other health facilities can however not be

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ignored. It is noteworthy that 50% percent of the healthcare workers at the Teaching Hospital also thought the referral system was not good, which implies that the respondents possibly assessed the referral system by different parameters, or may simply not have enough insight into the effect of the referral system on patients who are referred since they are not all responsible for receiving them or assessing them on arrival at the health facilities. The differences across the health facilities were also expected as the health facilities are lined up along different levels of the health system with varying resources.

The attitudes surveyed in this study were discrimination against children diagnosed of TB and the presence of any level of discomfort among healthcare workers when attending to children with TB as reported by the healthcare workers. About 5% of the respondents indicated that children infected with TB were discriminated against, which is an important finding since such attitudes are detrimental to childhood TB control in discouraging parents/guardians to follow through with treatment or encourage community members to access care at health facilities. No discrimination is justifiable as TB control in general is non-discriminatory. Besides, it was expected that the respondents would give socially desirable responses of no discrimination. A single reported case of discrimination raises cause for concern. It is also likely that the true percentage of healthcare workers who were aware of some form of discrimination is higher than this due to social desirability bias in the responses provided. This is a matter of concern that needs to be addressed especially where several studies have identified discrimination as a barrier to the diagnosis and control of childhood TB (Chiang et al., 2015; Ministry of Health, 2014; WHO, 2014) and patients having "*an inherent right to be treated with respect and dignity, including the delivery of services without stigma, prejudice, or discrimination*" according to the Patient's Charter for Tuberculosis Care (Holschneider et al., 2013). About 30% of the

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participants expressed some level of discomfort towards attending to children infected with TB and elucidates the need to reorient healthcare workers on childhood TB and address this negative attitude and others like it.

The inquisition into the TB related activities at the health facilities, showed a general inconsistent set of practices across the health facilities in relation to the stipulated practices in the *Standard Operation Procedures for TB Case Detection for Ghana, March 2010* document. With regard to contact tracing about a third of the respondents indicated that contact tracing was never done in their health facilities, which may have some verity to it and raises interests in the knowledge about contact tracing procedure. This is may be evidence of substandard contact tracing practices as was found in a study conducted in Ethiopia (Assefa, Klinkenberg, & Yosef, 2015) that represent a missed opportunity for childhood TB control. In a study conducted in Brazil to detect tuberculosis among contacts of patients with tuberculosis it was found that 92.4% had household contacts, of which 66.5% were the child's parents with a greater occurrence of TB when the contact lived with more than one source of infection (Caldeira, Sant'Anna, & Aide, 2004). Studies conducted in Botswana also support the need for enquiry into the factors influencing contact tracing (L. B. Tlale, Masupe, Molefi, & Tshikuka, 2015; L. Tlale et al., 2016).

Education of patients is one of the interventions in the SOP document to be done at the out patients' department (OPD) by the staffs at the records and waiting area, who are usually the enrolled nurses and registered nurses. Significant proportions of these staff however indicated that they did not provide education to parents representing a lost opportunity of educating parents in the facilities they work in. The significant difference in frequency of education across the health facilities suggests the need to train health staff on the SOPs for TB case detection.

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Moreover, the content of the education provided by healthcare workers would be worth investigating as some of them may have provided socially desirable responses.

Furthermore, none of the health facilities had a logbook for the TB related activities. Neither did any of them have a logbook for suspected cases as indicated as part of the SOPs for suspecting TB at the OPD reception/records/waiting area. It is not surprising that most of the respondents indicated that no refresher trainings on the Standard Operating Procedures for TB case detection were conducted in their facilities. Similarly, none of the health facilities were given targets for the number of suspected cases to pick up in line with the 5% indicated in the SOPs document though 88.8% of the respondents specified that they were given targets.

The fact that children were not routinely screened for TB in the health facilities except at the Metropolitan Hospital even with the symptom-based screening tool which was rolled out as a routine screening tool at the OPD points out the bias in TB intervention programmes possibly resulting in the low case detection rates in the district. In support of this point was the finding that all the health facilities but the metropolitan hospital gave a verified response to the effect that the symptom-based screening tool was not used on children suggesting that TB interventions should categorically be stated to include children.

With childhood TB being practically more difficult to diagnose than in adults, the help-seeking behaviour of healthcare workers presents a positive impact on case detection. Notably 29% of the respondents indicated that they never sought for help, which could be an underestimation due to social desirability bias of the responses. Healthcare workers need to be taught to seek help as much as possible and even a second opinion with suspected cases.

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Two systemic factors that were assessed were the reported work conditions of healthcare workers and the level of supervision in the various health facilities. Majority of the respondents stated that their work condition was good which means that most of them feel motivated in carrying out their responsibilities at work as suggested by the study conducted by Alhassan et al. (2013) where there was significant association between satisfaction levels and working conditions and the efforts of health facilities towards quality improvement and patient safety. A similar finding was made by Aduo-Adjei, Emmanuel, & Forster (2016) in a study conducted at the Korle Bu Teaching Hospital. Similarly, if the level of supervision is high, it invariably influences the motivation and performance of healthcare workers. With 64.5% of respondents assessing the level of supervision as average, and about a fifth that it was high it is obvious the NTP cannot depend on the current supervisory system of the health system to give the needed attention to childhood TB. Besides, over 50% of the respondents indicated that they receive no supervision from their TB coordinator in relation to childhood TB, with reported supervised areas being variable. This finding provides the useful insight about the need for reinforcement of the supervisory interventions for TB with more focus on childhood TB and to standardize protocols and supervisory functions.

In this study, majority of the respondents (70.1%) indicated that no performance assessment was conducted in their facilities with regards to childhood TB, and confirmed by 8 public health unit heads out of the 13 participating facilities to the effect that no performance assessment was conducted. Against the background of low level of notified childhood TB cases and poor supervision, the performance is most likely very poor, which results in "*inaccessibility of care and inappropriate care, which thus contribute to reduced health outcomes as people are not*

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using services or are mistreated due to harmful practices" as suggested by Dieleman & Harnmeijer (2006).

Besides this, the unavailability of the TB documents listed in the SOPs document at the facilities as well limited accessibility to X-ray services contribute to poor performance of healthcare workers with regards to childhood TB specifically, especially where majority of them claim they receive no incentives for their TB-related work. Interventions to increase childhood TB case detection would therefore require addressing the performance standards and factors that affect it, and importantly so as over a third of the respondents stated that the nature of the health system makes it difficult for them to diagnose TB in children, and about 30% being indifferent to its effect on them.

Limitations

Some of the health facilities did not grant permission for the study to include their health workers which contributed to the small sample size obtained and limited the generalizability of the findings to the whole district. The time limitation for the study also made it difficult to follow up on all the healthcare workers who consented to participate in the study but were unable to complete the questionnaires due to tight work schedule. A major limitation was the provision of socially desirable responses to some of the questions that could not be completely verified resulting in information bias. Other limitations included recall and selection bias. Furthermore, the research topic lends itself to mixed method approach, but was not possible due to time limitation.

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CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Childhood TB control faces significant challenges in the Cape Coast Metropolis despite proven interventions rolled out by the NTP over the years with only 2.8% (3) of the participants knowing the childhood TB control strategies. The knowledge level was inadequate in general and statistically significant differences in knowledge levels occurring between the various health facility categories, healthcare worker categories and professional experience.

Only 10.3% (11) respondents had participated in any specialized childhood TB workshop over the past two years, indicating that most of the healthcare workers were not reached by the training intervention. Besides, participation in the specialized workshop did not make significant difference to their knowledge level as compared to those who had not participated in any such workshop. Furthermore, there were suggestions of discrimination against children infected with TB in some health facilities and discomfort attending to children with TB by some healthcare workers.

Supervision received by healthcare workers in the health facilities was generally varied and practices at variance with standards stated in the *Standard Operating Procedures for TB Case Detection for Ghana, March 2010* document, and almost all the health facilities did not have copies of TB documents listed in the Standard Operating Procedures document.

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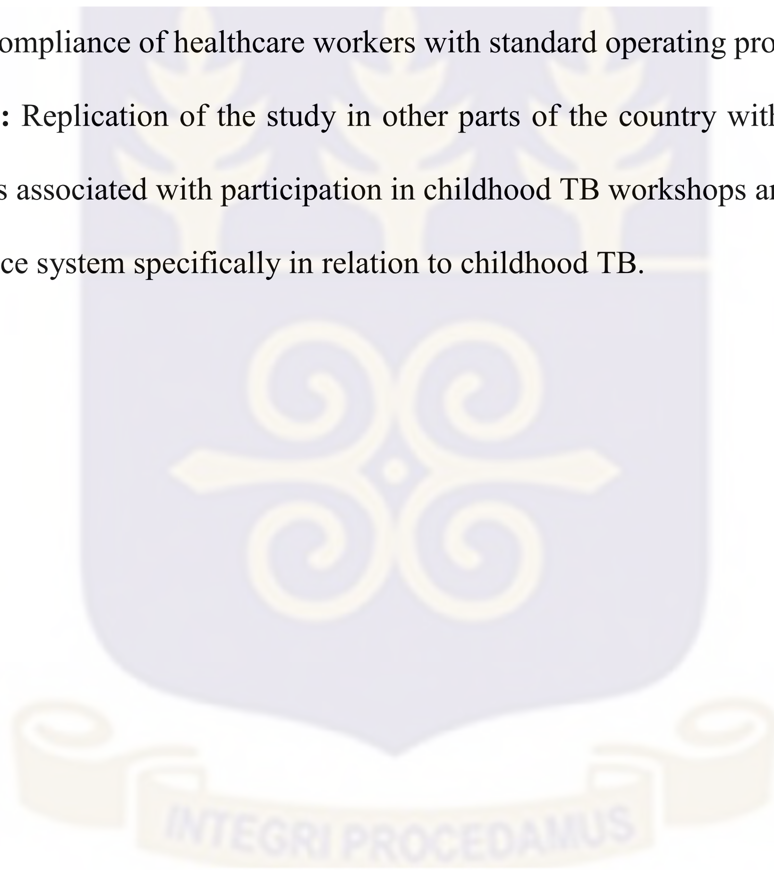
6.2 Recommendations

- **Clinical context:** improve the level and quality of supervision at the health facilities in line with the Standard Operating Procedures for TB case detection
- **Policy**: the National Tuberculosis Programme needs to intensify and regularize childhood TB training workshops at all levels of healthcare at no cost to participants, make TB documents readily available to all health facilities and to reinforce the supervisory systems available in the health facilities through the metropolitan health directorate, and monitor compliance of healthcare workers with standard operating procedures.
- **Research:** Replication of the study in other parts of the country with further probe into the factors associated with participation in childhood TB workshops and evaluation of TB surveillance system specifically in relation to childhood TB.



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APPENDICES

Appendix I. Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

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

My Ref. GHS/RDD/ERC/Admin/App/17/339
Your Ref. No.

Gideon Doudo
School of Public Health
University of Ghana
P. O. Box LG 13
Legon

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

GHS-ERC Number	**GHS-ERC: 25/12/2016**
Project Title	"Knowledge, Attitudes and Pracices of Healthcare Workers in the Cape Coast Municipality in Relation to Childhood Tuberculosis and their Perceptions about the Health System"
Approval Date	14th March, 2017
Expiry Date	13th March, 2018
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...
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

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

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Appendix II. Consent Form

CONSENT FORM

Study title: Health System Factors Influencing Childhood Tuberculosis Case Detection in the Cape Coast Metropolis, Ghana

Principal investigator: Gideon Duodu

Address: c/o Mr Kojo Dadzie, P. O. Box CE 11777, Tema Community 11

Mobile number: 0541230939

General information about the research: This research seeks to assess the knowledge, attitudes and practices of health care workers about childhood tuberculosis and their perceptions about the health system within which they work with the intent of providing a baseline for the assessment of the impact of specialized childhood tuberculosis training courses that have been implemented to increase childhood tuberculosis cased detection in Ghana. The research will be conducted over a period of three months, from April 2017 to June 2017.

Potential risks: There are no known risks for participating in this study

Benefits: There is no direct benefit to participating in the study. However, your participation provides the investigation with understanding of the limitations and health system challenges faced by health workers in the detection of childhood tuberculosis cases that could potentially limit the impact of the specialized childhood tuberculosis workshops on case detection.

Confidentiality: All possible steps have been taken to ensure your privacy. The questionnaire you fill has been assigned an arbitrary code number which will be used throughout the study. Only this code (not your name) will be used when analysing or reporting the data in order to maintain confidentiality.

Voluntary participation and withdrawal: Participation in the research is voluntary. You are free to withdraw from the study at any time. If you choose not to volunteer or if the research is ended for any reason by you or the researcher, this will have no effect on you.

Dissemination of findings: The results of the study may be published in a peer-reviewed journal, presented at conferences, or used as lecture notes.

Agreement: By signing this document, I am stating that I understand that the data obtained from this survey is for research purposes only. I am also stating that I have had the opportunity to ask questions concerning all aspects of the survey. I am also aware that participation is voluntary, that I may withdraw my consent at any time and that if I decide not to participate or decide to withdraw my participation I will not be affected in any way.

I the undersigned, hereby, consent to be a participant in this study.

Signature of participant: ………………………………………………………….

Date: ………………………………………

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

Signature of investigator: ……………………………………………………

Date: …………………………………

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Appendix III. Survey Questionnaire

PLEASE ANSWER ALL THE FOLLOWING QUESTIONS IN THE WAY THAT BEST REPRESENTS YOU, YOUR KNOWLEDGE AND PERCEPTIONS

A. DEMOGRAPHY

1. Sex: M / F
2. Age
   a) ≤ 20 years
   b) 21 – 25 years
   c) 26 – 30 years
   d) 31 – 35 years
   e) > 35 years
3. Job title:
   a) Community health nurse
   b) Public health nurse
   c) Physician assistant/Medical assistant
   d) House officer
   e) Medical officer/Resident
   f) Paediatrician
   g) Disease control officer
   h) TB coordinator
   i) Other. Please specify ……………………………….

4. Facility employed in:
   a) CHPS compound
   b) Health centre
   c) Polyclinic
   d) Cape Coast Metropolitan Hospital
   e) Cape Coast Teaching Hospital
   f) University of Cape Coast Hospital
   g) Private health centre
   h) Metropolitan Health Directorate

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5. How long have you been working under your current job title? ……………….

6. Have you attended any CHILDHOOD TUBERCULOSIS WORKSHOPS over the past 2 years?
   a) Yes
   b) No

B. PERCEPTION AND KNOWLEDGE ABOUT TUBERCULOSIS IN CHILDREN

7. How common is tuberculosis in children?
   a) Not common
   b) common
   c) Very common
   d) I don't know

8. Is tuberculosis in children a problem in Ghana?
   a) Yes
   b) No
   c) I don't know

9. How easy is it to diagnose tuberculosis in children?
   a) Not easy
   b) Easy
   c) Very easy
   d) I don't know

10. Are there any guidelines for diagnosing tuberculosis in children?
    a) Yes
    b) No
    c) I don't know

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11. How do children get infected with TB?
    a) From dust in the air
    b) Contact with a person infected with TB
    c) Spiritual
    d) I don't know

12. What is the name of the organism that causes tuberculosis in children?

    ……………………………………………………………………..

13. At what age do most cases of TB in children occur?
    a) Less than 5 years
    b) Between 5 years and 10 years
    c) Between 10 years and 15 years
    d) I don't know

14. Within how many years after exposure to a TB contact do children usually develop TB?
    a) 2 years
    b) 4 years
    c) 5 years
    d) I don't know

15. What is the risk level to an infant of being infected with TB if his/her mother has TB?
    a) No risk
    b) Low risk
    c) High risk
    d) Very high risk
    e) I don't know

16. A child with tuberculosis can easily infect another person with tuberculosis
    a) True
    b) False
    c) I don't know

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17. What is the commonest form of TB in children?

   a) TB Lymphadenitis
   b) TB of the spine
   c) Abdominal TB
   d) Pulmonary TB
   e) I don't know

18. Tuberculosis in children can present as any of these:

a)	Lymphadenitis	(i) True	(ii) False	(iii) I don't know
b)	Pleural effusion	(i) True	(ii) False	(iii) I don't know
c)	Spinal disease	(i) True	(ii) False	(iii) I don't know
d)	Pericarditis	(i) True	(ii) False	(iii) I don't know
e)	Abdominal	(i) True	(ii) False	(iii) I don't know
f)	Miliary disease	(i) True	(ii) False	(iii) I don't know
g)	Meningitis	(i) True	(ii) False	(iii) I don't know
h)	Bone disease	(i) True	(ii) False	(iii) I don't know

19. Typical symptoms of tuberculosis in children include: (circle all the possible options)

   a) Persistent cough
   a) Weight loss
   b) Failure to gain weight
   c) Fever
   d) Night sweats
   e) Fatigue
   f) Reduced playfulness
   g) I don't know

20. Tuberculosis rarely causes death in children:

   a) True
   b) False
   c) I don't know

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21. The diagnosis of TB can be made with confidence in the majority of children using careful clinical assessment
    a) True
    b) False
    c) I don't know

22. Important aids for diagnosis of TB in children include:
    a) Chest X-ray
    b) Full blood count (FBC)
    c) Erythrocyte sedimentation rate (ESR)
    d) Tuberculin skin test
    e) Sputum AFB
    f) Gene Xpert
    g) I don't know

23. What is the commonest abnormal chest X-ray finding in a child with TB?
    a) Pleural effusion
    b) Consolidation
    c) Lymphadenopathy
    d) I don't know

24. Do you know the three I's of childhood TB control?
    a) Yes
    b) No

25. If your answer to 29 was YES, please list the three I's of childhood TB control:
    i. ……………………………………………………………………….
    ii. ………………………………………………………………………..
    iii. ……………………………………………………………………….

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C. ATTITUDES AND PRACTICES

26. Is tuberculosis in children given the needed attention by the National Tuberculosis programme (NTP)?
    a) Yes
    b) No
    c) I don't know

27. Are children with TB discriminated against by health workers in your health facility?
    a) Yes
    b) No
    c) I don't know

28. How comfortable are you when attending to a child with TB?
    a) Very uncomfortable
    b) Uncomfortable
    c) Comfortable
    d) I have not attended to a child with TB before

29. In this health facility how often do you do contact tracing for children diagnosed of TB?
    a) Never
    b) Sometimes
    c) Often
    d) Always

30. How often do you educate parents about TB in children?
    a) Never
    b) Sometimes
    c) Often
    d) Always

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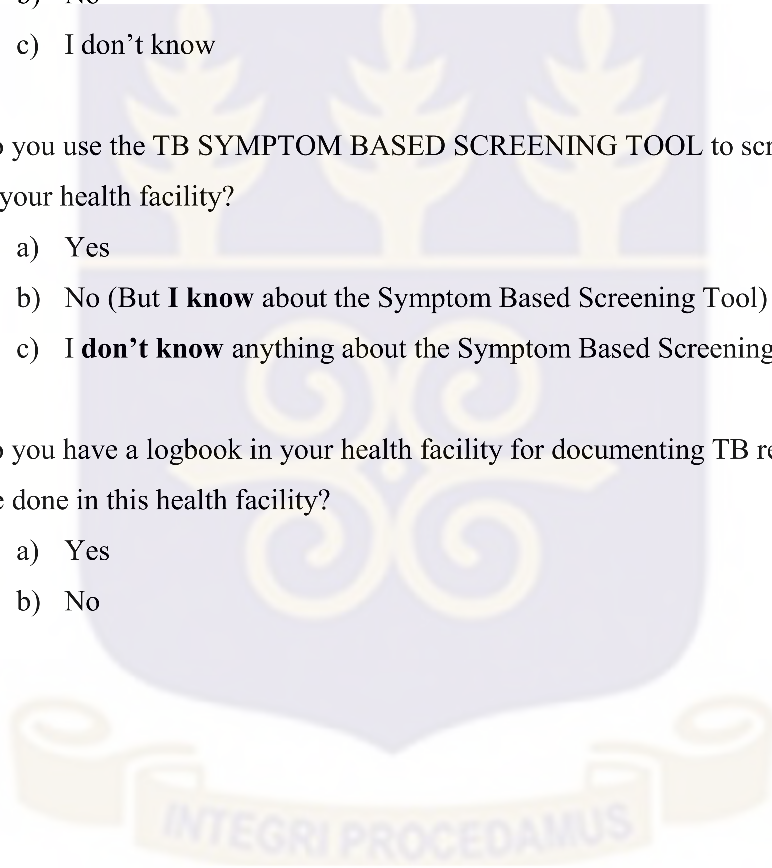
31. How often do you seek help from your colleagues or superiors for diagnosis of TB in children?
    a) Never
    b) Sometimes
    c) Often
    d) Always

32. Are children routinely screened for TB in your health facility?
    a) Yes
    b) No
    c) I don't know



33. Do you use the TB SYMPTOM BASED SCREENING TOOL to screen children for TB in your health facility?
    a) Yes
    b) No (But **I know** about the Symptom Based Screening Tool)
    c) I **don't know** anything about the Symptom Based Screening Tool

34. Do you have a logbook in your health facility for documenting TB related activities that are done in this health facility?
    a) Yes
    b) No

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D. HEALTH SYSTEM FACTORS

35. What do you think of the referral system for referring patients to other health facilities?
    a) Very good
    b) Good
    c) Poor
    d) Very poor

36. What are your working conditions like?
    a) Very good
    b) Good
    c) Poor
    d) Very poor

37. What incentives do you get for your work in relation to tuberculosis? Please tick all applicable options
    a) No incentives
    b) Allowances (money)
    c) T-shirts
    d) Recognition by TB coordinators
    e) Sponsorships for further training

38. What do you think of the level of supervision of work at the health facility?
    a) High
    b) Average
    c) Low
    d) No supervision

39. How often do you get supervision from TB coordinators on childhood TB?
    a) No supervision received
    b) Once a week (weekly)
    c) Once a month (monthly)
    d) Once in 3 months (quarterly)
    e) Once in a year

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40. In which areas do you receive supervision? Please tick all options that apply
    a) Case detection
    b) Registration of cases
    c) Contact tracing
    d) Reporting
    e) Data validation
    f) No supervision

41. How often do you have refresher trainings on the Standard Operating Procedures (SOPs) for TB Case Detection?
    a) No refresher trainings on SOPs are organized
    b) Once a month (monthly)
    c) Once in 3 months (quarterly)
    d) Two times in a year
    e) Once in a year
    f) Other. (Please specify): ……………………………………

42. How often do you have performance assessment in your health facility in relation to TB in children?
    a) No performance assessment is done
    b) Once a week (weekly)
    c) Once a month (monthly)
    d) Once every 3 months (quarterly)
    e) Once in a year
    f) Other. (Please specify): ……………………………………

43. Have you been given any targets by your TB coordinators/disease control officer about the number of suspected cases of TB in children to diagnose each month?
    a) No
    b) Yes

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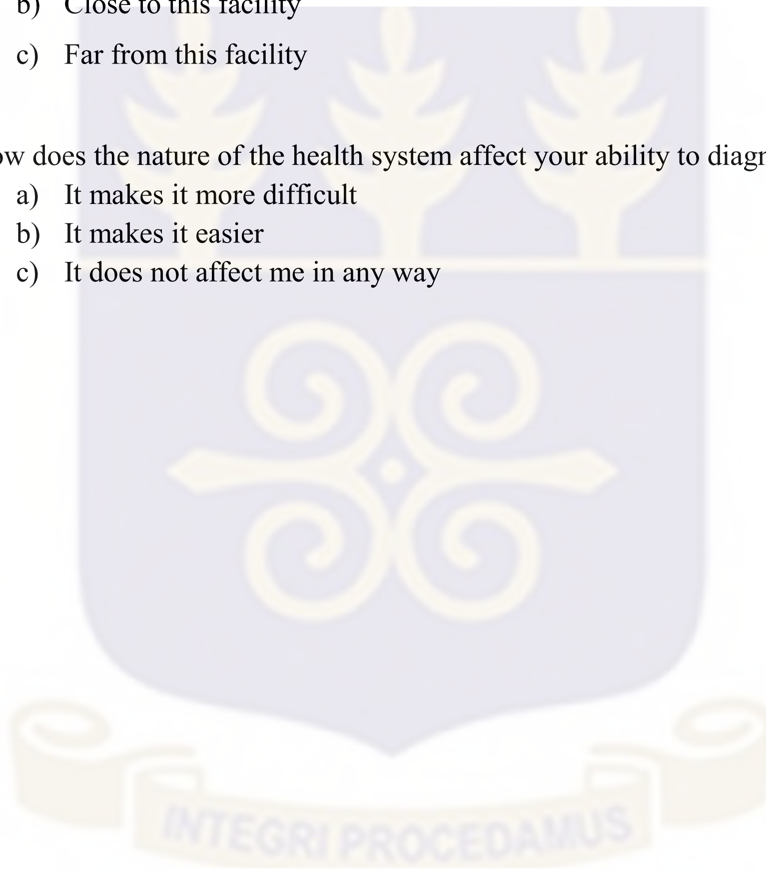
44. Which of the following documents on TB do you have in your health facility? (Please tick as applicable)

TB document	Health facility has it
TB workbook	
TB Desk Aide	
TB training manual	

45. How close are X-ray services to patients attending your health facility?
    a) Available in this facility
    b) Close to this facility
    c) Far from this facility



46. How does the nature of the health system affect your ability to diagnosis TB in children?
    a) It makes it more difficult
    b) It makes it easier
    c) It does not affect me in any way

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Appendix IV. Interview Checklist administered to Head of TB unit

THIS CHECKLIST IS TO BE COMPLETED BY INTERVIEWING THE TB COORDINATOR OF THE HEALTH FACILITY (In the case of CHPS compounds and Health Centres the In-charge of the Unit or Team for the day should be interviewed)

1. Health facility Name: ……………………………………………………………………….
2. How many childhood TB workshops have been organized in the district over the past 2 years? …………………………………
3. Total number of TB cases REGISTERED at the health facility (or the District—for the district TB coordinator) by year:

	2014	2015	2016
Total number of ADULT TB Cases (15 years and above)			
Total number of TB Cases in CHILDREN less than 15 years old			

4. Do you have a logbook for TB activities undertaken by the health facility?

	Logbook seen	Logbook not seen
YES		
NO		

5. If the answer to 4 is YES, please list the different activities logged in the book
   a) ……………………………………………………………….
   b) ……………………………………………………………….
   c) ……………………………………………………………….
   d) ……………………………………………………………….
   e) ……………………………………………………………….

6. Do you have targets for childhood TB cases in your facility?
   a) Yes
   b) No

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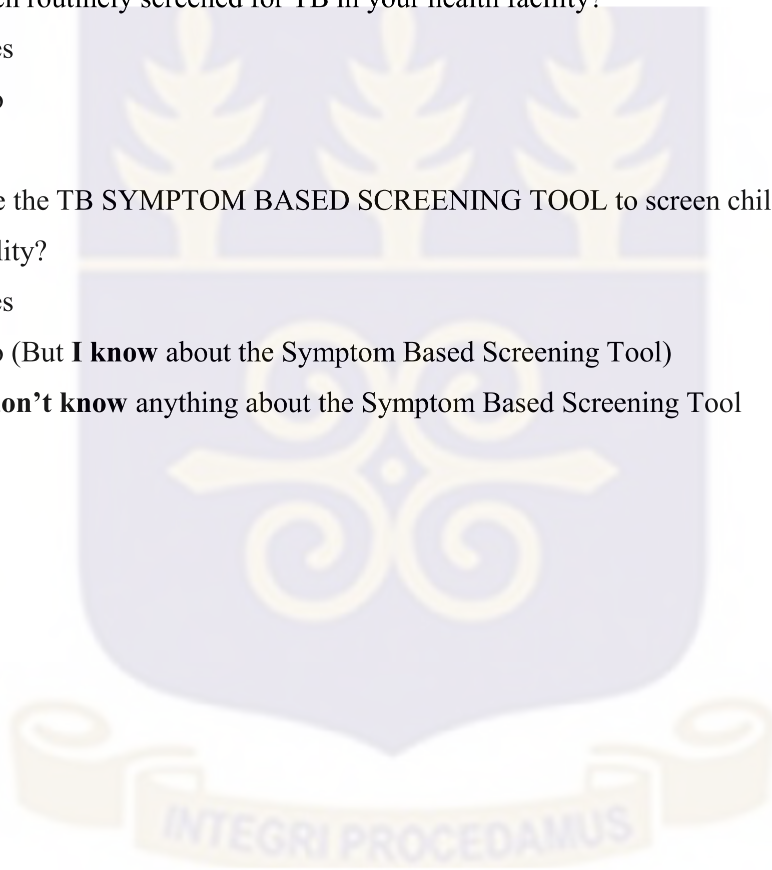
7. Which of the following TB materials do you have in this health facility?

	Available		**Not available**
	SEEN	NOT SEEN	
TB workbook			
TB Desk Aide			
TB training manual			
SOPs for TB Case Detection in Ghana, March 2010			

8. Are children routinely screened for TB in your health facility?
   d) Yes
   e) No

9. Do you use the TB SYMPTOM BASED SCREENING TOOL to screen children for TB in your health facility?
   d) Yes
   e) No (But **I know** about the Symptom Based Screening Tool)
   f) I **don't know** anything about the Symptom Based Screening Tool



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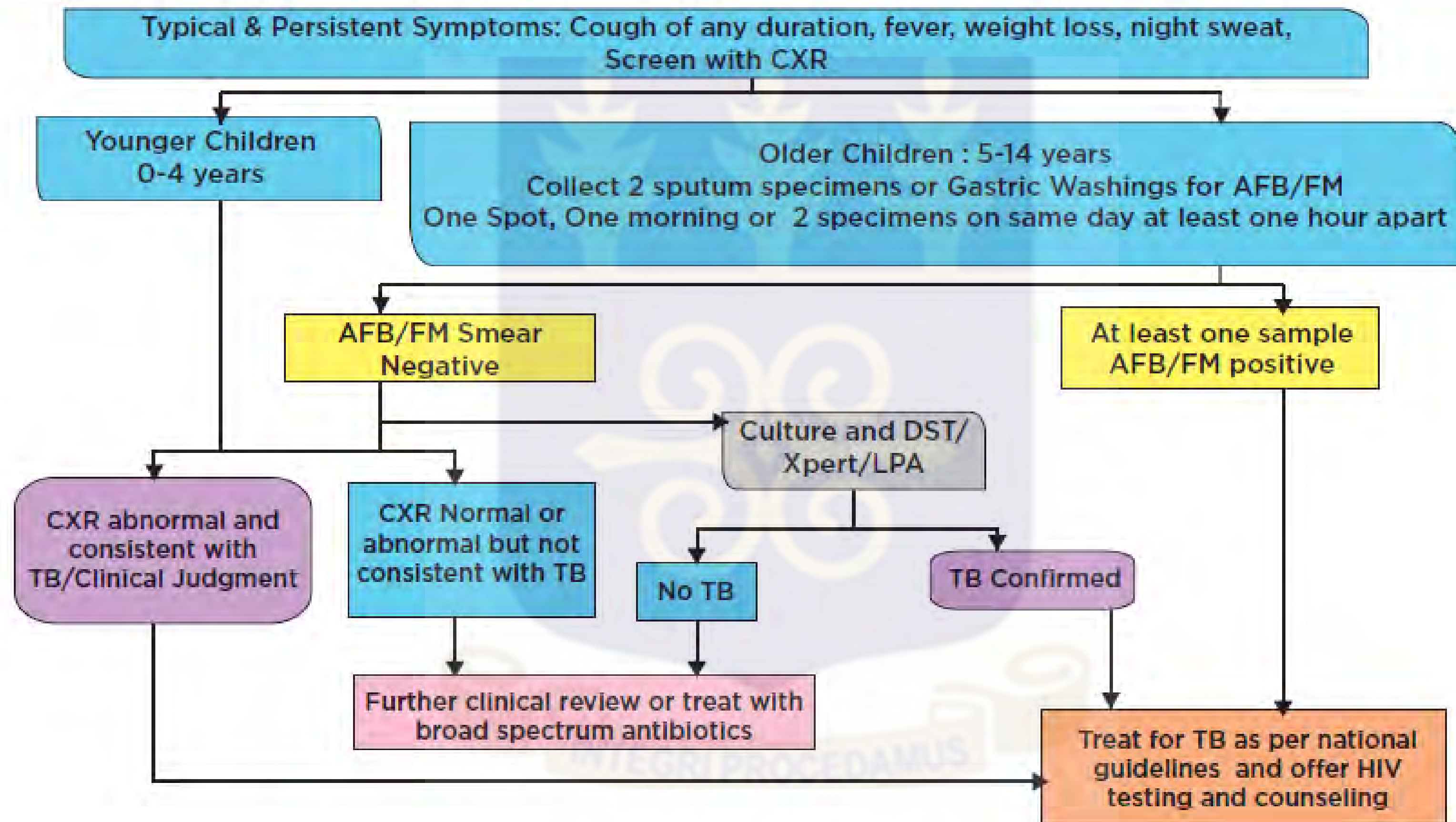
Appendix V. Algorithm for Childhood TB Case Detection



Source: Ghana Health Sector TB Strategic Plan 2015-2020

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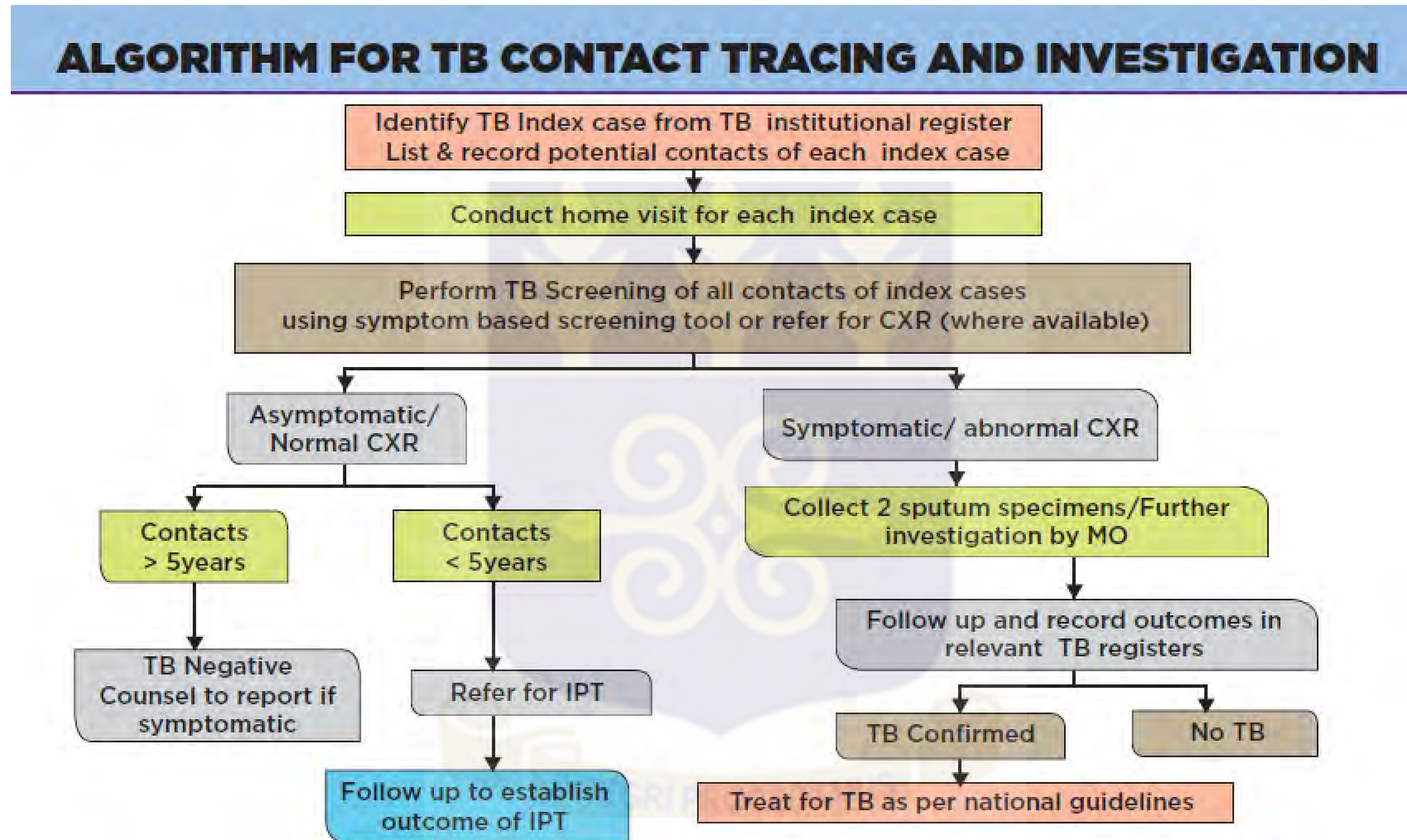
Appendix VI. Algorithm for TB Contact Tracing



Source: Ghana Health Sector TB Strategic Plan 2015-2020