

**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
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DEPARTMENT OF MEDICAL LABORATORY SCIENCE



**Assessment of Knowledge, Attitude and Practice of TB Infection Control
Among Medical Laboratory Professionals in Selected DOTS Providing Health
Facilities under Addis Ababa City Administration Health Bureau,
Addis Ababa, Ethiopia.**

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A thesis submitted to the school of Allied Health Science Department of Medical laboratory science, Addis Ababa University, in partial fulfillment of the requirements for the Degree of Master of Science in Medical Laboratory Sciences (Clinical Laboratory Management and Quality Assurance Specialty Track)

June, 2015

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ACRONYMS AND ABBREVIATIONS

AACAHB	Addis Ababa City Administration Health Bureau
AAU	Addis Ababa University
AFB	Acid Fast Bacilli
BCG	Bacille Calmette-Guerin
DOTS	Directly Observed Treatment, Short-Course
EPHI	Ethiopian Public Health Institute
FMOH	Federal Ministry of Health
HBCs	High Burden Countries
HCPs	Health Care Professionals
INH	Isoniazid
KAP	Knowledge, Attitude and Practice
LTBI	Latent TB Infection
MDR-TB	Multi Drug Resistance Tuberculosis
NTLCP	National Tuberculosis Leprosy Control Program
PTB	Pulmonary Tuberculosis
RNTCP	Revised National Tuberculosis Control Programme
TBIC	Tuberculosis Infection Control
TLCP	Tuberculosis Leprosy Control Program
WHO	World Health Organization
XDR-TB	Extensively Drug-Resistant TB

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Abstract

Background: Tuberculosis is one of the major public health problems and health workers, especially laboratory professionals, are at high risk areas for infection compared to the general population. Infection control measures are not always implemented even when HCWs are well informed. Insufficient studies were found that examine the level of knowledge, attitude and practice about TB infection control mechanisms among medical laboratory professionals in Ethiopia.

Objectives: - To assess knowledge, attitude and practice of TB infection control among medical laboratory professionals in selected DOTS providing health facilities under Addis Ababa City Administration Health Bureau, Addis Ababa, Ethiopia.

Methods: Cross sectional study was conducted in Addis Ababa between September 2014 and May 2015 on 213 Medical Laboratory professionals in selected DOTS providing government health facilities. Pre-tested and self-administered questionnaire were used. Data entry and analysis was performed by using SPSS version 20 software. Descriptive statistics, bivariate and multivariate analysis were made. The level of statistical significance was set at $p < 0.05$.

Results: A total of 213 participants filled the questionnaires (response rate were 95.9%) the mean knowledge score was $7.69 \pm (SD 2)$, mean attitude score were $44.63 \pm (SD 4)$ and mean practice score were $10.56 \pm (SD 2.75)$. Statistically significant association were observed between total knowledge and last training (AOR=5.03, 95%CI=2.129, 11.901) and presence of TB manual (AOR=0.108, 95%CI=0.037, 0.315). Total attitude score had significant association with level of health facility (AOR=2.715, 95%CI=1.262, 5.841). Total practice score had significant association with the duration last training obtained (4.77 , 95%CI=2.173, 10.472).

Conclusion: About 33.3% of the study participants had poor knowledge, 46.9% of them had negative attitude and 41.8% of them had poor attitude. Total knowledge score had significant association with last training, presence of TB manual and overall practice score. Total attitude score had significant association with level of health facility. Total practice had significant association with last training. Mean difference were observed between hospital and health center for knowledge but not for attitude and practice.

CHAPTER ONE

INTRODUCTION

1.1 Background

Tuberculosis is an infectious bacterial pathogen caused by the bacillus called *Mycobacterium Tuberculosis (M.TB)*; an acid fast rod shaped bacillus 0.8-5µm in length and 0.2-0.6µm in thickness. It typically affects the lungs (pulmonary TB) but can affect other sites as well (extra pulmonary TB). Untreated pulmonary TB patients discharging bacilli are the main source of infection. The disease is spread in the air when people who are sick with pulmonary TB expel bacteria, for example by coughing, sneezing and inhaled by healthy persons. People living in the same household, or who otherwise are in frequent contact with an infectious patient have the greatest risk of being exposed to the bacilli [1].

In general, a relatively small proportion of people infected with *M. tuberculosis* will develop TB disease. However, the probability of developing TB is much higher among people affected by poverty, malnutrition and crowded living conditions have been known for decades to increase the risk of developing the disease. More recently Human Immunodeficiency Virus (HIV) infection has been identified as a major risk factor for developing TB. TB affects all ages and both sexes within the every socio-economic group among the population. The age group mainly affected is between 15 and 45 years, which leads to grave socio-economic consequences in a country with high prevalence of the disease [1, 2].

According to World Health Organization (WHO) Global TB Report 2012, there were an estimated 8.7 million incident cases and 12 million prevalent cases of TB globally, in 2011, of which 1.1 million (13%) were among people living with Human Immunodeficiency Virus (HIV). About 26% of the incident TB cases occurred in Africa in 2011. The 22 High Burden Countries (HBCs) that have been given highest priority at the global level since 2000 accounted for 82% of all estimated cases worldwide. According to the same report, there were an estimated 630,000 Multi Drug Resistance Tuberculosis (MDR-TB) cases among the World's 12 million prevalent cases of TB in 2012 [3].

Ethiopia is one of the 22 HBCs, ranking 7th; the national population based TB prevalence survey conducted in 2010/11 revealed that the prevalence of TB in Ethiopia were estimated to be 240/100,000 populations. According to the WHO global TB report 2012 there were an estimated prevalence of 200,000 (237/100,000 populations) and 220,000 (258/100,000 populations) incident cases of TB in Ethiopia in 2011. There was an estimated 15,000 deaths (18/100,000 populations) due to TB. According to the same report there were an estimated 1700 and 550 MDR TB cases among notified new and re-treatment TB cases respectively in Ethiopia [4].

The vast majority of TB cases (95%) and deaths (98%) occur in resource limited countries. Each year, an individual with active Pulmonary Tuberculosis (PTB) infects an average of 10–15 people. Moreover, in a community with low levels of awareness about the causes, mode of transmission and preventive methods, the spreading of TB could be high [5, 6].

1.2 Statement of the problem

Tuberculosis is a major public health problem throughout the world. About a third of the world's population is estimated to be infected with tubercle bacilli and hence at risk of developing active disease. Healthcare workers, especially those who have frequent contacts with TB patients, are at higher risk of TB infection compared to the general population. Non-medical staffs in healthcare settings are also at risk, as undiagnosed pulmonary TB patients with cough present the risk of TB infection to close contacts and healthcare workers. Waiting rooms and corridors where patients wait to receive medical care are also areas of particular risk on most occasions. Incidence of TB among people working in congregate settings like laboratory, TB clinics and wards exceeds that of the general population [4].

Health care providers' lack of knowledge about TB, inadequate skills and not following treatment guidelines, lead to incorrect diagnosis and advice being given to patients and also affects the quality of service [7, 8].

Health care workers have 10–20 times higher risk of developing nosocomial tuberculosis (TB) than the general population. Center for Disease Control and Prevention (CDC) in 2005 reported that HCWs had lack of knowledge about TB infection control, which contributes to an increased risk. However, HCWs did not comply with the standard TBIC measures even if they were properly trained [9, 10, 11].

Highest prevalence of TB were found among laboratory staff (43.4%), followed by technician staff (39.4%), doctors (34.4%) and nurses (32.2%), and the lowest was observed in administrative staff (25.2%) in China. The median prevalence of latent TB infection (LTBI) in HPs was 63%. Risks of TB among HPs were high by confirming it using tuberculin skin test conversion [12, 13, 14, 15].

Insufficient studies were found that examine the level of Knowledge, Attitude and Practice about TB infection control mechanisms among medical laboratory professionals in Ethiopia. Thus in this study an attempt is made to explore such trend at Addis Ababa, Ethiopia

1.3 Rationale of the study

This study assist to indicate the progress of TB infection control progress in health care settings, to create awareness about the level of TB infection control besides the laboratory service and also assist in policy makers to develop strategy for promoting and improving TB infection control.

Knowledge, attitude and practice about TBIC interventions are critical for prevention and control of healthcare-associated TB infection, hence this study assist to design and implement the best strategy to prevent and monitor TB infection by health facility management . These interventions are among the most cost effective and available in healthcare settings. Despite the proven efficacy of infection control practices, HCWs often have limited knowledge of and training in their implementation in daily patient encounters [16].

Infection control of TB is one of the interventions recommended by WHO in countries with high prevalence of TB to reduce the burden and this study will also assist the hospitals and health centers managers to be aware of the extent of TB infection and develop strategies for promoting and improving TB infection control practice.

It is noticeable that there are gaps in medical laboratory professional's knowledge, attitude and practice towards TBIC while delivering a laboratory services to clients. In order to fill this gap and in view of the actual progress of TBIC in a health service program, an assessment of the existing level of knowledge, attitude and practice of laboratory professionals in health facilities is needed.

CHAPTER TWO

LITERATURE REVIEW

Studies from varied settings indicate that the level of knowledge, attitude and practice about TB is influenced by many factors including their areas of working environment, type of health institutions, whether public or private sector, year of experience.

A study conducted in Lima, Peru 2013(n=301) on knowledge and attitudes among frontline TB-personnel showed that major knowledge gaps were noted primarily in themes relating to treatment and diagnostics of TB and majority (99.2%) of participants agreed that more community involvement was needed to improve TB control and prevention and also that educating patients about TB was an important part of the TB treatment regime [17].

A comparative assessment of KAP regarding TB and Revised National Tuberculosis Control Program (RNTCP) among government and private practitioners in district Gwalior, India, 2011(n=200 from both government and private) showed that there were a large gap on TB and RNTCP among practitioner in both sectors. The mean score of knowledge related to TB and RNTCP was higher among government practitioners compared to private practitioners. There were a strong positive attitude towards RNTCP training and regular up gradation of knowledge (recent advances) on TB should be provided to all the practitioners. Concerning the referral practice, 85% of private practitioners preferred non accredited private laboratories as the most common place for sputum examination compared to government practitioners (5%). Non-accredited laboratories do not have any internal or external quality monitoring system which leads to frequent incorrect reporting, thus leading to false diagnosis by the practitioners [18].

Cross sectional KAP study conducted in Bangkok, Thailand, 2013(n= 212) on healthcare providers 56.13% had a good level of TB knowledge; the remaining had a fair level and Providers' knowledge levels were significantly linked to attendance at TB training, as well as their profession. It was found that 56.13% of providers had positive attitudes towards Tb. Most (66.98%) had positive attitudes towards providing Tb services, while 60% had positive attitudes towards the TB -control systems being used. Almost 60% showed negative attitudes towards Tb patients. Concerning TB care, many providers were not delivering care in accordance with the National Tuberculosis Program (NTP) guidelines. Duration of work, TB training attendance, and age were all found to be related to providers' practices in the delivery of TB care. Concerning

sputum collection, almost all medical technologists / laboratory technicians (93.88%) informed patients how to collect sputum for diagnosis. If the returned sputum sample was not suitable for diagnosis, 89.36% of providers would ask the patient to collect new sputum to assist a more accurate diagnosis [19].

A knowledge and infection control study conducted in Russia, 2010(n=96) on healthcare workers showed that the overall TB knowledge scores were low among healthcare workers, especially laboratory technicians and support staff. The biggest area of knowledge deficit was infection control. Knowledge level of TB HCWs could influence the prevalence of nosocomial TB infection [20].

A survey conducted in Jamaica, 2011 (n=245) showed that suboptimal performance on TB-related knowledge was found among the survey participants. Less than 40% of respondents had good knowledge of TB. Significant associations with good knowledge were only found with highest educational level obtained and the number of years employed to a public health facility. Over half of survey participants, 145(58.2%) agreed that TB was a major public health threat to Jamaica. This attitude contributes to the perceived seriousness of this disease locally, another factor considered to impact behavior under the Health Belief Model (HBM) [21].

A study conducted in Ujjain city of India, 2012(n=110) on DOT provider showed that 56.9% of DOTS provider has good knowledge of TB and significantly higher in men (72.4%; $P=0.04$), respondent aged < 30 (79.5%) ($P < 0.05$) and DOTS provider who are in health services ($P=0.016$). 100% identified cough for more than two weeks as the symptom of TB. Correct knowledge of case definition of default, relapse and failure was shown by 45.5%, 34.3%, and 20.6 % respectively. 80.4 % provide DOTS during home visit; knowledge of DOTS providers is not satisfactory about Tuberculosis. However, Knowledge is good in those who have higher qualification and are in health related services. 36.3 % of them had good Attitude and practice. 77.5 % providers were in favor to investigate them for TB. At the end of intensive phase, 70.5 % providers would like to repeat sputum microscopy where only 40.2 % want to repeat it at the end of treatment. If patient didn't come to take medicine at their schedule time 80.4 % providers would visit patients home. 82.4 % of DOTS providers asked for two sputum examination and 57.8 % of DOTS providers referred them to specialist at TB hospital. At the end of intensive phase, 70.5 % providers would like to repeat sputum microscopy where only 40.2 % want to

repeat it at the end of treatment. If patient didn't come to take medicine at their schedule time 80.4 % providers would visit patients home [22].

Another Peruvian study to assess the knowledge and attitudes of health care providers such as doctors and nurses, showed knowledge gaps which include identification of patients at high risk for TB, assessment for treatment outcome and consequences of treatment failure. HCPs agreed that traditional or alternative medicine made the TB situation worse (62.9%), but also understood that social and cultural factors played a part in treatment barriers (67.6%). Over half of HCPs felt that there was limited community awareness and knowledge of TB and only 50% thought that community members knew about facilities available for diagnosis and treatment. HCPs overwhelmingly agreed (98.6%) that educating patients is an important component of therapy and respondents reported a lack of adequate laboratory facilities (52.1%) and lack of adequate numbers of staff members (62.5%). Nearly 60% of providers agreed that TB treatment failures in Peru were due in part to errors in the treatment given for TB [23].

A study conducted in Pakistan 2009(n=22) investigating the knowledge of private practitioners (PPs) regarding TB management reported that private practitioners lacked knowledge in TB diagnosis and management. Only 14% of them advised sputum microscopy solely for pulmonary TB diagnosis; while over 40% PPs did not prescribe TB treatment regimen according to TB-DOTS category. Practice of private practitioners (PPs) regarding TB management reported that Majority of the PPs, 19 (86%), did not advise sputum microscopy for treatment/follow-up of TB patients at the end of 2nd, 5th and 7th months of treatment. At the completion of treatment, none of the PPs evaluated or recorded the treatment outcome as cured, treatment completed or treatment failure, 32% of PPs attended trainings for TB updates through NTP/NGOs training program. Regarding source of their knowledge about TB, 5(23%) PPs identified continuing medical education and two (9%) through medical periodicals [24].

A study conducted in India to assess the doctors' knowledge of TB management, where it was found that although the doctors working in the public sector have better knowledge of TB than the doctors working in the private sector, they all need to be trained for better diagnosis and treatment of TB [25]. In addition a study conducted in Oman, showed that general practitioners (GPs), particularly those working in the private sector, appear to have low suspicion and poor knowledge of TB in the areas of diagnosis, treatment, follow-ups and contact screening [26].

A study conducted in New Zealand showed that some HCWs had positive attitudes toward their TB patients, and valued and enjoyed working alongside with them even when they are not isolated [27]. In addition a study conducted in the Philippines among selected physicians in a tertiary hospital showed that some of them had positive attitude toward the TB patients. While they did not blame the patients, they considered performing physical examination on these patients as very risky [28].

A cross sectional survey conducted in Davangere city of India, 2010 on 181 allopathic and 143 non allopathic general practitioners showed that Majority of the practitioner have opted for some form of defaulter retrieval, with 48.6% of them stating that they would send a message through an acquaintance and the rest would either make a phone call or write a letter. Hundred percent of all doctors in both groups mentioned that they give health education regarding completion and regularity of treatment. Eighteen percent of the practitioners do not create any awareness and the reasons mentioned by some were that creating awareness about the side effects of the drug might lead to discontinuation of drugs and affect the treatment compliance. While most (43.8%) of the practitioners report that health education should be given to improve the drug compliance, 33.7% of them said they would refer to district TB center, 21% would refer to a specialist and 1.4% would threaten and warn [29].

A study conducted in a rural setting in Shandong Province of centers in Iraq, which showed that 38.2% of the 500 health care workers recruited into the study, handled suspected TB cases correctly [30]. However a study conducted at basic health facilities in Vietnam among the health staff showed that the competency related to patient management of tuberculosis patients was low [31].

A Belgian study done to assess the TB prevention practices showed that only 24% of the personnel wore masks adequate for filtering 1 micron size particles. It was also identified in the same study that the precautionary measures taken to prevent transmission of TB were not sufficient [32]. In addition a study conducted in Britain on mechanisms and management of MDR-TB showed that recent outbreaks of MDR-TB were due to bad clinical practices and therefore advocated for good clinical practices to minimize the impact of MDR-TB in the HIV era [33].

Cross sectional KAP study conducted in South Africa, 2014 (n=129) on Health care workers showed that majority of respondents recognized pulmonary TB as being potentially contagious, 117 (90.7%) recognized airborne spread as the mode of transmission, Only 69 (53.5%) considered fever to be a symptom of TB. The majority of respondents knew that sputum examination was a major diagnostic tool; however, only 29 (22.0%) respondents were aware of the appropriate place for sputum collection. All respondents indicated that they were willing to change their habits and practices towards TB IPC methods, with 93.0 % of them reporting positive attitudes. Forty-seven (36.4%) of the respondents self-reported inappropriate practices. On personal protective measures, 92 (71.3%) respondents reported that they used masks, of which 54.4% used the N95 respirator (accounting for 38.8% of the entire sample size). Other personal protective measure practices were fair [34].

A cross-sectional study conducted in Nigeria, 2013 (n= 52) showed that there were knowledge gaps existed regarding TB disease and treatment, but most defects were found in infection control. In this study 48% were Doctors/Nurses, only 14(27%) of the respondents had good knowledge scores [35].

A study conducted in Maseru, Lesotho 2011(n=130) on KAP of healthcare workers about prevention and control of MDR-TB showed that 47.3% of respondents had good knowledge about tuberculosis. 85.5% of respondents had this negative attitude towards patients with MDR-TB. There was no difference with regard to age category, but female respondents held more negative attitude than males (87.9% versus 81.8%). Moreover, respondents with more years of work experience held slightly more negative attitude as well as those who had good level of knowledge about MDR-TB. 61.5% of respondents had their own copy of the MDR-TB management guidelines; while 96% of the participants agreed that having MDR-TB guidelines would assist them in managing appropriately MDR-TB patients; 82.7% of respondents reported that they used the protective masks, N95. Similarly, respondents with negative attitude practiced the use of masks more than those with positive attitude. In contrast, respondents who had good knowledge about MDR-TB significantly wore their protective masks than those with insufficient knowledge. With regard to educating patients about MDR-TB, overall, 66.4% of respondents stated that they were individually involved in educating patients about MDR-TB. With regard to referring to the MDR-TB management guidelines manual, overall, 54.6% of respondents reported that they referred to it [36].

A Study conducted in South Africa, where it was stated that lack of training of HCWs, resulted in poor knowledge about MDR-TB, particularly concerning its causation, mode of transmission and duration of treatment [37]. In addition Loveday et al (2008) reported that inadequate knowledge and understanding by clinicians of effective TB diagnosis and treatment actually led to an increase in MDR-TB [38].

A study conducted in South Africa showed that HCWs are not supportive of TB patients and subject them to stigmatization, which was associated with high default rate from every form of TB treatment [39].

A cross-sectional study conducted in South Africa in 2009(n=499) among HCWs on operational evaluations of IC in drug-resistant TB showed that attending a facility-specific IC training in the previous 12 months was associated with significantly higher knowledge scores. However, the facility having an IC plan, >50% time IC nurse, annual TB training, and taking precautions when assisting in sputum collection were not associated with greater knowledge among participating HCWs [40].

A study conducted in South Africa showed that the HCWs have poor access to TB/MDR-TB information which includes the procedures that protect them from TB infection, and also poor management systems for nurses involved in TB treatment [41].

An institution based cross sectional study conducted in Amhara Region of Ethiopia in 2012(n=112) on private practitioners showed that overall 44 (39.3%) of the private practitioners did not have satisfactory knowledge about DOTS strategy. Those who attended DOTS training during two years prior to the survey were more likely to have satisfactory knowledge compared to those who did not receive training. 88 (78.6%) of the participants correctly indicated that acid-fast bacilli (AFB) sputum microscopy was the best monitoring tool. Among those providing smear microscopy as a tool for treatment monitoring, the correct frequency of treatment monitoring was mentioned by 44 (50%) of the respondents. The other 44 (50%) indicated different schedules that were not according to the recommendations of NTLCP guidelines; 83 (74%) of the respondents use NTLCP manuals as a major source of information about TB control programs [42].

A cross-sectional study was conducted in Addis Ababa in 2014/15(n=590) on health workers showed that 36.1% had poor knowledge and 51.7% unsatisfactory practice score towards tuberculosis infection control. Having more than six years working experience in health facility and tuberculosis related training were significantly associated with knowledge on tuberculosis infection control. Having experience in tuberculosis clinic and tuberculosis related training were significantly associated with practice on tuberculosis infection control [43].

An institution-based study was conducted in Northwest Ethiopia in 2010/2011(n=313) among health professionals showed that 74.4% were found to have good knowledge and 63.2% good practice on TBIC. Training was found to be a predictor of TBIC knowledge and knowledge of TBIC was a strong predictor of good TBIC practice [44].

A cross-sectional KAP study was conducted in Addis Ababa in 2012(n=261) among healthcare workers about hand hygiene and tuberculosis (TB) infection control measures showed that the large majority of HCWs (71%) were concerned about acquiring TB while at work [45].

CHAPTER- THREE

OBJECTIVES

3.1. General Objective

- ❖ To assess the knowledge, attitude and practice of TB infection control among medical laboratory professionals in selected DOTS providing health facilities under Addis Ababa city Administration Health Bureau.

3.2. Specific Objectives

- ❖ To assess the level of knowledge of Medical laboratory professionals about TB infection control.
- ❖ To assess the attitude of medical laboratory professionals towards TB infection control in Addis Ababa city administration Health Institutions.
- ❖ To describe the practice of medical laboratory professionals towards TB infection control in Addis Ababa city administration health institutions.

CHAPTER- FOUR

METHODS AND MATERIALS

4. 1. Study design

Cross-sectional study design were applied by using structured self-administered questionnaire to assess the level of knowledge, attitudes, and practice of Medical laboratory professionals towards TB infection control.

4.2. Study period

The study was conducted between March to May, 2015.

4.3. Study Area

The study was conducted in Addis Ababa at Zewditu Memorial hospital, Ras Desta Damtew Memorial hospital, Yekatit 12 hospital, Minilik II hospital and 21 selected health centers.

Addis Ababa is one of the oldest, largest and fast growing city in Africa and also the capital city of Ethiopia and Africa with an average altitude 2400 meters above sea level with an area of 540 sq. km. The city's governmental structure consists of three administrative levels: the City Government of Addis Ababa, 10 sub-cities and 99 kebeles respectively. Addis Ababa has an estimated total population of 2.86 million with a density of 5394.8 people / km² and its health coverage in the capital has increased to 85% [46, 47].

Regarding health institutions, the city has 47 hospitals both government and private, 83 government health centers [48]. 204 private higher clinics, 226 private medium clinics and 143 private lower clinics. There are 934 physicians, 170 health officers, 430 pharmacy professionals, 3621 nurses, 192 health assistant, 83 environmental health professionals and 602 laboratory professionals in both public and private health institutions [49]. From these hospitals only four government hospitals and 54 health centers under AACAHB provide DOTS for TB patients.

The main reason to select the study sites/ hospitals and health centers found in Addis Ababa/ for this study was based on the availability of TB DOTS program. There were no city or town in the country that has this much amount variety of health facility, professionals and densely populated households living in inconvenient slum and confined areas. It was also convenient for me since I was working for the last ten years, for five years as a medical laboratory professional in health

center and the rest five years as regulatory officer, in Lideta sub-city health office, supervising both government and private health institutions and I would like to see the major gaps of laboratory professional's knowledge, attitude and practice on prevention and control of TB infection and also the laboratory setups.

4.4 Population

4.4.1 Source population

Source population were all medical laboratory professionals working in four government hospitals and 21 government health centers in which TB DOTS Program were provided.

4.4.2 Study Population

All medical laboratory professionals working in a selected health facilities and who were willing to participate in the study.

4.5. Sample size:

The required sample size was determined by using single population formula considering the following assumptions:

- ❖ 50% was taken due to absence of reliable previous study that shows KAP study on Medical laboratory professionals towards TB infection control.
- ❖ Level of significance = 0.05
- ❖ Marginal error (d) = 5%
- ❖ Non-response rate = 10%

The formula for calculating the sample size (n) was:

$$n = \frac{(Z_{\alpha/2})^2 P x (1-P)}{d^2}$$

Where:

- n= sample size
- $Z(\alpha/2)$ = Z-score at 95% confidence interval = 1.96

P= positive prevalence (assuming that 50 % of the KAP study on Medical laboratory professionals towards TB infection control)

- 1-P=Q= negative prevalence/proportion

- $d = \text{marginal error} = 0.05$ (5%)
- Therefore n becomes:

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}, \quad n = 384$$

By using this formula the sample size used was found to be 384. Since the exact number of source population of respondents was less than 10,000, and the source population were finite the following correction formula was used.

$$n_f = n_i / (1 + n_i/N)$$

- Where $n_f = \text{corrected sample size}$
- $n_i = \text{uncorrected sample size, and}$
- $N = \text{total number of all the source population (Total number of Medical laboratory professionals working in four Hospitals and 54 Health centers).}$

Therefore, $(384 / (1 + 384/421) = 202)$, so the sample size is $202 + 20$ (10 % non-responses, refusal and incomplete) = 222. A total two hundred twenty two Medical Laboratory professionals were included in this study.

4.6. Sampling Technique

The four public Hospitals, Ras Desta Damtew, Minilik II, Zewditu Memorial Hospital, and Yekatit 12 Hospital, were purposely selected since they are currently providing DOTs service for TB patients under AACAHB. All (97) medical laboratory professionals were included from these four hospitals as a study unit by using convenient sampling method.

There are also a total of 54 health centers providing DOTS for TB patients under AACAHB. In each health center there are six medical laboratory professionals according to the standard (Business Process Reengineering (BPR) Manual). In order to select the rest 125 study subjects from a total of 324 laboratory professionals working in 54 health centers providing DOTS, 21 health centers were selected by using simple random sampling technique since all health centers providing DOTS were homogeneous. All medical laboratory professionals of the 21 health centers were included in the study.

4.7. Inclusion and Exclusion criteria

Inclusion criteria:

Medical laboratory professionals in selected public health facilities who were

- ❖ available during data collection day
- ❖ willing to participate in the study

4.8. Data Collection Tools and Procedure

4.8.1. Structured questionnaire

The questionnaire was developed by reviewing relevant literature, using the Program and Clinical Management of Tuberculosis guideline of FMOH, Ethiopia and WHO guideline in Laboratory services in TB control part 1, 2 and 3. A number of questions that could address the objective of this study were gathered and adapted. In order to improve the developed questionnaire valuable comments were received from different sources and also pretest was made on pilot study. The English version questionnaire were used which is found in Annex III.

4.8.2. Data collection procedure

Data were collected from volunteer laboratory professionals by using standardized pre-tested and self administered questionnaires after obtaining informed consent from the participants. Data collection tool was prepared in English considering that all laboratory professionals are above certificate level of education. The questionnaires were distributed and collected by three well trained data collectors who have sufficient work experience in data collection. The data collection was carried out during March 1- March 30/2015. Data collections were started from hospitals then continued to the health centers in a similar manner. The questionnaire consisted of 35 questions: eleven for knowledge and for attitude and thirteen for practice.

4.9. Study Variables

4.9.1. Dependent/Outcome variables:

- Knowledge, Attitude and practice of medical laboratory professionals towards TBIC.

4.9.2. Independent/Explanatory variables:

- Socio-demographic characteristics, year of service, level of health facility, participation on TB training and the length last training were obtained.

4.10. Method of Measuring Variables

Knowledge was assessed using eleven questions by scoring the response 0 (Zero) for wrong answers and 1 (One) for correct answers. After checking the distribution of the responses, mean scores were used as cut-off points for categorizing knowledge score as good (those who scored above the mean value) or poor those who scored below the mean value).

There were a total of eleven questions to measure attitude using five level Likert scale ranging from strongly agree to strongly disagree. The scores were divided into two as positive attitude for strongly agree and agree responses and negative attitude for strongly disagree and disagree responses.

Practice were assessed using thirteen questions with sub sections as, TB guidelines, ventilation of working area, patient education about TB and availability and use of personal protective equipments. Based on the mean score classification was made as good practice or poor practice.

4.11. Data Quality Assurances

The questionnaires were pre-tested to ensure that they become clear for respondents and those pre-tests were not included in the actual study. Then corrections were done accordingly. Quality of data collection process was supervised and monitored by well trained supervisor and Principal Investigator. During data collection, adequate training was given for data collectors and appropriate supervision was made. Questionnaires were prepared and customized to avoid entry of illegal values and skip patterns. Each questionnaire was given an identification number and validated by double entry.

4.12. Data Management and Analysis

Data was coded and entered into the analysis software SPSS (version 20). Data were checked for missing value by frequency using SPSS. Variables were analyzed with appropriate statistical tests for their type. Data was initially analyzed by incorporating descriptive statistic and results were summarized in frequencies and percentage. Statistical methods including: frequency distribution, bivariate and multivariate analysis was computed sequentially. Statistical significance was considered at $p < 0.05$.

4.13. Ethical Consideration

Ethical approval was obtained from the Departmental Research and Ethics Review Committee (DRERC), Addis Ababa University, department of medical laboratory science and from Addis Ababa city administration health bureau and Permission were obtained from respective hospitals and health centers. Written consent was obtained from each of the respondents after the purpose of the study had been explained. Respondents allowed to decide whether or not to participate in the study. To ensure confidentiality, the participants data where coded.

4.14. Dissemination and Utilization of Result

The final result of the study will be submitted to Department of Medical Laboratory Sciences, AAU, which could serve as a reference material to researchers and experts. In addition, a copy of this material will be given to Addis Ababa city administration health bureau and respective health institutions. The result will also be disseminated through publication in peer reviewed local and international journals and through presenting it in relevant workshops and seminars.

4.15. Operational Definition

Knowledge: knowledge of TB is awareness of the etiology, transmission, symptoms, duration of TB treatment, primary diagnostic tool for TB, and reagents used for ZN staining technique and set of measures applied for facility level TB infection control.

Good Knowledge: the level of knowledge was categorized as good for those who scored above the mean.

Poor/insufficient Knowledge: the level of knowledge was categorized as poor/insufficient for those who scored less than the mean.

Attitude: is the study subject's opinion, outlook, feelings or idea towards TB as a major public health threat, Laboratory professionals are among high risk group, infection prevention and control methods decrease transmission of TB, social and cultural factors contribute TB treatment barrier, educating patients help to increase quality of sputum microscopy and training increase competency of lab on TB AFB microscopy.

Positive Attitude: Attitude score above the mean.

Negative Attitude: Attitude score below the mean.

Practice: Practice is overt behavior, habit or customs of laboratory professionals follow up or carry out in his/her daily activities to prevent and control transmission of TB infection, maintain quality of sputum microscopy.

Good Practice: practice scores that fall above the mean.

Poor Practice: practice scores that fall below the mean.

Health care Professionals: those who are involved in giving a technical health related activity in a given health facility and have at least some level of health related professional training. It includes physicians, Health Officers, nurses and laboratory technologists/technicians.

CHAPTER FIVE

RESULTS

5.1. Socio-demographic Characteristics of the Study Population

Of the two hundred twenty two questionnaires 213 were returned after properly filled by the participants, (response rate, 95.9%). In this study, majority of the study participants were males 113(53%) and 100 (47%) were females figure (1).

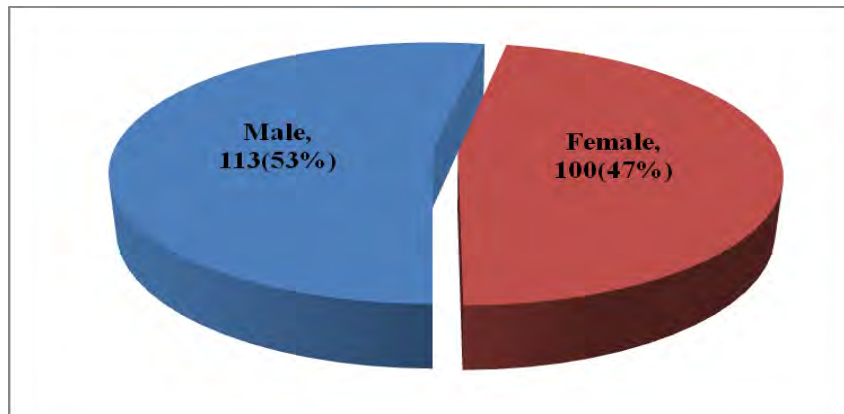


Figure 1. Number and percentage of study participants by gender

Regarding educational back ground, 2(0.9%) were certificate, 108(50.7%) were diploma Laboratory technicians, 99(46.5%) were degree Laboratory technologists, 4(1.9%) were Masters Degree in medical laboratory technology. With respect to marital status 134(62.9%) were single 77(36.2%) were married & 2(0.9%) were divorced (figure 2).

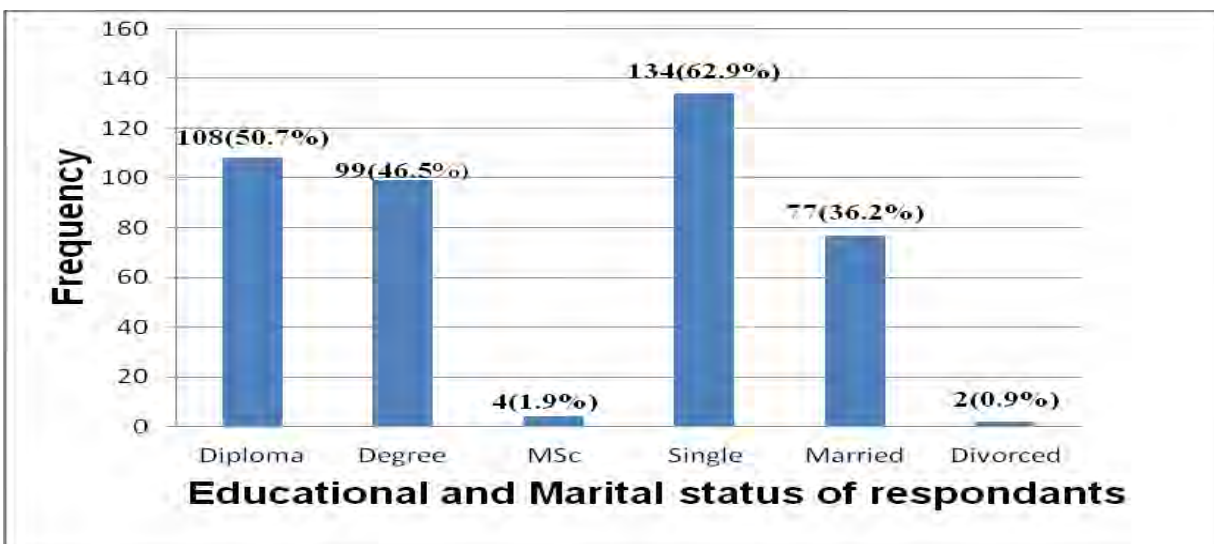


Figure 2. Number and percentage of study participants by Educational and Marital status

Regarding respondents' work place, majority of the study participants were from health centers 120(56.3%) and the rest 93(44%) were from hospitals.

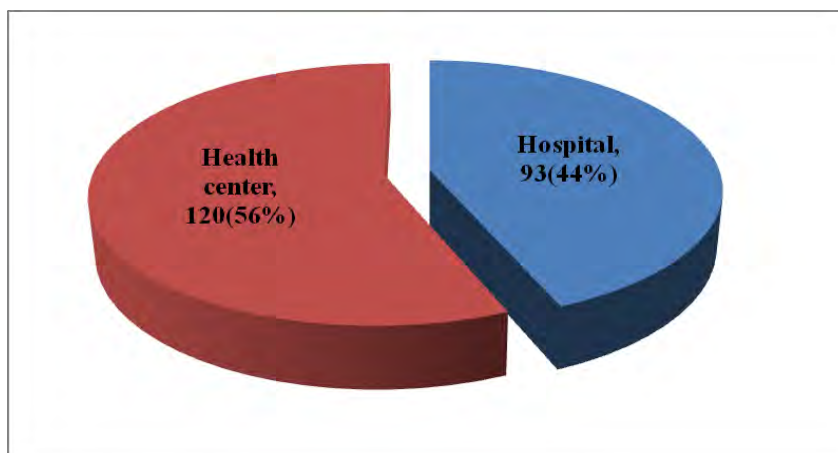


Figure 3. Number and percentage of study participants by work place

Age range was from 19 to 58 years with a mean \pm Standard Deviation (SD) age of 27.79 ± 5.38 years and the median age was 27 years.

More than half of the respondents (128 of 213 or 60.1%) had a total work experience of less than or equal to 5 year. The mean and SD work experience were 5.63 and 5.04 respectively and the median work experiences were 4 years.

More than half of the respondents, 132(62%) were participated on TB training and the remaining 81(38%) of them did not participated on TB training. Only 77(36.1%) of the respondents have got the last training on TB less than or equal to one year, 55(25.9 %) of them have got the last training two and above years (Table-1).

Table 1: Socio demographic characteristics of laboratory professionals' towards TBIC working at Selected DOTS providing health facilities Addis Ababa, Ethiopia March to May, 2015 (n=213)

Variables	Frequency	Percentage
Age group in years		
18-27	116	54.5
28-37	88	41.3
≥38	9	4.2
Work Experience in health facilities		
≤5years of experience	128	60.1
6-10years of experience	61	28.6
11-15years of experience	16	7.5
≥16years of experience	8	3.8
Participation on training		
Yes	132	62
No	81	30
Length of last training obtained		
<1year	65	30.5
1year	12	5.6
2year	24	11.3
3and above year	31	14.6

5.1.2. Knowledge of Lab professionals towards TB infection control

All of the respondents (213 or 100%) replied that they knew about TB and causative agent of it (i.e., mycobacterium TB). Almost all of them (211 or 99.1%) knew the mode of transmission of TB (that is to be air). Only 140(65.7%) of them identified that vomiting is not the most common sign and symptom of TB. 171(80.3%) of them knew AFB smear microscopy is the most important and reliable primary diagnostic tool for TB. Only 74(34.7%) of them mentioned that adults are the most commonly affected age group by TB. 164(77%) of them answered that individuals with poor socioeconomic status are the most commonly affected. 66(31%) of them correctly answered that carbolic acid is not the reagent used in ZN staining technique. 175(82.2%) of them mentioned that 6-8month is the length of treatment for a new TB patients.

148(69.5%) of them correctly identified that TB bacilli resistant to Isoniazide and Rifamlicin with or without resistant to others is the definition of MDR-TB. Only 61(28.6%) of them knew developing policies for TB is not the set of measures applied for facility level TB infection control (Table 2).

Table 2. Knowledge of laboratory professionals' towards TBIC working at Selected DOTS providing Health Facilities in Addis Ababa, Ethiopia ,March to May, 2015 (n=213)

Knowledge Item	Frequency	Percentage
Knowledge about TB		
Yes	213	100
Causative agent of TB		
Mycobacterium TB	213	100
Mode of TB transmission		
Air	211	99.1
Not Most common sign and symptom of TB		
Cough>2weeks	39	18.3
Night sweet	9	4.2
Loss of appetite	14	6.6
Loss of weight	5	2.3
General weakness	6	2.8
Vomiting	140	65.7
Reliable primary diagnostic tool for TB		
Chest X-ray	16	7.5
AFB smear microscopy	171	80.3
Culture & DST	26	12.2
Most commonly affected age group		
Children	42	19.7
Adults	74	34.7
Elderly	81	38
Don't know	16	7.5
Most commonly affected socioeconomic status by TB		
Poor	164	77
Both group	1	0.5

Rich	46	21.6
Reagent not used in ZN staining technique		
Carbol fuchsin	7	3.3
Sulphuric acid	140	65.7
Carbolic acid	66	31
Length of treatment for a new TB patient		
6-8months	175	82.2
8-12 months	9	4.2
18-24months	26	12.2
Definition of MDR-TB		
TB bacilli resistant to Isoniazide & Rifamlicin with or without resistant to others	148	69.5
Resistant to Isoniazide only	9	4.2
Resistant to Rifamlicin only	42	19.7
Don't know	14	6.6
Not the set of measures applied for facility level TBIC		
Managerial activity	73	34.3
Administrative activity	32	15
Environmental activity	47	22.1
Developing policies for TB	61	28.6

5.1.3. Knowledge level of Laboratory professionals towards TBIC

Overall knowledge of medical laboratory professionals towards TB infection control was evaluated by summarizing eleven questions. The study revealed that the mean knowledge score was 7.69 with SD of 2 and median value of 8.0. Based on this knowledge score medical laboratory professionals were categorized into having good knowledge that fall above the mean and poor knowledge that fall below the mean. More than half of the respondents 142(66.7%) scored above the mean score.

5.1.4. Factors affecting the knowledge level of laboratory professionals' knowledge on TBIC

In bivariate analysis, overall Knowledge of laboratory professionals about TB infection control showed statistically significant association with Last training obtained (P= 0.00) and Presences of TB manual (P= 0.00). However; our data did not show a significant association with sex, educational status, work experience, and level of facility. Respondents who had taken last training less than one year were about five times more likely to be adequately knowledgeable on TB infection control than those who had taken training greater than one year (AOR=5.033, 95%CI 2.129-11.901) and respondents who did have manual on TBIC at their working place were more likely to be adequately knowledgeable on TBIC than those who did not have manual (AOR=0.108, 95%CI 0.037-0.315) (Table-3).

Table 3: Laboratory professionals' knowledge and associated factors on TB infection control working at selected health facilities in Addis Ababa, Ethiopia ,May, 2013 (n=213)

Variables	Knowledge Level		Odds Ratio		P value
	Poor Knowledge	Good knowledge	Crude OR	Adjusted OR	
Sex					
Male	38(33.6%)	75(66.4%)	1	1	0.052
Female	33(33%)	67(67%)	1.029 (0.581-1.821)	0.972 (0.549-1.721)	
Work Experiences in Year					
≤10 Years	64(33.9%)	125(66.1%)	1	1	0.289
>10 Years	6(25%)	18(75%)	1.536(0.581-4.059)	1.850(0.594-5.767)	
Level of facility					
Hospital	46(49.5%)	47(50.5%)	1	1	0.471
Health Center	24(20%)	96(80%)	3.915(2.139-7.165)	0.730(0.310-1.718)	
Educational Status					
Diploma & below	42(38.2%)	68(61.8%)	1	1	0.147
Degree & above	28(27.2%)	75(72.8%)	1.654(0.926-2.955)	0.524(0.219-1.254)	
Training on TBIC					
No	29(35.8%)	52(64.2%)	1	1	0.733
Yes	41(31.1%)	91(68.9%)	1.238(0.690-2.222)	0.567(0.022-14.738)	
Last training obtained					
≤1 Year	15(22.7%)	51(77.3%)	1	1	0.000
>1 Year	28(41.2%)	40(58.8%)	0.420(0.198-0.891)*	5.033(2.129-11.901)**	
Presences of TB Manual					
No	30(50%)	30(50%)	1	1	0.000
Yes	40(26.1%)	113(73.9%)	2.825(1.518-5.259)*	0.108(0.037-0.315)**	

* Significant association (P<0.05) crude OR. ** Significant association (P<0.05) Adjusted OR.

5.1.5. Attitude level of Laboratory professionals towards TB infection control.

Almost all of the respondents 207(97.2%) believe that TB is a major public health threat. Similarly 208 (97.7%) agreed that laboratory professionals are among high risk group considering their substantial risk of exposure to TB cases. And 203(95.3%) of the respondents believe that IPC methods decrease transmission of TB. In addition 193(90.6%) of them agreed social and cultural factors contribute a TB treatment barrier. 204(95.8%) of them also agreed on incomplete or interrupted treatment for TB can be a risk factor for development of MDR-TB. 210(98.6%) of them agreed on educating patients on how to collect sputum samples will increase quality of sputum microscopy. 207(97.1%) of them agreed on training and updating of lab personnel with NTLCP will increase the competency on TB AFB smear microscopy(Table-4).

To evaluate attitude of medical laboratory professionals towards TB infection control, a total of eleven Likert-scale questions were asked with a total score of 55. The study revealed that the mean attitude score was 44.63 with SD of 4 and the median value of 45. Based on this attitude score, respondents were categorized into having positive attitude that fall above the mean value and negative attitude that fall below the mean attitude. Based on this, 113(53.1%) of the respondents have scored above the mean score and have positive attitude. The rest 100(46.9%) of the respondents have scored below the mean score and have negative attitude.

Table-4. Attitude Level of laboratory professionals towards TB infection control working at Selected DOTS providing Health Facilities in Addis Ababa, Ethiopia ,March to May, 2015 (n=213)

Attitude Item	Frequency				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
TB is major public health problem	164(77%)	43(20.2%)	1(0.5%)	3(1.4%)	2(0.9%)
Lab professionals are among high risk group	148(69.5%)	60(28.2%)	0	4(1.9%)	1(0.5%)
MDR-TB cannot cure no matter the treatment	21(9.9%)	9(4.2%)	11(5.2%)	98(46%)	74(34.7%)
IPC methods decrease TB transmission	154(72.3%)	49(23%)	6(2.8%)	2(0.9%)	2(0.9%)
Social and cultural factors contribute a TB treatment barrier	96(45.1%)	97(45.5%)	10(4.7%)	9(4.2%)	1(0.5%)
Incomplete or interrupted treatment for TB can be risk factor for development of MDR-TB	170(79.8%)	34(16%)	3(1.4%)	3(1.4%)	3(1.4%)
Traditional or alternative medicines can worsen treatment	111(52%)	59(27.7%)	13(6.1%)	19(8.9%)	11(5.2%)
Most Lab afraid that they may contract TB from the patients	65(30.5%)	81(38%)	17(8%)	26(12.2%)	24(11.3%)
TB patients should not be isolated	46(21.6%)	35(16.4%)	12(5.6%)	76(35.7%)	44(20.7%)
Educating patients how to collect sputum sample will increase quality of sputum microscopy	167(78.4%)	43(20.2%)	1(0.5%)	2(0.9%)	
Training and updating Labs increase competency on TB AFB microscopy	159(74.6%)	48(22.5%)	4(1.9%)	1(0.5%)	1(0.5%)

5.1.6. Factors affecting the level of laboratory professional's attitude towards TBIC

When we saw the association of laboratory professional's attitude with associated risk factors, significant association were found between overall attitude and level of health facility(P=0.011). However; our data did not show significant association with sex, experience, last training obtained and educational status. Laboratory professionals who are working in hospitals were 2.7 times more likely to be positive attitude towards TBIC than those who are working in health centers (AOR=2.715, 95%CI=1.262-5.841) (Table-5)

Table 5. Laboratory professionals' attitude and associated factors towards TBIC working at selected health facilities in Addis Ababa, Ethiopia ,March to May, 2015 (n=213)

Variables	Attitude Level		Odds Ratio		P value
	Negative Attitude	Positive Attitude	Crude OR	Adjusted OR	
Sex					
Male	60(53.1%)	53(46.9%)	1	1	
Female	40(40%)	60(60%)	1.698(0.985-2.927)	0.885(0.433-1.809)	0.738
Work Experiences in Year					
≤10 Years	88(46.6%)	101(53.4%)	1	1	
>10 Years	12(50%)	12(50%)	0.871(0.373-2.038)	1.537(0.564-4.189)	0.401
Level of facility					
Hospital	38(40.9%)	55(59.1%)	1	1	
Health Center	62(51.7%)	58(48.3%)	0.646(0.374-1.117)*	2.715(1.262-5.841)**	0.011
Educational Status					
Diploma & below	50(45.5%)	60(54.5%)	1	1	
Degree & above	50(48.5%)	53(51.5%)	0.883(0.515-1.514)	1.064(0.501-2.260)	0.871
Training on TBIC					
No	36(44.4%)	45(55.6%)	1	1	
Yes	64(48.5%)	68(51.5%)	0.850(0.488-1.481)	0.735(0.042-12.699)	0.832
Last training obtained					
≤1 Year	38(57.6%)	28(42.4%)	1	1	
>1 Year	27(39.7%)	41(60.3%)	2.061(1.035-4.103)	0.567(0.271-1.187)	0.132

* Significant association (P<0.05) crude OR. ** Significant association (P<0.05) Adjusted OR.

5.1.7. Practice level of Laboratory professionals towards TB infection control

About two – thirds of the respondents 153(71.8%) had a copy of TB manual; of them 5% didn't read it. Half of them - 106(49.8%) did not use separate window for sputum reception this may cause cross contamination for both professionals and patients. Almost all of them 201(94.4%) didn't have separate place for food and drink storage. About two third of them - 135(63.4%) performed preventive maintenance frequently and 146(68.5%) of them ventilated the lab before they start their daily work. Whereas 111(52.1%) of them didn't disinfect sputum containers, applicator sticks, and slides. Most of them 171(80.3%) didn't use goggles while working in TB lab and 153(71.8%) of them didn't use mask/N95 respirators this may be due to lack of supplies (Table-6).

The overall practice score was classified into two levels as, poor practice and good practice. The mean practice score were 10.56 with a SD of 2.75 and the median practice score were 11. Based on this practice score, 124(58.2%) of the respondents have scored above the mean score and have good practice.

Table-6. Practice Level of laboratory professionals towards TB infection control working at Selected DOTS providing Health Facilities in Addis Ababa, Ethiopia ,May, 2015 (n=213)

Practice Item	Frequency	
	Yes	No
Presence of TBLCP manual for lab technicians	153(71.8%)	60(28.2%)
Do you refer the manual	142(66.7%)	71(33.3%)
Is there separate window for sputum sample preparation	107(50.2%)	106(49.8%)
Do you retain sputum samples in the lab more than a day before disposing it	63(29.6%)	150(70.4%)
Use of appropriate sputum coups	198(93%)	15(7%)
Is there separate place for food and drinks storage in your lab	12(5.6%)	201(94.4%)
Disinfection of sputum containers, applicator sticks and slides before discarded	102(47.9%)	111(52.1%)
Preparation of smears in a well ventilated environment	145(68.1%)	68(31.9%)
Use of all necessary PPE while working in TB lab	197(92.5%)	16(7.5%)
Glove	209(98.1%)	4(1.9%)
Goggle	42(19.7%)	171(80.3%)
Gown	210(98.6%)	3(1.4%)
Mask/N95 respirators	60(28.2%)	153(71.8%)

5.1.8. Associated factors affecting the Level of laboratory professionals' practice towards TBIC

When we saw the association of laboratory professionals practices with associated factors, there was significant association between overall practice and the duration last training had taken (P. Value =0.011). However; our data did not show a significant association between overall practice with sex, experience, level of facility and educational status. Laboratory professionals who had last training less than or equal to one year were about five times more likely to have towards TBIC than those who had training greater than one year (AOR=4.770 CI =2.173-10.472) (Table-7).

Table 7. Laboratory professionals' Practice and associated factors towards TBIC working at selected health facilities in Addis Ababa, Ethiopia ,March to May, 2015 (n=213)

Variables	Practice Level		Odds Ratio		P value
	Poor Practice	Good Practice	Crude OR	Adjusted OR	
Sex					
Male	48(42.5%)	65(57.5%)	1	1	
Female	41(41%)	59(59%)	1.063(0.616-1.834)	0.58(0.272-1.239)	0.160
Work Experiences in Year					
≤10 Years	75(39.7%)	114(60.3%)	1	1	
>10 Years	14(58.3%)	10(41.7%)	0.470(0.198-1.113)	1.453(0.508-4.050)	0.495
Level of facility					
Hospital	43(46.2%)	50(53.8%)	1	1	
Health Center	46(38.3%)	74(61.7%)	1.383(0.799-2.396)	0.678(0.309-1.491)	0.334
Educational Status					
Diploma & below	45(40.9%)	65(59.1%)	1	1	
Degree & above	44(42.7%)	59(57.9%)	0.928(0.538-1.601)	0.628(0.281-1.400)	0.255
Training on TBIC					
No	30(37%)	51(63%)	1	1	
Yes	59(44.7%)	73(55.3%)	0.728(0.413-1.283)	0.940(0.043-20.507)	0.969
Last training obtained					
≤1 Year	17(25.8%)	49(74.2%)	1	1	
>1 Year	43(63.2%)	25(36.8%)	0.202(0.096-0.423)*	4.770(2.173-10.472)**	0.000

5.1.9. Association between laboratory professionals knowledge, attitude and practice towards TB Infection Control.

Overall knowledge had highly statistically significant association with level of overall practice towards TBIC among the respondents (P=0.000). As level of knowledge increases, proportion of respondents with good practice increases among respondents. However overall knowledge had no significant association with the level of medical laboratory professionals overall attitude towards TBIC (P = 0.846). The test result indicated that the level of attitude had no significant association with the level of lab professionals practice behavior towards TBIC (P = .619) (Table 8)

Table 8. Association between laboratory professionals knowledge, attitude and practice towards TBIC.

Variables	Status	Overall Practice Level		Total	X ²	df	P value
		Poor Practice	Good Practice				
Overall knowledge	Poor	43(60.6%)	28(39.4%)	71 (100%)	15.44	1	.000
	Good	46(32.4%)	96(67.6%)	142 (100%)			
	Total	89 (41.8%)	124 (58.2%)	213 (100%)			
Overall attitude	Negative	40 (40%)	60(60%)	100 (100%)	0.247	1	.619
	Positive	49(43.4%)	64(56.6%)	113 (100%)			
	Total	89(41.8%)	124(58.2%)	213 (100%)			

5.2. Results of observation data

All laboratories considered in this study 24(100%) were observed using appropriate sputum cups, two third 16(66.7%) of them decontaminate all Personal Protective Equipment (PPE) and laboratory wastes before it leaves the lab and 15(62.5%) of the labs perform AFB smears in separate area. However most of the laboratories 19 (79.2%) did not perform risk assessment for professionals, 18(75%) of the laboratories did not follow a written biosafety plan, 17(70.8%) of the laboratories do not have any training on aerosol prevention and control, 15(62.5%) of the laboratories did not limit access in to the lab during sputum sample processing and 14(58.3%) of the laboratories were not follow the written chemical hygiene plane (Table 9).

The sample of processed by such laboratories per week is not that much large but the range is wider it ranges from 10 in 4 laboratories to 80 in one. The mean values of sample processed per week were 30.83 with SD of 17.24.

Table 9. Observation checklist

Observation Items	Frequency	
	Yes	No
The lab provides sputum collection containers	24(100%)	
The lab provide sample transportation	9(37.5%)	15(62.5%)
Presence of certified personnel for appropriate packaging	9(37.5%)	15(62.5%)
The lab follow a written biosafety plane	6(25%)	18(75%)
Decontaminate all PPE and lab waste before it leaves the lab	16(66.7%)	8(33.3)
The lab follow a written chemical hygiene plane	10(41.7%)	14(58.3%)
The lab perform risk assessment	5(20.8%)	19(79.2%)
Providing safety training on aerosol prevention	7(29.2%)	17(70.8%)
The lab limit access into the lab when sputum samples are being processed	9(37.5%)	15(62.5%)
The lab have one-pass(non-recirculation) ventilation system	11(45.8%)	13(54.2%)
The lab provide Personal Protective Equipments (PPE)	24(100%)	
The lab take steps to eliminate cross contamination	11(45.8%)	13(54.2%)
The lab perform sputum collection in separate window	14(58.3%)	10(41.7%)
The lab performs AFB smear preparation and microscopy in separate area	15(62.5%)	9(37.5%)
The lab have BSC2	1(4.2%)	23(95%)

CHAPTER SIX

DISCUSSION

In this study, 66.7% of the respondents had good overall knowledge about tuberculosis infection control. The knowledge of the respondents was increased due to their information dissemination through training. This finding was consistent with the study conducted by Demissie G et.al in Addis Ababa; Ethiopia (63.9%) of the respondents had good overall knowledge on 582 health workers [43].

However it is higher as compared with the previous study done in Bangkok; Thailand, which was 56.13%, this difference could be due to differences in the study participant's professions, knowledge level of participants and the study site they include were only hospitals [19]. The finding also higher than the study conducted in; Ujjain, Madhya Pradesh 56.9% this difference could be due to differences in sample size, knowledge level, study site and also currently health institutions in Addis Ababa are on accreditation program [22]. On the other hand, this finding was lower than the findings of the study conducted in Iraq 95.5%, Free State, South Africa 89.2% and Northwest Ethiopia 74.4% [30, 34, and 44], this difference might be due to the study population and the sample size

In this study, when we see the mean score for knowledge, it is 7.69 ± 2 , but our finding is lower as compared with similar study conducted in Lima, Peru, by Kiefer E et.al, which indicate that 10 ± 1.9 mean score. This discrepancy might be due to sample size, the level of health institutions and the knowledge level of study participants [23].

In this study knowledge had significant association with the duration last training were obtained with $p < 0.02$; this finding were consistent with the study conducted in South Africa by Farley J E et.al on 499 HCWs, attending a facility-specific infection control training in the previous 12 months was associated with significantly higher knowledge scores ($p < 0.001$) [40].

In this study 33.3% of the study participants had poor knowledge on TB infection control and training obtained less or equal to one year were the predictor of knowledge $P < 0.02$ this finding is consistent with similar study conducted in Amhara region of Ethiopia which showed that 39.3% of the study participants did not have satisfactory knowledge and training during the two years prior to the survey were the predictor of knowledge $P < 0.02$) [42].

The present study found that 53.1% of the study participants had positive attitude towards TBIC which were also consistent with the study conducted in Bangkok, Thailand, which showed that 56.13% of healthcare providers had positive attitude towards TB [19].

The study showed that 98.2% of the respondents agreed on patient's education on how sputum sample collection improve quality of sputum microscopy this intern will improve TB prevention and control. This goes inline with the study conducted in Lima, Peru which showed majority (99.2%) of participants agreed that more community involvement was needed to improve TB control and prevention and also that educating patients about TB was an important part of the TB treatment regime [17], similar finding were found on another study in Peru which showed that 98.6% of the study participants overwhelmingly agreed that educating patients is an important component of therapy [23].

This study showed that almost all (97%) respondents agreed on TB were a major public health threat. This result was higher as compared with the previous study done in Jamaica which showed over half (58.2%) of surveyed participants agreed that TB was a major public health threat to Jamaica. This attitude contributes to the perceived seriousness of this disease [21]. This difference might be due to sample size, the level of health institutions and the attitude level of study participants.

This study showed that almost all (97.7%) respondents agreed that laboratory professionals are among high risk group considering their substantial risk of exposure to TB cases. This finding was in disagreement with the study conducted by Tenna A et.al in Addis Ababa; Ethiopia (71%) of the study participants felt HCWs are at high risk for occupational acquisition of TB [45]. This discrepancy may be due to differences in the study participants, sample size and study site deference most of the time university hospitals are believed that they have fully equipped with appropriate IC materials and HCWs use it appropriately.

This study showed that 68.5% of the respondents have negative attitude towards TB patients, and this is supported by a study conducted in South Africa which were showed that HCW are not supportive of TB patients and subject them to stigmatization [39]. However the study conducted in NewZeland showed that some HCW had positive attitudes towards their TB patients and valued and enjoyed working alongside with them [27]. This discrepancy may be due to the trainings given to health professional's change their attitude on TB patients and the set up of facility may different.

As observed in this study 79.7% of the respondents agreed that traditional or alternative medication worsen TB treatment. This finding is higher as compared with the study conducted in Peru, where 62.9% of HCP agreed; in addition in this study 90.6% of respondents agreed that social and cultural factors played a part in treatment barriers but it was in disagreement with similar study which showed 67.6% of them agreed on social and cultural factors played a part in treatment barriers [23]. This discrepancy may be due to sample size, study participants professional differences and the professional's attitude level difference.

This study revealed that 71.8%, of the respondents had a copy of the manual/ guidelines; this finding were consistent with the study conducted in Maseru, Lesotho on HCW which showed that 61.5% of respondents had their own copy of the guidelines [36].

Regarding practice, 71.8% of the respondents did not use protective masks, N95 respirators; this finding is not consistent with the study conducted in Maseru, Lesotho on HCW which showed 82.7% of respondents reported that they used the protective masks, N95, when they are in contact with MDR-TB patients. This difference may be due to the availability of PPE in health institutions and knowledge level of the study participants about the use of PPE [36].

On the other hand this study indicated that only 28.2% of the respondents wear mask which is in close agreement with the study conducted in Belgium with only 24% of the respondents wear mask adequate for filtering 1 micro size particles, this shows precautionary measures taken to prevent transmission of TB were not sufficient and this may be due to lack of supplies [32].

In the present study 41.82% of the respondents had poor practice towards TB infection control, almost similar findings were observed in the study conducted in Addis Ababa; Ethiopia 51.7% unsatisfactory practice score towards TB infection control [43]. Similar study conducted in Northwest Ethiopia on HCPs showed that 63.3% of the study participants had good practice on TB infection control while in our study 58.2% of the study participants had good practice which was almost in close agreement [44].

In this study, though the crude odds ratio showed significant association with knowledge towards TB infection control, when the effect of these multiple predictor variables, are controlled, there is statistically significant association with duration of last training were obtained and knowledge levels of laboratory professionals. Similarly, multivariate logistic regression revealed that good TB infection control knowledge is a strong determinant for good TB infection control practice.

7. Strengths and Limitations of the study

Strengths

- The study was generated representative data since it addressed medical laboratory professionals from all sub cities in Addis Ababa.
- This study has used data collection through self administered questionnaires for professionals and observation checklists for facility assessments, to complement the findings each other.

Limitations

- Even though the data was collected using a structured questionnaire, it was self-reported and one cannot discount the existence of a personal desirability bias that respondents might not have reported their actual perception and practice behavior.
- Lack of related literature was also one of the major challenges that we faced during the study period.
- Since the study design used was cross-sectional, the finding regard to factors associated with knowledge and practice might not be strong so that the readers should use the findings cautiously.

8. Conclusion

From the findings of the study, the following conclusions were made

About 33.3% of the respondents knowledge were below the mean knowledge score (7.69), 46.9% of the respondents have negative attitude towards TBIC (below the mean attitude score i.e. 46.9) and 41.8% of the respondents had poor practice towards TBIC (below the mean practice score i.e. 10.6).

Total knowledge score had significant association with the duration last training were obtained, presence of TB manual and total practical score. Total attitude score had significant association with level of health facility and total practical score had significant association with the duration last training were obtained. There were a significant mean difference between hospital (6.64) and health center (8.43) for total knowledge score but not total practice& attitude.

9. Recommendation

- Training given to participants should focus to change knowledge, attitude, practice and set measures that are applied for facility level TB infection control
- Periodic reassessment of KAP of medical laboratory professionals towards TB infection control should be done.
- Health facilities should make available within their system TB infection control guidelines and standardize written policies, so that laboratory professionals will know how to prevent and control the disease.
- Health facilities should make available supplies for infection prevention materials to the laboratories.
- Further similar studies that include assessment of KAP and magnitude of TB infection due to occupational exposure among laboratory professionals are needed.

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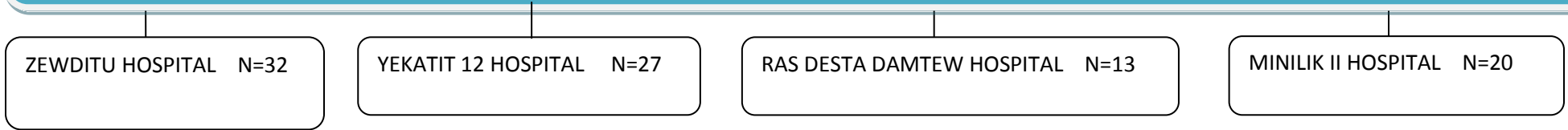
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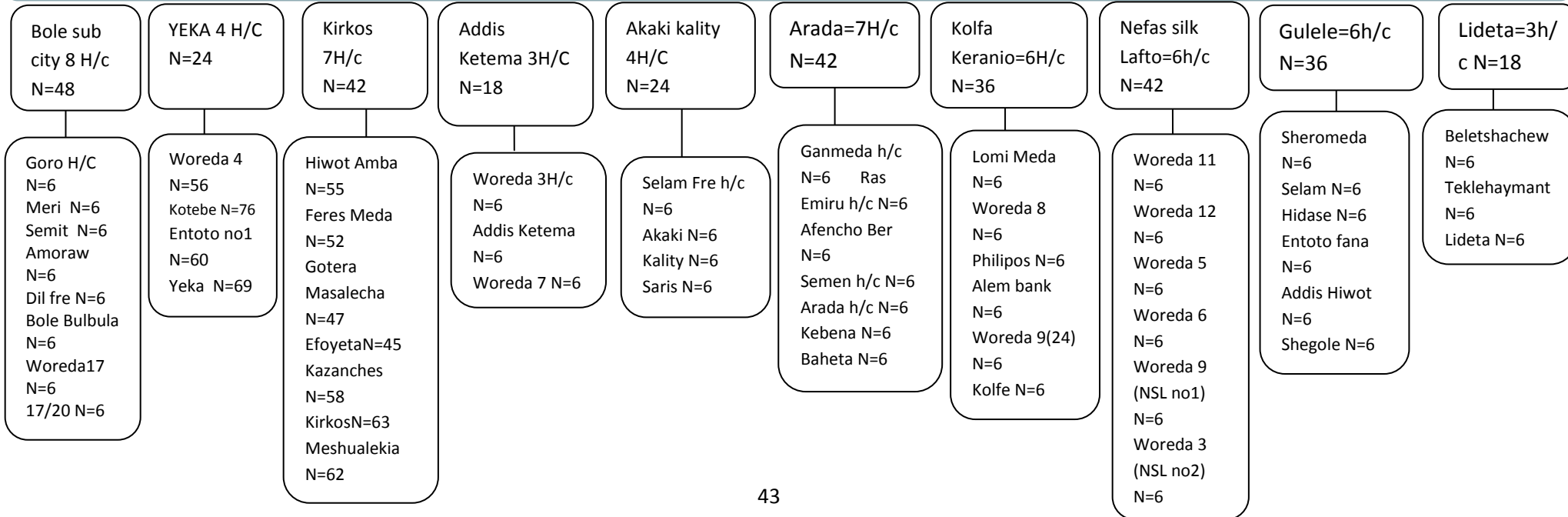
ANNEXES

ANNEXE I: Sampling frame

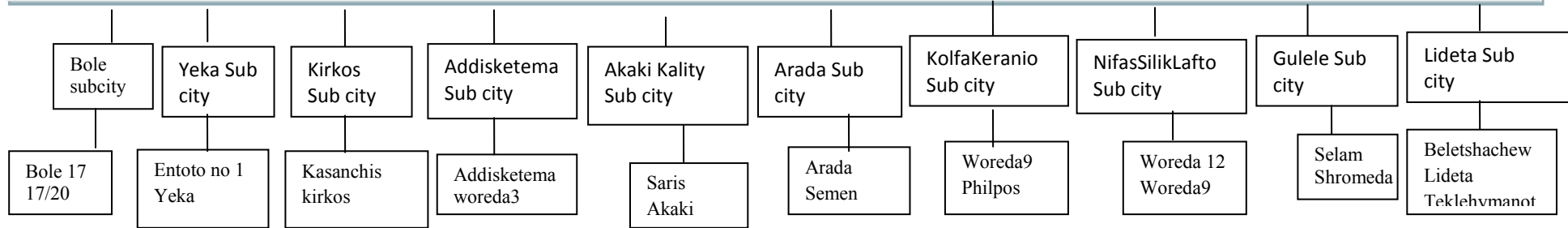
AARHB DOTS IMPLIMENTD SITE LABORATORY PROFESSIONALS N=421



DOTS IMPLIMENTED SUBCITIES AND THERE RESPECTIVE HEALTH CENTERS



Selected health centers for the study



ANNEX -II: English Version Subject information sheets

ADDIS ABABA UNIVERSITYS CHOOLOF ALIAD HEALTH SCIENCE DEPARTMENT OF MEDICAL LABORATORY SCIENCE

Questionnaires for the Assessment of knowledge, attitude and practice of TB infection control among Medical laboratory professionals in selected DOTS providing health facilities under Addis Ababa City Administration Health Bureau.

Identification: Type of facility_____ Name of facility_____ Institution code_____

Address:

Kifle Ketema_____ Keble_____ Telephone_____

I am currently a student of Addis Ababa University, School of Medical laboratory Sciences. I would like to collect information from you by self administer questionnaires about knowledge, attitude and practice of laboratory professionals about Tuberculosis(TB) infection control in a selected DOTS providing health facilities.

This questionnaire is administrated to Medical laboratory professionals working in the selected health facilities in Addis Ababa. This study will contribute a lot for laboratory professionals in order to diagnosis, preventing and controlling of TB infection. Additionally introduce the basic information about TB diagnosis, infection prevention and the spread of active multiplication of the bacteria inside the body after the possible exposures.

The objective of the study is to assess knowledge, attitude and practice of TB infection control among Medical laboratory professionals in selected DOTS providing health facilities.

Your cooperation and willingness for answering the questionnaires will be very helpful in identifying the problems related to the issue. The information collected by the use of these questionnaires will never release to any parties and it kept confidentially. In addition you will never be expected to mention your name and I.D number. You are free to answer or not the questionnaires. Please, be aware that all information you provide us is valuable and very important.

Do I have your permission to continue?

If yes, continue to the next page for answering the questioners.

For any information you can contact:

Mr. Mossie Tamiru E-mail: muswontam@gmail.com

Tel: +251 913035044

Consent form to participants on the study of assessment of KAP of laboratory professionals towards TB infection control in a selected DOTS providing health facilities, Addis Ababa, Ethiopia.

I have read the information stated on the topic above and verbal discussion from the supervisor and clearly understood the purpose and expected benefit of the research. I hereby need to guarantee with my signature below that I have decided to voluntarily take part in the study without any forceful act by the research coordinators to contribute my part for the successful completeness of the research on KAP of Medical laboratory professionals towards TB infection control.

Unique code no. _____ Signature _____ date _____

Supervisor's Name _____ Signature _____

I thank you for your cooperation.

ANNEX-III : Questionnaire

Structured self administered questionnaires for the Assessment of knowledge, attitude and practice of TB infection control among Medical Laboratory professionals in a selected DOTS providing health facilities under Addis Ababa city administration health bureau, Addis Ababa Ethiopia, 2014/2015.

PART-I: SOCIO-DEMOGRAPHIC CHARACTERSTICS OF THE RESPONDENTS			
No	Questions	Coding classification	Code
101	Sex of the respondents	Male = 1 Female = 2	
102	Age in completed years	Age in completed years _____	
103	What is your marital status?	Single = 1 Married = 2 Divorced = 3 Widowed = 4 Other specify = 5 No response = 99	
104	What is your educational level on your profession?	Certificate = 1 Diploma = 2 First degree = 3 Masters degree = 4 PhD/Sub specialty=5	
105	Type of facility Employed?	Hospital = 1 Health center = 2	
106	How many years of experience do you have?	_____ years	
107	Have you ever been participated in any training program about TB?	Yes=1 No=2	
108	If 'yes' how long did you take the training?	<1year=1 1year=2 2 year=3 3 year & above =4	

PART-2: Questions about knowledge of Medical Laboratory professionals towards TB

Please circle the code best fits for your answer. (TB stands for Tuberculosis).

No	Questions	Coding classification	Code
201	Do you know about TB?	Yes=1 No=2	
202	If “yes” what is the causative agent for TB?	Mycobacterium tuberculosis=1 Streptococcus pneumonia=2 Haemophilus influenza=3	
203	What is the mode of transmission for TB?	Air=1 Food=3 Water=2 Don't know=88	
204	Which one is not the most common sign and symptom of TB?	Cough>2weeks=1 Loss of appetite=3 General weakness=5 Night sweet=2 Loss of weight=4 Vomiting=6	
205	What is the most important and Reliable primary diagnostic tool for TB?	Chest X-ray =1 AFB smear microscopy=2 Culture and DST=3 Don't know=88	
206	What is the most commonly affected age group by TB?	Children=1 Elderly=3 Adults=2 Don't know=88	
207	Which socioeconomic status is mostly affected by Tuberculosis?	Poor=1 Both groups=3 Rich=2 Don't know=88	
208	In Ziehl- Neelsen staining technique which reagent is not used?	Carbol fuchsin=1 Sulphuric acid=2 Methylene blue=3 Carbolic acid=4	
209	How long is the treatment for a new patient with TB?	6-8 month=1 18-24 month=3 8-12month=2 Don't know=88	
210	How Multi-Drug resistant tuberculosis (MDR-TB) defined?	TB bacilli are resistant to Isoniazid & Rifampicin with or without resistance to others=1 Resistant to Isoniazid only=2 Resistant to Rifampicin only=3 Don't know=88	
211	Which one is not the set of measures that are applied for facility-level TB infection control?	Managerial activity =1 Administrative activity =2 Environmental activity=3 Developing policies for TB=4	

PART-3: Questions about attitudes of Medical Laboratory Professionals towards TB

Please circle the code best fits for your answer.

No	Questions	Coding classification	code
301	TB is a major public health threat.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
302	Laboratory professionals are among high risk group considering their substantial risk of exposure to TB cases.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
303	No matter the treatment, MDR-TB cannot be cured.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
304	Do you think that Infection prevention and control methods decrease transmission of TB	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
305	Social and cultural factors contribute a TB treatment barrier.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
306	Incomplete or interrupted treatment for TB can be a risk factor for Development of MDR –TB.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
307	Traditional or alternative medicines can worsen treatment.	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
308	Do you think that Most laboratory professionals are afraid that they may contract TB from the patients?	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
309	Do you think that TB patients should not be isolated?	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
310	Do you think that educating the patient on how to collect sputum samples will increase quality of sputum microscopy?	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	
311	Do you think that training and updating of lab personnel with NTLCP will increase the competency on TB AFB smear microscopy?	Strongly agree=1 Agree=2 Neutral =3 Disagree=4 Strongly disagree=5	

PART-4 Questions about practice of Medical Laboratory Professionals towards TB with regard to the diagnosis, prevention and control of TB infection

Please circle the code best fits for your answer.

No	Questions	Coding classification	code
401	Is there a copy of manual for TB & Leprosy control program (TLCP-MOH) at your Laboratory?	Yes=1 No=2	
402	Do you refer the TB laboratory manual?	Yes=1 No=2	
403	Is there separate window for sputum sample reception?	Yes=1 No=2	
404	Do you retain sputum samples inside the Lab more than a day before disposing	Yes=1 No=2	
405	Do you use wide mouthed, sterile, leak-proof, and clear 50ml plastic sputum cups with screw cap closures for collection?	Yes=1 No=2	
406	Is there a place for food and drink storage in your laboratory?	Yes=1 No=2	
407	How often do you perform preventive maintenance on TB Lab Equipments?	No=1 Frequently =2 Rarely=3	
408	How often do you ventilate the lab before you start your daily work and during preparing AFB smear?	No=1 Frequently=2 Rarely=3	
409	Do you disinfect sputum containers, applicator sticks, and slides with 5% phenol overnight before you discarding?	Yes=1 No=2	
410	Do you prepare sputum smears in a well ventilated environment, near an open flame?	Yes=1 No=2	
411	Do you clean you working bench with 70% Alcohol daily?	No=1 Frequently=2 Rarely=3	
412	How often do you follow SOP while you are preparing and staining sputum smears?	No=1 Frequently=2 Rarely=3	
413	Do you use all necessary PPE while working in TB lab?	Yes=1 No=2	
	Glove	Yes=1 No=2	
	Google	Yes=1 No=2	
	Gown	Yes=1 No=2	
	Mask/N95 respirators	Yes=1 No=2	

ANNEX-IV: Observation check list

No	Questions	Yes	No	Remarks
1	Does the Laboratory provide sputum collection containers that include a sterile, leak-proof, and clear 50 ml plastic conical centrifuge tube with screw cap closures?			
2	Does the Laboratory provide sputum sample transportation?			
3	Does the Laboratory have personnel certified to package and ship sputum samples with appropriate packaging system?			
4	Does the Laboratory follow a written biosafety plan that: a. Defines safe laboratory practices? b. Includes procedures for handling spills and other emergencies?			
5	Does the Laboratory decontaminate all personal protective equipment and laboratory waste before it leaves the laboratory area?			
6	Does the Laboratory require employees to review the biosafety plan annually?			
7	Does the Laboratory follow a written chemical hygiene plan that defines safe laboratory practice?			
8	Does the Laboratory perform a risk assessment within the work area or laboratory?			
9	Does the Laboratory provide safety training on aerosol prevention techniques for all employees before assigning work with sputum sample processing?			
10	Does the Laboratory limit access into the laboratory when sputum samples are being processed?			
11	Does the Laboratory have a one-pass (non-recirculating) ventilation system?			
12	Does the Laboratory provide personal protective equipment that includes laboratory coats or gowns, gloves, respiratory, and face protection?			
13	How many sputum specimens are processed in the Laboratory per week?			
14	Does the Laboratory take steps to eliminate cross contamination during sputum processing?			
15	Does the Laboratory perform AFB smear microscopy in a separate area, and collect sputum in a separate window?			
16	Does the Laboratory have BSC?			

DECLARATION

I, the under signed, declare that this thesis is my original work in partial fulfillment of the requirements for the degree of Masters of Science in Medical Laboratory Sciences (Clinical Laboratory Management and Quality Assurance Track). All the sources of the materials used for this thesis and all people and institutions who gave support for this work are fully acknowledged.

Name: Mossie Tamiru (BSc)

Signature- ----- **Date:** -----Jun, 2015

Place of submission: Addis Ababa University, school of Allied Health Science Department of Medical laboratory science.

Date of submission: -----

Approval of the primary advisor

This thesis has been submitted for examination with my approval as a university Advisor.

Advisor's Name:

Kassu Desta (MSc, PhD fellow) Signature----- Date: -----Jun, 2015

Tedla Mindaye (MSc, PhD fellow) Signature----- Date: -----Jun, 2015

Fatuma Hussen (MPH, PhD fellow) Signature----- Date: -----Jun, 2015