ASSESSING THE PRACTICES, KNOWLEDGE AND PERCEPTION OF PATIENTS AND HEALTH CARE WORKERS TOWARDS PREVENTION OF TUBERCULOSIS IN DAR ES SALAAM TANZANIA

BY

NIYONIZIGIYE ASTRIDA MARKO

A dissertation submitted to the University of Zambia in partial fulfillment of the requirements of the degree of Master in One Health Analytical Epidemiology

THE UNIVERSITY OF ZAMBIA

SCHOOL OF VETERINARY MEDICINE

DEPARTMENT OF DISEASE CONTROL

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DECLARATION

I, Niyonizigiye Astrida Marko, do hereby declare that the contents of this dissertation submitted here is my original work and have not been previously submitted to any university for the award of Master’s Degree or any other qualifications.

Signature…………………………………….. Date…………………………………………
CERTIFICATE OF APPROVAL

This dissertation submitted by NIYONIZIGIYE ASTRIDA MARKO is approved as fulfilling the requirements for the award of the degree of MASTER OF SCIENCE IN ONE HEALTH ANALYTICAL EPIDEMIOLOGY (OHAE) of the University of Zambia.

Supervisor........................................................................................................

Signature........................................Date...........................................

Examiner ...........................................................................................................

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Chairman (Board of Examiners).................................................................

Signature........................................Date..............................................
ABSTRACT

Tuberculosis (TB) remains a major global infectious disease health problem. It causes ill-health among millions of people each year. Tanzania, like other countries in Africa, shares the same TB burden with an estimated prevalence of 337 per 100,000 populations. Many people including Health Care workers (HCWs) have been infected with TB. The objectives of this study were to identify factors influencing TB transmission among HCWs and patients; to describe how the level of knowledge, perception, and attitude of HCWs and patients influence TB preventive practices and to explore the health seeking behavior among patients and HCWs.

The study was conducted at Muhimbili National Hospital and Mwananyamala Hospital in Dar es Salaam, Tanzania. The research design was a health facility-based cross-sectional study. Both qualitative and quantitative design approaches were employed. The quantitative approach was health facility-based using self-administered questionnaire for HCWs and patients. While qualitative approach was Focus Group Discussions (FDGs) with HCWs and patients; key informants interviews and observations that involved assessing the knowledge, practices, and perception of HCWs and patients towards prevention of tuberculosis transmission. Questionnaires were administered to 384 respondents identified by simple random selection; 90 participants were selected for the nine FGDs; six for patients and three for HCWs. FGDs were conducted for males and females independent of each other and covered the age groups 15-29, 30-39, and 40-50 years old. Statistical analysis was performed using Stata, version 11 for descriptive and inferential statistics analysis basing on the following age categories; 15-29, 30-39, and 40-50 years. Data collected through FGDs were analyzed thematically. As would be expected, more HCWs (17.1%) were aware of TB compared to patients (9.4 %). In terms of duration before treatment, patients delayed by at least 2 months more compared to (HCWs). HCWs who stopped anti-TB drugs were significantly fewer than patients (5.2% versus 7.7%, $P = < 0.0001$). In terms of patients and HCWs knowledge in relation to TB, there was no significant difference between the two groups.

Generally, participants were knowledgeable about modes of TB infection. Despite this, there were many other factors that prevented their health seeking behaviors. These included preference to going to pharmacies; using local medicine; fear of TB/HIV association and HIV testing; belief in traditional medicine; self-medication; fear of stigmatization and discrimination; fear of losing employment; high cost of accessing medical services; delay in diagnosis; frequent misdiagnosis; and, taking more than one month (and up to six months) before seeking appropriate medical treatments. Even after getting treatments some patients preferred to stop medication in order to seek alternative health care; avoid severe side effects. The knowledge of patients and HCWs on prevention of TB is not practiced. It is concluded that knowledge of HCWs and patients by itself is not sufficient to reduce the TB burden and transmission in Tanzania. There is need to change or improve people’s perceptions and misconceptions, practices and beliefs. Further, there is need to improve testing equipment and availability of competent laboratory technicians at all levels of HCFs (from the level of dispensary to referral hospitals), availability and accessibility of PPEs. Effective TB infection prevention and control strategies should be in place for sensitizing the community and HCWs on TB prevention transmission.
DEDICATION

Firstly I thank Almighty God for his blessing and audience throughout the study. I dedicate this work to my deceased husband Anicet Damian Ntacho who encouraged me to progress in this academic field especially in my professional career advancement. My deepest appreciation goes to my father Ruyaga Marko Bitaho and my mother Ester Marko Bitaho who brought me on earth and grounded a firm foundation of my academic journey. Their contribution is enormous indeed, that I cannot quantify. I also extend my sincerely appreciation to my dear brother Hon. Baptister Marco Bitaho who is a lawyer by profession, he dedicated his life to serve and stand for the last heard people’s rights and committed his life to support me in my professional advancement. My sincere appreciation goes to my children Agustino Ntacho, Gloria Ntacho, Adelino Ntacho, Baraka Emmanuel, and Thierry N. Ruyaga for being patient and providing moral and social support throughout my two years stay at the University of Zambia. Special appreciation goes to my young daughter Scholastica Anicet Ntacho for her daily prayers for the social and academic life success of our family. Candidly appreciation goes to my elder brother Ngezahayo Essayer for his contribution to my academic life, brother in law Vincent Jacob Butiku, Deogrratius Ruyaga Bitaho and Emmanuel Daniel Mutura for their moral and material support during my study period. I am further thankful to Mr. Deodatus Mapunda, Dar es Salaam and Ester Abednego of Vocational Educational and Training Authority for their valuable material and moral support. I extend my sincere appreciation to Fr. Ephraim Mathew Ogha for his encouragement throughout my two years of study at the University of Zambia. Sincere appreciation goes to Prof. Samuel Manyele for his encouragement and material support throughout my two years of study at the University of Zambia.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AFB</td>
<td>Acid Fast Bacilli</td>
</tr>
<tr>
<td>AIDS</td>
<td>Acquired Immuno Deficiency Syndrome</td>
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<tr>
<td>ARV</td>
<td>Antiretroviral</td>
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<tr>
<td>BCG</td>
<td>Bacillus of Calmette and Guerin</td>
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<tr>
<td>bTB</td>
<td>bovine Tuberculosis</td>
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<tr>
<td>CD4</td>
<td>Crust of Differentiation Antigen 4</td>
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<tr>
<td>CHMT</td>
<td>Council Health Management Team</td>
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<tr>
<td>CI</td>
<td>Confidence Interval</td>
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<tr>
<td>CSF</td>
<td>Cerebral Spinal Fluids</td>
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<tr>
<td>DOT</td>
<td>Direct Observation Treatment</td>
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<tr>
<td>ED</td>
<td>Executive Director</td>
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<tr>
<td>EMD</td>
<td>Emergency Medical Departments</td>
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<tr>
<td>EPTB</td>
<td>Extra Pulmonary Tuberculosis</td>
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<tr>
<td>FGD</td>
<td>Focus Group Discussion</td>
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<tr>
<td>HAI</td>
<td>Healthcare Associated Infections</td>
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<td>HIV</td>
<td>Human Immuno Virus</td>
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<tr>
<td>HCWs</td>
<td>Health Care Workers</td>
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<tr>
<td>HCF</td>
<td>Health Care Facility</td>
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<tr>
<td>HQI</td>
<td>Hospital Quality Improvement</td>
</tr>
<tr>
<td>IPC</td>
<td>Infection Prevention and Control</td>
</tr>
<tr>
<td>KAP</td>
<td>Knowledge Attitudes and Perception</td>
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<tr>
<td>LMIC</td>
<td>Low and Middle Income Countries</td>
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<tr>
<td>MDR TB</td>
<td>Multidrug Resistance Tuberculosis</td>
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<tr>
<td>MNH</td>
<td>Muhimbili National Hospital</td>
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<tr>
<td>MOHSW</td>
<td>Ministry of Health and Social Welfare</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>MTB</td>
<td>Mycobacterium Tuberculosis</td>
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<tr>
<td>MUHAS</td>
<td>Muhimbili University of Health and Allied Sciences</td>
</tr>
<tr>
<td>NI</td>
<td>Nosocomial Infection (Hospital Associated Infections)</td>
</tr>
<tr>
<td>NIMR</td>
<td>National Institute of Medical Research</td>
</tr>
<tr>
<td>OHAE</td>
<td>One Health Analytical Epidemiology</td>
</tr>
<tr>
<td>OPD</td>
<td>Out Patients Department</td>
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<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
</tr>
<tr>
<td>PLWHIV</td>
<td>People Living With Human Immuno-deficiency Virus</td>
</tr>
<tr>
<td>PPD</td>
<td>Purified Protein Derivative</td>
</tr>
<tr>
<td>PTB</td>
<td>Pulmonary Tuberculosis</td>
</tr>
<tr>
<td>QI</td>
<td>Quality Improvement</td>
</tr>
<tr>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>TANNA</td>
<td>Tanzania National Nurses Association</td>
</tr>
<tr>
<td>TB/HIV</td>
<td>Tuberculosis and Human Immuno Virus</td>
</tr>
<tr>
<td>WHA</td>
<td>World Health Assembly</td>
</tr>
<tr>
<td>WHO</td>
<td>Health World Organization</td>
</tr>
<tr>
<td>UNZA</td>
<td>University of Zambia</td>
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<tr>
<td>UTH</td>
<td>University Teach Hospital</td>
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<tr>
<td>UTI</td>
<td>Urinary Tract Infections</td>
</tr>
<tr>
<td>VETA</td>
<td>Vocational Educational and Training Authority</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td><strong>Discrimination</strong></td>
<td>Discrimination occurs when individuals or institutions unjustly deprive others of their rights and life opportunities due to stigma.</td>
</tr>
<tr>
<td><strong>Dyspnea</strong></td>
<td>Dyspnea is difficult or labored breathing; shortness of breath. Dyspnea is a sign of serious disease of the airway, lungs, or heart. The onset of dyspnea should not be ignored; it is reason to seek medical attention.</td>
</tr>
<tr>
<td><strong>Empyema</strong></td>
<td>Empyema is a collection of pus (dead cells and infected fluid) inside a body cavity. Usually, this term refers to pus inside the pleural cavity, or “pleural space.”</td>
</tr>
<tr>
<td><strong>Hemoptysis</strong></td>
<td>Hemoptysis is the coughing up of blood or bloody sputum. It can be caused by infections including pneumonia, tuberculosis and other ill health conditions.</td>
</tr>
<tr>
<td><strong>Immunocompromised</strong></td>
<td>An individual whose immune response is weakened as a result of an immunodeficiency disorder or exposure to immunosuppressive drugs or irradiation.</td>
</tr>
<tr>
<td><strong>Leukocytosis</strong></td>
<td>Leukocytosis is a white blood cell count (the leukocyte count) above the normal range in the blood. It is frequently a sign of an inflammatory response.</td>
</tr>
<tr>
<td><strong>Lymphadenopathy</strong></td>
<td>Lymphadenopathy is the enlargement or swelling of lymph nodes. The enlargement of lymph nodes can be detected through physical examination and also by imaging. It is the signs of infections.</td>
</tr>
</tbody>
</table>
Meningitis: A serious disease in which there is inflammation of the meninges caused by viral or bacterial infection and manifested by intense headache, fever, sensitivity to light, and muscular rigidity.

N95 mask: N95 mask is a type of ventilator which is able to filter 95% of circulating particles which could be allergens, proteins, dusts, or viruses from ambient air.

Pancytopenia: Is a medical condition in which there is a reduction in the number of red and white blood cells, as well as platelets.

Pericarditis: Inflammation of the pericardium caused by infection with bacteria.

Peritonitis: Inflammation of the peritoneum typically caused by bacterial infection either via the blood or rupture of an abdominal organ.

Pleural effusion: A pleural effusion is a buildup of fluid in the pleural space, an area between the layers of tissue that line the lungs and the chest cavity, caused by Congestive heart failure, Kidney failure, Infection, and malignancy.

Stigma: Stigma refers to attitudes and beliefs that lead people to reject, avoid, or fear those they perceive as being different.

Tonsillitis: Tonsillitis is an inflammation of tonsils and can be due to infection, injury, or allergies.
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CHAPTER ONE

INTRODUCTION

1.1 Background Information

Tuberculosis (TB) remains a major global health problem. It causes ill-health among millions of people each year and ranks as the second leading cause of death from an infectious disease worldwide, after the Human Immuno-deficiency Virus (HIV). Most of these TB cases and deaths occur among men. In 2011, 430,000 deaths were among men. But the burden of disease among women is also high. In 2012, there were an estimated 2.9 million cases and 410,000 TB deaths among women, as well as an estimated 530,000 cases and 74,000 deaths among children (WHO, 2013). Global efforts to control TB were strengthened in 1991 when the World Health Assembly (WHA) resolution declared TB as a major global public health problem. The WHA planned to detect 70.0% of smear positive TB cases and to successfully treat 85.0% of smear positive TB cases detected by the year 2000 (Sharma et al., 2005).

However, the targets were not achieved by the year 2000 and later the stop TB partnership in 2000 re-set the targets of the WHA at 70.0% detection of smear positive TB cases and to successfully treat 85.0% of smear-positive TB cases by the year 2005 through the Direct Observation Treatments (DOTs) programme. These large numbers of TB cases and deaths occurred not-withstanding, 21 years on from the 1993 World Health Organization (WHO) declaration of TB as a global public health emergency, major progress has been made. Globally, the TB mortality rate (deaths per 100,000 people per year) has fallen by 45% since 1990 and TB incidence rates (new cases per 100,000 people per year) are decreasing in most
parts of the world (WHO, 2014). Between 2000 and 2013, an estimated 37 million lives were saved through effective diagnosis and treatment (WHO, 2014).

According to the (WHO, 2009) an estimated 9.27 million new cases of tuberculosis (TB) occurred in 2007. Out of that figure, 31% were in Sub Saharan Africa and 14.8% of these were among people living with HIV. While pulmonary tuberculosis (PTB) was the most common presentation, extra-pulmonary tuberculosis (EPTB) was also detected as an important clinical problem. The term EPTB is used to describe isolated occurrence of TB at body sites other than the lung (WHO, 2009).

Tanzania like other countries in Africa shares the same burden of TB. For example in 2010 there were 63,453 TB cases among the population of 44,928,923. In particular, Rungwe district recorded an increase in new cases of TB in recent years whereby 527 new TB cases were reported in 2011 compared to 435 in 2009 (Tarimo 2012).

Tanzania ranks fourteenth (14th) among high-burden TB countries in the world, with the prevalence of TB reported at 337 per 100,000 populations (Kamenju and Aboud, 2011). In 2007, an estimated 32,000 Tanzanians died because of TB, 62.5% of these were People Living with HIV (PLWHIV). In a recent hospital based study in Dar es Salaam Tanzania, it was reported that over 90% of the TB patients were also infected with HIV (Kamenju and Aboud, 2011).

The Tanzanian Government through the Ministry of Health and Social Welfare (MOHSW) has adopted a Stop TB strategy which aims at strengthening DOTS strategy and empowering patients and communities to actively participate in prevention activities. It also aims to achieve universal access to high-quality diagnosis and treatment for people with TB, to
reduce the suffering and socioeconomic burden associated with TB, and protect poor and vulnerable populations from TB, TB/HIV, and Multi-Drug Resistance-TB (MDR-TB). It also suggested for the government to improve and develop new tools, protocols and guidelines for prevention of TB to the community and at HCFs that enable their timely and effective use (Tarimo, 2012).

According to the Centers for Disease Control (CDC, 2013), people with TB symptoms should be assisted to get their sputum examined either by transporting the person or the sputum sample to the nearest health facility. If tested positive, the patient should be registered and provided with appropriate anti TB drugs to be given at a health facility or with treatment support at home, depending on patient’s preference. Encouraging every person living with HIV to be screened for TB and based on the screening to assist them receive prevention treatment (Isoniazid preventive therapy). Patients taking TB drugs need support to take their drugs and finish their treatment. Simple behavioural change interventions such as asking people to cover their mouth and nose when coughing and sneezing could help to limit the spread of TB infection and reduce the risk of others from being infected (MOHSW, 2013).

1.2 Statement of Problem

In Tanzania TB infection is remaining a major challenge. Many people including Health Care Workers have been infected. Despite reaching geographical Direct Observed Treatment (DOT) coverage of 100% and treatment success rate of 89%, TB case detection rate remains at 77% and the total number of all cases detected annually has been decreasing (MOHSW, 2013). Reasons why TB is still high are unclear. As long as cause(s) remain unclear, many people will continue be infected and this will lead to suffering and socioeconomic burden.
The study related to identification of factors responsible for increasing the prevalence of TB is extremely important. This study assessed the knowledge, practice and perception of HCWs and patients towards prevention of TB transmission. From the study suggestions on some strategies to reduce TB transmission infections in the community and healthcare facilities were suggested.

1.3 Significance of the study

Role the community and healthcare facility played in control of healthcare associated TB infections, especially for caregivers whether at the Health care facilities (HCFs) or in home settings were assessed. Negative perception on healthcare services, unavailability of PPEs, unavailability and inaccessibility of TB policy and guidelines in HCFs were the other factors identified. Furthermore the multiple health care seeking before getting proper treatments and other malpractice among patients and HCWs that predisposed to increasing of TB transmission in this study were assessed. The factors associated with high prevalence of TB in HCFs and communities were identified. It also suggested formulation of TB infection committees that cut across the Health care facilities for better dissemination of updated health information related to TB infection prevention. Putting in place preventive measure including deployment and use of personal preventive equipment (PPE) were suggested. Also sensitizing the community on prevention of TB infection using brochures, conducting health education through seminars, meeting, mass media and the use of hospital TV screens especially in clinics were suggested.

1.4 Justification for this Study

Studies on awareness, practice and perception towards TB infection have been conducted in Tanzania. But many of these studies were done in communities and not a healthcare
facilities (hospital environment); However Health care workers were not included. Our study included HCWs because the prevalence of TB infection in this population category in Dar es Salaam was not well known since no study related to TB in HCWs was conducted. Likewise the tools that were used in the previous studies were questionnaires and checklists for in-depth interviews which were very few. Some information related to TB infection transmission among Health care workers and other non-infected patients were not obtained. In view of that, the researcher decided to conduct the similar study that including both patients and HCWs using different data collection tools. The reports obtained explored more findings that were not obtained in the previous studies. These methods had revealed to have big impact since enough findings related to TB infections among health care workers and patients were obtained and it had enriched the findings of the previous studies.

1.4 General Objective

To investigate the knowledge, attitudes, and practices of HCWs and patients towards prevention of TB transmission in Dar es Salaam.

1.5 Specific Objectives

1. To identify factors influencing TB transmission among patients and HCWs

2. To describe how the level of knowledge, perception, and the attitude of HCWs and patients influence TB preventive practice; and

3. To explore the health seeking behaviour against TB treatment among Patients and HCWs.
1.6 Benefits of the Study

Information from this study related to TB transmission in Dar es Salaam, included the reasons for delaying to seek care on HCFs such as; fear for what will be the diagnosis, stigma and discrimination associated to TB/HIV, high charges of hospital services, self-medication including buying medicine to the nearby pharmacies and using herbs was generated. Also the advice from friend and family members was the other reason mentioned. Likewise the information acquired helped to understanding the factors that made patients and HCWs don’t seek healthcare to HCFs such as going for traditional medicine and prayers, self-medication using herbs and using unprescribed medicine from the nearby pharmacies. The mentioned practice were also associated to perceptions and health seeking behaviors that the community had such as delay of investigations, wrong diagnosis, doughty on the competence of HCWs, believe in which craft and trust in traditional medicine. Additionally the information obtained helped the researcher to recommend future control measures in healthcare facilities and community aiming at improving public health interventions against tuberculosis such as improving awareness of the community and public at large. It also suggested improving HCWs practices on prevention of TB transmission at the HCFs that includes provision of PPEs such as N95 mask, isolating patients suspected to have TB infection and putting patients with active TB in a separate ward.
CHAPTER TWO

LITERATURE REVIEW

2.1 General Tuberculosis Infection

*Mycobacterium tuberculosis* is a member of the *M. tuberculosis complex*, (MTC) which is defined as the etiologic agent of TB in distinct hosts that include *M. tuberculosis, M. bovis, M. africanum, M. canetti, M. microti, M. caprae* and *M. pinnipedii*. While the vast majority of tuberculosis cases in humans are caused by infection with *M. tuberculosis* (Malama *et al.*, 2013). More than 3% of tuberculosis cases in humans and most cases in cattle are caused by *M. tuberculosis* and *M. bovis* infection. *M. tuberculosis* typically affects the lungs but can also affect other parts of the body. The disease spreads through air when a patient expels bacteria, for example, by coughing and sneezing. In general relatively small proportion of people infected with TB develops the disease (Sakamoto, 2012).

Human tuberculosis (TB) is caused by *M. tuberculosis* and *M. bovis*. While *M. tuberculosis* is transmitted through inhalation, *M. bovis* often enters human hosts through close contact with infected cattle or consumption of contaminated animal products such as unpasteurized milk. Globally, most cases of zoonotic TB are caused by *M. bovis*, and cattle are the major reservoir. Müller *et al.* (2013) described in details how to diagnose TB infections caused by *M. tuberculosis* and *M. bovis* based on its signs and symptoms, mode of transmission and preventive measure.
2.2 Pulmonary Tuberculosis (M. Tuberculosis)

Tuberculosis is an infection caused by rod shaped non spore forming aerobic bacterium of the member of the Mycobacterium tuberculosis complex. Mycobacterium spp. typically measure 0.5 um by 3um, are classified as Acid Fast Bacilli (AFB) and have unique cell wall structure crucial to their survival. The well-developed cell wall contains a considerable amount of fat acid mycolic acid covalently attached to the underlying peptidoglycan bound polysaccharide, arabinogalactan providing an extraordinary lipid (barrier). This barrier is responsible for many of the medical challenges. The physiological characteristics of tuberculosis including resistance to antibiotics and host defence mechanisms of the quantity of the cell wall components affect bacterial virulent and growth rate (Mackintosh and Bengal, 2001).

2.2.1 Pathogenesis of Mycobacterium Tuberculin

M. tuberculosis spread by the small airborne droplets called droplet nuclei generated by coughing and sneezing, or singing with person with pulmonary or laryngeal tuberculosis. The miniscule droplets can remain airborne for minutes to hours after expectoration. The number of bacilli droplets, the virulence of the bacilli, exposure of bacilli to ultraviolet light, degree of ventilation and occasion of aerosolisation, all influence transmission. Introduction of M. tuberculosis into the lungs leads to infection of the respiratory system. However, the organisms can spread to other organs, such as the lymphatics, pleural cavity, peritoneum, bones/joints, or meninges, and cause extra pulmonary tuberculosis (Knechel, 2013).
For persons with intact cell-mediated immunity, the next defensive step is formation of granulomas around the *M. tuberculosis* organisms restricting growth and establishing latency, by undergoing fibrosis and calcification, successful control the infection so that the bacilli are contained in the dormant healed lesions. In the majority of cases the immune system is strong enough to combat this primary attack. Most of the bacilli are eliminated but a few persist in a dormant stage. Tuberculosis is most common in patients whose immune system is severely impaired, such as patients with advanced HIV-infection and other conditions such as diabetes mellitus, malignancies, malnutrition and vitamin A and D deficiencies (Mugusi, 2013).

According to TB infection and control in the health facility manual of South Africa (2009), defence against tuberculosis is mediated by macrophages and activated cytotoxic T lymphocytes. CD4 cells play critical roles in defence against TB. Therefore, HIV-positive persons are at risk of TB disease. The annual incidence of TB disease after latent TB infection is 10 times greater than that amongst HIV-negative persons. The lower the CD4 cell counts the greater the risk for disseminated TB and death. TB disease in HIV positive persons also causes more rapid progression of HIV infection, and so the two diseases make each other worse (Health Department Republic of South Africa, 2014).

Once inhaled the infectious droplets settle through the airways. The majority of the bacilli are trapped in the upper parts of the airways where the mucus secreting goblet cells exist. The mucus produce catches foreign substances and the cilia on the surface of the cells constantly beat the mucus and its entrapped particles upward for removal. This system provides the body with an initial physical defence that prevents infection in most person
exposure to tuberculosis. Bacteria in droplets that bypass the mucocilliary system and reach the alveoli are quickly surrounded and engulfed by alveolar macrophages (Knechel, 2014).

The most abundant immune effector cells present in alveolar spaces, the microphages, the next line of the host defence, are part of the innate immune system and provide an opportunity for the body to destroy the invading mycobacteria and prevent infection. Microphages eat really available phagocytic cells that combat many pathogens without requiring previous exposure to the pathogens. Several mechanisms and macrophage receptor are involved in uptake of the mycobacteria. The mycobacteria lipoarabinomannan is a key ligand for a macrophage receptor. The complement system also plays a role in the phagocytosis of the bacteria. The complement protein C3 binds to the cell wall and enhances recognition of the mycobacteria by microphages opsonization. C3 is rapid, even in the air space of a host with no previous exposure to \textit{M. Tuberculosis} (Knechel, 2014). The subsequently phagocytosis by macrophages initiates a cascade of events that result in either successful control of the infection, following by latent tuberculosis, or progression to active disease called the primary progression tuberculosis. The outcome is essentially determined by the quality of the host defence and the balance that occur between host defence and the invading mycobacteria (Mugusi, 2013).

After being ingested by microphages the mycobacteria continue to multiply slowly, with bacterial cell division occurring every 25 to 32 hours regardless of whether the infection becomes controlled or progresses. Initial development involves production of proteolytic enzymes and cytokines by macrophages in an attempt to degrade the bacteria. Cytokines attract T lymphocytes to the site as well as the cells that constitute cell mediated immunity were released. Macrophages then present mycobacterial antigen on their surface to the T
cells. Immune process continues for 2 to 12 weeks, the microorganism continues to grow until they reach sufficient number to fully elicit the cell mediated immune responses which can be detected by the skin test. For persons with intact cell-mediated immunity, the next defensive step is formation of granulomas around the *M. tuberculosis* organisms. These nodular type lesion forms from an accumulation of activated T lymphocytes and macrophages and creates a micro environment, limits replication and the spread of the mycobacteria. This environment destroys macrophages and produces early solid necrosis at the center of the lesion; however the bacilli are able to adapt to survive. In fact *M. tuberculosis* organisms can change their phenotypic expression such as protein regulation to enhance survival. By 2 or 3 weeks the necrotic environment resembles soft cheese often referred to caseous necrosis, and it is characterized by low oxygen levels, low pH and limited nutrition (Knechel, 2014).

This condition restricts further growth and establishes latency. Lesion in persons with adequate immune system generally undergoes fibrosis and calcification. There is successful controlling the infection so that the bacilli are contained in the dormant healed lesion. The lesion in person with less effective immune system progresses to primary progressive tuberculosis. For less immunocompetent person, granuloma formation is initiated yet ultimately is unsuccessful in containing the bacilli the necrotic tissue undergoes liquefaction, and the fibrous wall losses structural integrity (Knechel, 2014).

The semiliquid necrotic material can then drain into a bronchus or nearby blood vessels leaving an air filled cavity at the original site in the patients infected with tuberculosis. Droplets can be coughed up from the bronchus and infect other persons. If discharge into a vessel occurs, occurrence of extrapulmonary tuberculosis is likely. Bacilli can also drain into
the lymphatic system and collect in the tracheobronchial lymph nodes of the affected lung where the organism can form new serous granulation (Mugusi, 2013).

Three factors determine the likelihood of transmission of *M. tuberculosis*: The number of organisms expelled into the air. The concentration of organisms in the air is determined by the volume of the space and its ventilation. The length of time an exposed person breathes the contaminated air. One cough can produce 3,000 droplet nuclei and a sneeze up to a million droplet nuclei. The infectious dose of tuberculosis is 1 to 10 bacilli. The most infectious cases are those with smear positive pulmonary TB. Those with 3+++ on smear microscopy being the most infectious than those with 1+. Smear negative pulmonary TB cases are much less infectious. Extra-pulmonary cases are almost never infectious, unless they have pulmonary tuberculosis as well. Individuals with latent tuberculosis infection are not infectious, as they do not have replicating bacteria and cannot transmit the organism (Health Department Republic of South Africa, 2014).

2.2.2 Signs and Symptoms of Tuberculosis

The main symptoms of pulmonary tuberculosis are: Persistent cough of 2 weeks or more or any duration if HIV positive, fever for more than 2 weeks, drenching night sweats, unexplained weight loss (more than 1.5 kg in a month), a productive cough. A history of contact with a person with pulmonary TB increases the likelihood of a TB diagnosis and symptoms such as coughing, weight loss need to be investigated. Sometimes coughing bloodstained sputum (hemoptyisis), shortness of breath, chest pain, fatigue and loss of appetite (MOHSW, 2006).
Physical signs may not be helpful in confirming the diagnosis, but it is important to examine the patient carefully. Some of the common signs are; the body temperature may be high or irregular (greater than 38.5°C). The pulse rate may be raised because of fever. There may be abnormal signs in the chest including, crackles in the lung apices more pronounced on deep breathing, localized wheeze in local obstruction or pressure, dullness where there is effusion and in chronic disease there may be extensive fibrosis with the trachea pulled to one side. As the cellular process occurs, tuberculosis may develop differently in each patient depending on the status of the patient’s immune system. The stages include latency, primary disease, primary progress disease and extra-pulmonary disease. Each stage has different clinical manifestations (Health Department Republic of South Africa, 2014).

2.2.2.1 Latent Tuberculosis

Mycobacterium tuberculosis organisms can be enclosed but are difficult to completely eliminated. Persons with latent TB have no signs or symptoms of the disease, do not feel sick, and are not infectious. However, viable bacilli can persist in the necrotic material for years or even a lifetime. If the immune system later becomes compromised, as it does in many critically ill patients, the disease can be reactivated. Although co-infection with human immunodeficiency virus is the most notable causes for progression of the active diseases, other factors such as uncontrolled diabetes mellitus, sepsis, renal failure, malnutrition, smoking, chemotherapy, organ transplantation and long term corticosteroid usage that can trigger reactivation of a remote infection are more common in progression of active TB. Additionally, person 65 and above years old have a disproportionally high rate of disease that any does in other age groups because of diminished immunity and reaction of the disease (Knechel, 2014).
2.2.2.2 Primary Disease

Primary pulmonary tuberculosis is often asymptomatic, so that the result of the diagnostic test basing at the only evidence of the disease, although it exists sub clinically. Associated paratracheal lymphadenopathy may occur because the bacilli spread from the lungs through the lymphatic system. If the primary lesion enlarges pleural effusion is distinguishing the finding. This effusion may remain small and resolved spontaneously. Also it may become large enough to induce symptoms such as fever, pleuritic chest pains and dyspnea. Dyspnea is due to poor gas exchange in the areas of affected lung tissue. Dullness during percussion and lack of breath sounds are physical findings indicative of a pleural effusion because excessive fluids has entered the pleural cavity (WHO, 2006).

2.2.2.3 Primary Progress

Active tuberculosis develops in only 5% to 10% of person exposed to *Mycobacterium tuberculosis*. When a patient progress to active tuberculosis, early signs and symptoms are often nonspecific. Manifestation often includes progressive fatigue, malaise, weight loss and a low grade fever accompanied by chill and night sweat. Wasting a classic feature of tuberculosis is due to the lack of appetite and the altered metabolism associated with the inflammatory and immunity responses. Wasting involves the loss of the both fat and lean tissue, the decreased muscle mass contributes to the fatigue. Finger clubbing a late signs of poor oxygenation, may occur, however it does not indicate the extension of the disease. A cough eventually develops in most patients (Muller, 2013).

Although the cough may initially be non-productive, it advances to a productive cough of purulent sputum. The sputum may also be streaked with blood. Hemoptysis can be due to destruction of patient vessels in a cavity or the formation of an aspergilloma in an old cavity.
The inflamed parenchyma may cause pleuritic chest pain. Extensive disease may lead to dyspnea or orthopnea because the increased interstitial volume leads to a decrease in lung diffusion capacity. The rupture of a dilated over involved areas during inspiration particularly after cough. Hematologic findings revealed anemia which is the cause of the weakness and fatigue. Leukocytosis many also occur because of the large increase in the number of leukocytes or white blood cells in response to the infection (Muller, 2013).

2.2.3 Extrapulmonary Tuberculosis

Although the pulmonary system is the most common location for tuberculosis, extrapulmonary disease occur in more than 20% of imunocompetent patients and the risk for extrapulmonary disease with immunosuppression is high. The most serious location is the central nervous system where infection may result in meningitis or space occupying tuberculosis. If not treated tubercular meningitis is fatal in most cases, making rapid detection of mycobacterium essential. Headaches and change in mental status after possible exposure to tuberculosis or in high risk groups should prompt consideration of this disease as a differential diagnosis. Another fatal form of extrapulmonary tuberculosis is infection of the bloodstream by mycobacteria (Knechel, 2014).

This form of the disease is called disseminated or miliary tuberculosis can then spread throughout the body, leading to multi-organ involvement. Miliary tuberculosis progresses rapidly and can be difficult to diagnose because of its systematic and nonspecific signs and symptoms such as fever, weight loss and weakness. Lymphatic tuberculosis is the most common extrapulmonary tuberculosis and cervical adenopathy occur most often. Other possible location includes bones, joints and genitourinary system. The microorganisms live
everywhere in our environment. Humans normally carry them on their skin and in the upper respiratory, intestinal and genital tracts. In addition, microorganisms live in animals, plants, soil, air and water. Some microorganisms, however, are more pathogenic than others that are more likely to cause disease. Given the right circumstances, all microorganisms may cause infection, such as when transmitted to an immunocompromised patient with AIDS (Mugusi, 013).

All humans are susceptible to bacterial infections and also to most viral agents. The dose of organisms necessary to produce infection in a susceptible host varies with the location. For bacteria, viruses and other infectious agents to successfully survive and spread, the following factors or conditions must exist; infectious agent, reservoir. Port of entry, means of transmission, port of exit and susceptible host. Preventing the spread of infectious diseases requires removing or blocks one or more of the conditions necessary for transmission of the disease by applying preventive measures including health education, provision of PPEs and use of recommended disinfectants to inhibit the growth of microbes (Tietjen et al., 2003)

According to Tanzania ministry of health and social welfare (2013), TB infection control includes covering the mouth and nose when coughing or sneezing, raising awareness of how TB is transmitted and ensuring that houses, clinics, workplaces and other “congregate settings” are well ventilated. This is particularly important for rooms where people with infectious TB spend a lot of time. The natural ventilation was emphasized. Poor compliance with respiratory protection requirements and improper use of recommendations in healthcare settings remains a vexing problem. There are many reasons to focus attention on healthcare
workplaces. Healthcare personnel are sometimes exposed to a variety of potential airborne respiratory hazards including M. tuberculosis (MOHSW, 2013).

In some of these situations the patient is the source of the exposure, but still requires medical care. Not surprisingly, some studies have found that compared to non-healthcare settings, healthcare personnel could be at a higher risk of exposure to infectious respiratory diseases. Occupational safety and health interventions involving respiratory protection requires the users to comply with recommended best practices to receive the full benefits of the intervention. Studies have shown that failure to implement all aspects of a respiratory protection program can result in inhalation of higher than anticipated airborne hazards. The Best practice for ensuring respirator compliance among healthcare professionals is to demonstrate compliance in the daily bases (Menon, 2013).

2.2.4 Diagnosis of Pulmonary Tuberculosis (M. Tuberculosis)

Chest X-ray may show diffuse, uniformly distributed, small miliary (“like small millet seeds”) nodules. Full blood count may show pancytopenia (this may also be seen as a result of HIV) or anemia. Liver function tests may be abnormal. Bacteriological confirmation is sometimes possible from sputum, Cerebral Spinal Fluids (CSF) and bone marrow). Smear microscopy of sputum from cases with disseminated (miliary) tuberculosis is usually negative (Health Department Republic of South Africa 2014).

Active signs of TB may be considered as a possible clinical diagnosis when patients present with physical signs and symptoms suggestive of TB plus abnormal findings on a chest radiograph. The radiographs may show the characteristic findings of infiltrates with cavitation in the upper and middle lobes of the lungs; however atypical features may be seen
in immunocompromised patients. Traditionally, in spite of modern advances, the first laboratory test used to detect active tuberculosis is microscopic examination of a sputum smear or other diagnostic specimen for the presence of acid-fast bacilli (AFB) using the Ziehl-Neelson staining. Definitive diagnosis of tuberculosis requires the identification of *M. tuberculosis* in a culture of a diagnostic specimen. A patient with positive culture but negative AFB sputum examinations is also a smear-positive case of pulmonary TB (Mugusi, 2013).

2.2.5 Treatment of Pulmonary Tuberculosis

The standard treatment regimen for all patients is made up of an intensive phase lasting 2 months and a continuation phase lasting 4 months. During the intensive phase 4 drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol) are used to rapidly kill the tubercle bacilli. Infectious patients become less infectious within approximately 10-14 days of starting treatment and symptoms abate. However, the majority of patients with sputum smear-positive TB will become smear-negative within 2 months. The continuation phase, 2 drugs (isoniazid, rifampicin) is used, over a period of 4 months. The sterilizing effect of these drugs eliminates the remaining bacilli and prevents subsequent relapse (Health Department Republic of South Africa, 2014).

Zambia Tuberculosis and leprosy TB Manual (2008) postulates that if the patient is still smears positive at the end of the fourth month, all drugs are stopped for 3-4 days. During that period the sputum specimens are taken for culture and sensitivity testing, the patient should be on the continuation phase. Sputum specimens should be examined for AFB and two months after the continuation phase should continue. Another test should be done for
confirmation of the treatment result. Patients who are smearing positive after the completion of the continuation phase are no longer eligible for the re-treatment therapy. If the pre-TB treatment sensitivity pattern shows resistance to either Isoniazid or Rifampicin alone, there is still a good chance of cure provided that the patient takes the drugs under full supervision until the end of treatment. If the pre-treatment specimen showed resistance to both Isoniazid and Rifampicin, the chance to achieve sputum conversion is limited. This patient should be notified as a potential case of MDR TB to the district TB coordinator for further investigation and management (Zambia Tuberculosis and leprosy TB Manual (2006).

Failure to comply with TB treatment regimen is the other factor that encourages TB relapse. Thinwa (2004) revealed that traditional medicine plays a significant role in the management of TB and HIV/AIDS in South Africa. Illness episodes, HIV and TB are associated with certain meanings that offer explanations of their cause. HIV/AIDS is still largely interpreted as an isidliso (Black Poison) associated with the evil machination of witchcraft (Biesen, 2012). Several factors such as the lack of awareness of certain diseases, financial constraints, accessibility of health services, and stigmatization prevent people from seeking help in the healthcare facilities. Health seeking delay has also often been cited as a reason for patients’ self-medicating. Haram (2008) observed that once fallen ill, most TB and TB/HIV patients turned to self-treatment through buying medicine at the shop or at the dispensary. Other patient turned to the governmental hospital/clinic, others turned to traditional healers on their own initiative while others were advised to do so by their closest kin, friends, and neighbours.
2.2.6 Control of Pulmonary Tuberculosis

The safety of BCG has been confirmed and its clinical efficacy has been carefully studied. A BCG vaccination programme will not be expensive because of the low cost of making the vaccine and applying it. It protects against both primary infection and reinfection. The degree of protection is 80%. There are claims that it prevents 100% of TB meningitis and 94% of genitourinary TB, but it is doubtful whether such protection lasts for 15 years. There are strong indications that it may last for only 5 years in a country in which other diseases, malnutrition, vitamin and protein deficiencies combine to reduce the immune response (Kleeberg, 1984).

In children, malnutrition, measles, whooping cough increase the risk of progression to active TB disease. BCG immunization gives variable protection against the progression of TB from infection to disease. The main benefit of BCG is the protection against the development of the serious forms of TB in children, such as TB meningitis and disseminated TB (Health Department Republic of South Africa 2014). Decreasing TB infection rates is fundamental to achieving the long-term aim of TB control in successive generations (Wood et al., 2011).

Reducing TB infection transmission rate, especially in high-density townships, should therefore become a primary target for long-term TB control. According to Bwana (2009), community-based DOT in Tanzania involved village health workers; Community Health Management Team (CHMT), community leaders, religious people and other community member. Those teams highlighted were well trained as a trainer of trainees (TOT), on TB/HIV services, including care and treatment of patients with TB/HIV co-infection. Pertaining to Care and Treatment Clinics (CTC), ant TB and antiretroviral drugs (ARV) are provided in one section to ensure compliance to treatment (Bwana, 2009).
The WHO treatment guidelines (2006) emphasize educating the community and all health workers on the importance of respiratory symptoms, especially persistent and productive cough, blood stained sputum and chest pains. This is particularly important if they persist for 2-3 weeks or more. Patients with these symptoms should be asked to come to a health facility for examination. Before the start of the re-treatment regimen, two sputum specimens must be collected, sent as soon as possible to the nearest laboratory for sputum smear and culture and drug susceptibility tests. A re-treatment case is at risk of developing multi-drug resistant disease and should receive a fully supervised treatment for the whole duration of treatment.

Developing and displaying health education messages on the ward and clinic walls is encouraged. Health education continues to be one of the most important strategies in the fight against TB. Efforts are directed at patients to make them more aware of all aspects of TB disease, its treatment and the basic rules to prevent the spread of infection to others in the community. Health education plays a key role in encouraging patients to seek diagnosis for TB and to adhere to the treatment regimen. To receive a timely TB diagnosis, patients must recognize the symptoms/signs of the disease and present themselves to the health care provider for TB diagnosis. The most important starting point is early recognition of the symptoms, if people can access health care for diagnoses and the right treatment provided the short-course regimens of first-line drugs that can cure around 90% of cases care available (WHO, 2013).

Infection control includes covering the mouth and nose when coughing or sneezing, raising awareness of how TB is transmitted and ensuring that houses, clinics, workplaces and other
“congregate settings” are well ventilated. This is particularly important for rooms where people with infectious TB spend a lot of time (MOHSW, 2013).

There should be advocate for prompt isolation of patients suspected or confirmed to have TB. In healthcare settings patients suspected to have TB should be placed in a negative pressure room and appropriate particular mask N95/high – efficient particulate air filter and should be readily available outside the door for anyone entering the room. Visitors should be minimized and children should be discouraged from visiting the place. It is recommended to instruct the patients to cover the mouth and nose during coughing and sneezing. The non-urgent procedure should be postponed until the infectious phase (10-14 days) passed (Knechel, 2009).

Adequate nutrition is an important feature through all stages of infection. Malnutrition appears to increase the risk for tuberculosis. People with low body mass index are greatly more at risk for tuberculosis than those with high body mass index. Additionally, among patients underweight at the time of diagnosis those who increased their weight by 5% during the first two months of treatment have significantly less relapse than the patients gaining less than 5%. Patients (Knechel, 2009). Health Care Providers (HCPs) and care takers should take particular note of underweight tuberculosis patients recognizing that being underweight is a risk factor for relapse and encourage aggressive nutritional support. Many patients with tuberculosis experience feelings of guilt and face stigma and patients’ family members often fear associating with the patients. They need support and education on disease transmission, treatment regimen and preventive measure (Knechel, 2009).
2.2.7 Prevalence of Pulmonary Tuberculosis (PTB)

Sharma (2012) asserts that the global prevalence of TB/ in patient with HIV infection was estimated at 8 %. However, some regions of the world such as Africa have significantly higher rates of TB-HIV co-infection, where prevalence ranges between 31% and 66% (Sharma, 2012). The prevalence of TB among close contacts of infectious patients is about 2.5 times higher than in the general population (Chani 2010). According to the study done in 2011 by WHO, almost 9 million new cases and 1.4 million TB deaths 990,000 were among HIV-negative people and 430 000 HIV-associated TB deaths. Worldwide, Approximately 80% of TB cases are found in 23 countries with the highest incidence rates being recorded in Africa and South-East Asia (WHO, 2014).

The rapid increase of TB in Tanzania is mainly attributed to the HIV pandemic. Tarimo (2012) reported that tuberculosis affects more people living in overcrowded houses and further observed that Dar es Salaam contributed 24.3% of all cases of TB in the country, Mwanza 7.2%, Iringa 6.3%, Morogoro 6.2%, Mbeya 5.8%, Tanga 5.6% and other regions together contributed 44.2%. It has generally been observed that delays in case detection and treatment may worsen the prognosis of the disease and spread of TB infection. According to study done at Muhimbili National Hospital more than 20 years after launching of Stop TB programme, the number of TB cases has steadily increased from 11,753 in 1983 to about 65,665 in the year 2004, at almost six-fold (Mugusi, 2013).
2.2.8 Factors Contributing to Prevalence of PTB

2.2.8.1 Infection Control Malpractices

HCW’s knowledge, attitudes and perceptions about TB play an important role in their ability to diagnose and provide care for individuals with TB (Miller, 2007). Health care viewed TB as an infectious, dangerous and life threatening condition since they are exposed to risk, they fear to contract TB infections during performing diagnostic and invasive procedure due to inavailability of PPEs such as N95 mask that could protect them during their provision of care to patients suspected to have active TB, as the results HCWs fail to provide reliable laboratory results and quality services because they scare to become infected (Miller, 2007).

2.2.8.2 Stigma and Discrimination

Suleiman et al., (2013) reported that stigma contributes to the suffering from illness in various ways, and it may delay presentation and treatment leading to prolonged transmission of infectious diseases, drug resistance or complications that increase treatment costs for this treatable health problem. Similarly, Gilani et al., (2012) observed that disease dissemination and social discrimination are common TB associated stigmas. Such stigmas lead to a person feeling ashamed or fearful of his/her illness and tend to hide it from others instead of seeking proper treatment. According to study done by Miller (2007) the stigma of TB is powerful because the public fear infectious diseases. Lack of knowledge about TB fuels fear and many people continue to be oblivious to the fact that TB is curable (Butler et al., 2010).
2.2.8.3 Spiritual Healing Powers Seekers

A study conducted by Haram (2008) revealed that charismatic church congregations believe that illness is caused by bad and sinful behaviour. Such bad behaviour is moreover linked to modern and urban ways of life and what is seen as a neglect of God’s commandments. The Devil (‘Satani’), in turn, takes demand of people’s life. Such a neglect of God’s will, causes illness in people and is manifested by the devil or evil spirits who torments the sick and afflicted person. It is therefore believed that the only means to regain health is to drive these evil forces out of the body. Ultimately, through prayers and faith the person may resume good health (Haram, 2000).

According to one religious healer the reverend in the Pentecostal church, bad spirits can also cause diseases and claimed that faith in God heals even AIDS (Haram, 2000).

Yimer et al., (2009), adds that medicine in Ethiopia is heavily influenced by religious beliefs. Many of the cures that are used are derived from the Ethiopian Orthodox Church. While most of the saints in the church have specific healing practices associated with them, Mikael (for both men and women) and Mariam (for women) are probably most famous for their power to heal (Yimer et al., 2009). When a person becomes sick, his friends and relatives may say to him, “Mikael must be with you. Mikael will protect you.” Likewise, Mariam is said to protect the health of women, especially during childbirth. Even in cases where people seek bio-medical treatment, the eventual outcome of the treatment, whether complete recovery, continued illness or death, is often attributed to the will of the saints (Yimer et al., 2009).
2.2.8.4 Non-compliance to TB Treatment

Zai et al. (2010) demonstrated that there are some factors affecting compliance, which are lack of knowledge and awareness about TB. Lack of skills in the management of TB/HIV disease brings about stigmatization. Educating the patients about cough hygiene and that sputum produced after coughing should be placed in a handkerchief, tissue or sputum container is essential. Similarly, instructing patients to cover their mouth and nose with a handkerchief when coughing and sneezing.

2.2.8.5 Standard Guidelines HCFs for Healthcare Acquired Infections (HAI)

According to Technical Policy and Guidelines for TB/HIV Collaboration in Ghana (Anon 2007) reduction of occupational and nosocomial exposure to TB/HIV infection, all health facilities should implement procedures for reduction of occupational and nosocomial exposure to infection. These procedures include standard infection prevention procedures such as handling all the hospital linen with minimum agitation to avoid aerosolisation of pathogenic microorganisms, putting on N95 mask when performing bronchoscopy procedures, aspirating sputum from the TB suspect children for test, when performing laryngoscopy, gastroscopy, intubations procedure and respiratory care.

HCWs are at an increased risk of contracting TB infection as well as developing the disease. This occupational risk is at alarming proportions in the low- and middle-income countries (LMIC), because of increased exposure and lack of preventive measures. Effective environmental and personal protective measures along with education to the patients and the HCW needs to be carried out expeditiously, to reduce the occupational risk of TB (Jesudas and Thangakunam, 2013).
It should be emphasized that the HCWs performing bronchoscopies, intubations and respiratory care are at particularly high risk to acquire healthcare infections (Jesudas and Thangakunam, 2013). Poor compliance with respiratory protection requirements and improper use of recommendations in healthcare settings remains a vexing problem. There are many reasons to focus attention on healthcare workplaces. Healthcare personnel are sometimes exposed to a variety of potential airborne respiratory hazards including *M. tuberculosis* (WHO, 2003).

In some of these situations the patient is the source of the exposure, but still requires medical care. Not surprisingly, some studies have found that compared to non-healthcare settings, healthcare personnel could be at a higher risk of exposure to infectious respiratory diseases (Menon, 2013). Occupational safety and health interventions involving respiratory protection requires the users to comply with recommended best practices to receive the full benefits of the intervention. Studies have shown that failure to implement all aspects of a respiratory protection program can result in inhalation of higher than anticipated airborne hazards (Menon, 2013). The best practice for ensuring respirator compliance among healthcare professionals is to demonstrate compliance day to day (Menon, 2013).

### 2.2.8.6 Community Sensitization and Communication in Control of TB

According to Shukla *et al.*, (2015), effective interpersonal communication between healthcare providers and a patient is one of the most important elements for improving client satisfaction, treatment compliance and health outcomes. Patients who understand the nature of their illness and its treatment and who believe the provider is concerned about their well-being, show greater satisfaction with the care received and are more likely to comply with treatment (Shukla *et al.*, 2015). According to Gumeyi (2010) knowledge is the level of
understanding that the client displays when taking tuberculosis treatment in order to be able to achieve self-care.

2.2.8.7 Co-Infection and Drug Interaction

Patients with co-infections like HIV/AIDS and other chronic illnesses whose immune systems are compromised can easily develop active TB and drug reactions. It is very important to detect and treat co-infections (Eticha, 2014). People living with HIV have an estimated 20 to 30 time’s greater risk of developing active TB than people without HIV infection (Nilsson, 2012).

HIV is therefore the biggest risk factor for developing TB. The clinical features of patients with TB/HIV are more likely to include extra pulmonary disease, miliary infiltrates and non-reactive tuberculin tests. The number of atypical presentations of TB is linked with less CD4+ cells. Patients with advanced HIV and low CD4+ cell count can also have atypical chest x-rays. Patients with TB who are HIV-negative are less likely to have pulmonary disease than those HIV-infected patients with TB (Nilsson, 2012). According to Thinwa (2004), patients utilizing a combination of biomedical and traditional medicine run the risk of encountering harmful drug interactions especially since prescribed traditional treatments usually lack characterized active ingredients and dosages. Traditional healers give some patients presenting TB symptoms certain traditional medicine that induce vomiting and HIV/TB patients are also given treatments facilitated through enemas. Both of these treatments could potentially pose health risks to patients for TB infected patients.
2.2.8.8 Weakness Related to Drugs, Nutrition and Drug Adverse Reaction

WHO nutritional care and support manual (2013) explains that, an essential dietary nutrient is a substance that a person needs to consume in order to live, grow and be healthy. Nutrients are required to regulate body processes, build and repair tissues, promote health and prevent disease. Under nutrition is commonly associated with illness and infections such as gastrointestinal disorders and malabsorption, pneumonia, TB and HIV. The association between TB and under nutrition has long been known. TB makes under nutrition worse and under nutrition weakens immunity.

2.3 Bovine Tuberculosis

Bovine tuberculosis is a disease characterized by the progressive development of characteristic granulomas, or tubercles, in the lungs, lymph nodes, and/or other organs, which affects the health of the individual animal and has a detrimental effect on animal production. The disease is infectious and can spread within a herd before any signs of disease are obvious. Infection may be localized with no obvious clinical symptoms or may cause chronic debilitating disease. In some cases, the infection lies dormant for many years, spreading only when the animal is subjected to additional stresses such as overstocking or drought, or if the immune system deteriorates in old age. Control of bovine tuberculosis, like control of human tuberculosis, relies on early diagnosis, removal of infected animals and tracing and containment of contact exposed cases. The primary mode of spread of bovine tuberculosis (bTB) between herds is by the introduction of infected animals into non-infected herds (Cousins 2001).
2.3.1 Bovine Tuberculosis in Human

*Mycobacterium bovis* (*M. bovis*), the bovine tubercle bacilli, is the cause of bovine tuberculosis. It has a wide range of host animal species, which includes cattle, goats, bison, antelopes, humans and non-humans and can cause disease in susceptible hosts. Bovine tuberculosis spreads by ingestion of infectious food, whether by drinking contaminated milk or ingesting contaminated pastures or feed. Cutaneous, congenital and genital infections have been recorded but are considered rare (Malama et al., 2013). In practice, infection is acquired almost exclusively by the inhalation of infected droplets. Alimentary infection may be primary, as occurs in calves drinking the milk of cows with tuberculous mastitis, or may be secondary from swallowing mycobacteria-laden exudate from the lungs. Tonsillitis with secondary involvement of regional lymph nodes may result from the ingestion of bacilli in the food. It is usually characterized by formation of nodular granulomas known as tubercles. Although commonly defined as a chronic debilitating disease, bTB can occasionally assume a more progressive course. Any body tissue can be affected, but lesions are most frequently observed in the lymph nodes (particularly of the head and thorax), lungs, intestines, liver, spleen, pleura, and peritoneum (Cousins, 2001).

2.3.2 Pathogenesis of Bovine TB in human

*Mycobacterium bovis* can enter human hosts through ingestion, inhalation or direct contact with mucous membranes or broken skin. Principally, milk is still regarded as the principal vehicle for transmission of *M. bovis* to humans in countries where bovine TB is not controlled. Ingestion of contaminated milk or other dairy products is more often associated with abdominal tuberculosis and other extra-pulmonary forms of the disease (Ashford et al., 2001).
Extra-pulmonary disease occurs in more than 20% of patients. The most serious location is the central nervous system, where infection may result in meningitis, which could be fatal in most cases. Another fatal form is infection of the blood stream by mycobacteria; this form is called disseminated or miliary tuberculosis. Extrapulmonary TB of the pleura, lymphatics, bone, genito-urinary system, meninges, peritoneum, or skin occurs in about 15 per cent of TB patients (Sugawara, 2013). The tubercle bacilli sometimes go to the other sites preferable the apex and form the primary lesion. This primary lesion is called ghon focus. From this lesion the bacilli spread to the nearest lymph-stations, which are in most times the hilar lymph nodes. The primary lesion combined with the hilar lymphadenopathy is called primary complex. The immune response develops after 4-6 weeks after infection. The number of bacilli that have invaded the body and the strength of the immune system determines whether the infection is stopped or develops into full blown tuberculosis disease (Mugusi, 2013).

Close physical contact between humans and potentially infected animals is present in some communities, especially in developing regions. In many African countries cattle are an integral part of human social life; they represent wealth and are at the center of many events and, therefore they are risk for bovine TB (Cousins, 2001).

2.3.3 Clinical Signs of Bovine Tuberculosis in human

The most common types of extra-pulmonary tuberculosis are: TB lymphadenitis, tuberculous pleural effusion (usually single-sided), TB of the bones and joints, tuberculous pericardial effusion, TB meningitis, disseminated/miliary tuberculosis, tuberculous empyema, TB peritonitis. Disseminated tuberculosis and tuberculosis meningitis are acute,
severe forms of TB, often occurring soon after primary infection. They occur most commonly in children and young adults. These acute forms of TB are often fatal (Health Department Republic of South Africa 2014). When this form of disease is suspected, treatment should be commenced immediately without waiting for bacteriological proof of diagnosis. HIV positive patients particularly those with low CD4 counts may present with extra pulmonary disease. The presentation of extra-pulmonary TB is generally not different between HIV positive and HIV-negative patients, however, differences do occur. This depends on the size of the lesions. Detection of enlarged superficial lymph nodes provides a useful diagnostic sign, whereas small lesions located deep in lymph nodes are of little or no value in establishing a clinical diagnosis. The principal sign of tuberculosis is wasting, emaciation, weakness, anorexia, dyspnea, and off and on fevers (Health Department Republic of South Africa, 2014).

2.3.4 Laboratory diagnosis

In patients with EPTB, diagnosis should be based on one culture-positive specimen or histological or strong clinical evidence consistent with active extrapulmonary disease, followed by a decision by a clinician to treat with a full course of anti-TB chemotherapy. Immunological diagnostic tests such as the Mantoux tuberculin skin test are of limited application due to cross reactivity within cells and poor sensitivity. Instead Polymerase Chain Reaction (PCR) can be used (Mugusi, 2013)

2.3.5 Treatments of Bovine in human

Six months treatment is as effective in extra-pulmonary as in pulmonary disease. In some instances of severe or complicated disease (meningitis, TB bones/joints, miliary TB)
treatment may need to be extended to nine months. The intensive phase remains two months and the continuation phase is prolonged to seven months. The use of pyridoxine (Vitamin B6) is recommended for all adults patients started on TB treatment to prevent peripheral neuropathy most commonly caused by isoniazid. Dose of pyridoxine: 25mg daily. If the patient develops peripheral neuropathy at any stage during TB treatment, the dose can be increased to 50 – 75mg (up to maximum of 200mg) until the symptoms subside, then reduce to 25mg daily and 7.5.2 tablets (Steroids). The use of corticosteroids is recommended in extra-pulmonary tuberculosis, particularly for TB meningitis and pericarditis. High dose steroid treatment for 2-4 weeks and the taper off gradually over several weeks depending on clinical progress is recommended. The response to treatment is assessed clinically (Health Department Republic of South Africa 2014).

2.3.6 Prevalence of Bovine TB in Human

Bovine TB is among of extrapulmonary infection (EPTB) which is also an important clinical problem. The term EPTB is used to describe isolated occurrence of TB at body sites other than the lung (Sharma et al., 2005). There is evidence to suggest that zoonotic TB accounted for a significant proportion of the TB cases in the western world before the introduction of regular milk pasteurization programs. Currently, in high-income countries, bTB is well controlled or eliminated in most areas, and cases of zoonotic TB are rarely seen (Müller, 2013).

However in most countries in Africa, bTB is prevalent, but effective disease control, including regular milk pasteurization and slaughterhouse meat inspection, is largely absent. This situation is exacerbated by the presence of multiple additional risk factors such as
human behaviour and the high prevalence of HIV infections. Although HIV/AIDS is thought to facilitate transmission and progression to active disease of any form of TB, some studies showed a significantly increased proportion of *M. bovis* infections among HIV–co-infected TB patients compared with HIV-negative TB patients (Müller, 2013). No assessment of the global consequences of zoonotic TB has yet been done. This may have been partially caused by the difficulty of differentiating TB caused by *M. tuberculosis* or *M. bovis*, which requires mycobacterial culture and the subsequent use of biochemical or molecular zoonotic *M. bovis*–induced Tuberculosis in Humans (Müller, 2013).

However, the contribution of *M. bovis* to human tuberculosis in Tanzania is unknown, owing to the absence of efforts in most laboratories in hospitals and health centres to differentiate between the species of the *M. tuberculosis* complex. Despite the lack of data, *M. bovis* infection is considered as a pathogen of concern to people living in rural areas where cattle is reveal (Katale et al., 2012).

2.3.7 Challenge in Control Bovine tuberculosis in Human

In regions where bovine TB is common and uncontrolled, milk borne infection is the principal cause of cervical lymphadenopathy, abdominal and other forms of nonpulmonary TB. Although proper food hygiene practices could play a major role in controlling these forms of TB, such practices are often difficult to institute in some countries. The informal sector used to ignore standards of hygiene and quality since producers can sell animal products directly to the final consumers. The total milk produced is consumed fresh or soured. Contaminated milk and milk products should not be underestimated (Thoen, 2009).
The immunity of the infants is low as at this age they start to develop their immunity. They are not depending on their mothers’ immunity, so it is easier to acquire TB in case of exposure. The old age people are also at risk of getting infections since their immune system are no longer able to fight against infections such as TB. People who are immune compromised such as HIV/AIDS, chronic illnesses like kidneys and diabetes can weaken immune system and become more susceptible to develop infections in case of exposure. Also patients who are under chemotherapy and radiotherapy, those who are using antibiotics for a long time as well as those with organ transplant are at high risk because treatments suppresses immunity (Wenwei, 2013). Malnourished and low income people are also at risk of getting tuberculosis simply because they have weak defence mechanism (Thoen, 2009).

People eating or drinking contaminated food, meat which is not properly cooked and unpasteurized dairy products (Fresh milk, yoghurt and cheese) are at risk of getting TB. Coming into contact with infected animals and animal products, specifically milking, herding cattle and goats, hunting, slaughtering, treating animals, handling skins and hides increases risk of getting tuberculosis (Mackintosh and Bengs, 2001). Traditional practice of living in the same house with animals, in adequate knowledge on disease transmission promote the spread of TB infection. Education and behaviour modification of the population is emphasized to eradicate Microbacterium bovis infection in the community (Mackintosh and Bengs, 2001).

2.3.8 Control Measures of bovine in human

Testing the milk and meat before consumption is emphasized. Measures to prevent transmission of infection are the primary objective to be achieved with trained public health
personnel, public education, and proper hygienic practices. Those with the symptoms of Bovine TB should report to the health facility in time to get proper healthcare services as earlier as possible (Thoen et al., 2009).

2.4 Bovine TB prevalence in animal

In Tanzania the highest prevalence of 13.3% M. bovis infection was reported in the Southern Highlands and larger herds of cattle had a higher rate of bovine tuberculosis. The prevalence of M. bovis infection in cattle in other parts of the country was reported as follows: (Shinyanga, Mwanza, Bukoba) 0.2 % in intensively managed farms, (Rift valley districts (Babati, Hanang, Mbulu and Karatu) 0.93% and Manyara region 0.9% (Katale et al., 2012).

2.4.1 Pathogenesis in Animals

The tubercle bacilli enter the body via the respiratory route. The bacilli spread from the site of initial infection in the lung through the lymphatics or blood to other parts of the body, the apex of the lung and the regional lymph node being the favoured sites. M. bovis infection first results in the formation of a primary focus, which is usually, located in the lungs in mammals, lymphatic drainage from the primary focus leads to the formation of caseous lesions in an adjacent lymph node. This lymph node lesion, together with the primary focus, is known as the primary complex. This primary complex seldom heals in animals. In cattle and other animals, aerosol spread of tubercle bacilli frequently leads to involvement of lungs and thoracic lymph nodes, whereas exposure by ingestion of contaminated food and water often results in primary foci in lymph tissues associated with the intestinal tract (Cousins, 2001).
At sites of localization of the organisms, granulomas form and develop into tumour-like masses called tubercles in advanced cases. Because of the continued growth of the organisms, these tubercles often enlarge to a considerable size. Large masses may develop on the serous membranes of the body cavities. As the granulomas increase in size, necrosis of their central portions may occur. Finally, these central portions are reduced to caseous masses, which have a tendency to undergo mineralization or liquefaction. In mammals, tubercles may become enclosed in dense fibrous tissue and the disease becomes arrested. Advanced lesions associated with clinical disease include caseous nodules or cavities with liquefaction (Sugawara, 2013).

Bacilli are transferred from the primary foci via lymph and blood vessels; they lodge in other organs and tissues, thereby establishing sites of additional tubercles. When the bloodstream is invaded by numerous tubercle bacilli from a local lesion, many tubercles develop in the major organs (Sugawara, 2013). The acute form of generalized infection (known as miliary tuberculosis) is often rapidly fatal. If small numbers of bacilli enter the circulation from the primary complex, a few isolated lesions develop in other organs. These widely distributed lesions may become encapsulated and remain small for extended periods, usually causing no detectable clinical signs of disease. The progression of the disease from early infection of macrophages to the development of caseous nodules that undergo calcification and liquefaction, as well as the regression, progression, or generalized spread of lesions, depends on the interrelation of the immune response of the host and the proliferation of the bacilli in macrophages. The disease can take months to develop (Cousins, 2001).
2.4.2 Clinical Findings

Clinical signs of tuberculosis vary depending on the extent and location of the lesions. The organs of the thoracic cavity are usually involved; when the lungs are extensively affected, an intermittent hacking cough is commonly detected, mainly after exercise (Health Department Republic of South Africa, 2014).

2.4.3 Diagnosis of Bovine Tuberculosis in Animals

Clinical diagnosis of tuberculosis is usually possible only after the disease has reached an advanced stage and, with the exception of milially tuberculosis, is dependent on the site of lesions. At the time of diagnosis, most infected animals are shedding bacilli and are a source of infection for other animals. Ante mortem evaluations are a critical component of tuberculosis control programs throughout the world. At this time, one of the most reliable and practical methods of diagnosis in domestic animals is assessment via the tuberculin skin test (Mackintosh and Bengs, 2001).

Animals infected with mycobacteria are allergic to the proteins contained in tuberculin and develop characteristic delayed-type hypersensitivity reactions when exposed to those proteins. The deposition of tuberculin intradermally in the deep layers of the skin usually elicits a local reaction characterized by inflammation and swelling in infected animals, whereas such reactions at the injection site fail to develop in uninfected animals. The sensitivity and specificity of the intradermal test often depend on the field conditions, prevalence of infection, and other factors. The intradermal tuberculin skin test may not be effective or practical for use in all species, but has been accepted worldwide, for identification of *M. bovis* in cattle, bison, goats, and captive cervids. At present, most
countries use *M. bovis* for the preparation of Purified Protein Derivative (PPD) tuberculin for veterinary use; heat concentrated synthetic-medium old tuberculin is infrequently used. The use of PPD tuberculin is preferable because it is easier to standardize and more specific than old tuberculin and is particularly useful in comparative tuberculin tests used to differentiate responses caused by *M. bovis* or *M. tuberculosis* and those induced by other mycobacteria. Most countries use PPD tuberculin at a dose of 0.1 ml (ie, 0.1 mg of protein) containing 5,000 tuberculin units in mammals and 0.05 ml containing 2,500 tuberculin units in chickens.

When testing for avian tuberculosis, an *M. avium*-PPD tuberculin must be used because animals infected with *M. avium* react less to tuberculin made from the culture filtrate of *M. bovis*. Specific skin tests are serially applied to livestock herds for diagnosis of tuberculosis. Large mammals such as cattle, bison, or deer are usually injected in 1 of the folds at the base of the tail or in skin of the cervical region (the caudal fold test); swine are injected in the skin behind the ear or vulva, and chickens are injected in the skin of the wattle. The injection sites are examined by observation and palpation for characteristic swelling 48 hours after injection for swine and chickens and 72 hours after injection for cattle, sheep, and goats (Mackintosh and Bengs, 2001)

In general, animals for which test results are positive or suspect are removed from the farm and examined post-mortem for confirmation of mycobacterial infection, depending on federal and state testing regulations, which vary with species or the specific circumstances under which testing was undertaken. In cattle that are suspected to have *M. bovis* infection, the comparative cervical skin test is administered by another caudal fold test (Ashford *et al.*, 2001)
The comparative cervical skin test is performed by injecting biologically balanced *M. avium* and *M. bovis* PPD tuberculins into separate sites in the skin of the neck. The injection sites are examined by observation and palpation. The differences in the size of the resultant skin responses are compared on a graph, which indicates whether the observed tuberculin sensitivity is caused by infection with *M. bovis* rather than infection with *M. avium* subsp avium or *M. avium* subsp paratuberculosis. These results are then used to classify animals as negative for infection (the response to the test is negative), suspected to have infection (the response to the test is unclear), or reactor (the response to the test is positive). Although skin tests are useful tools in tuberculosis testing programs, they have the drawback of requiring the individual performing the test to visit a production facility or premises on which the animals are kept on occasions: to administer the tuberculin, and another to assess the results of the test (Ashford *et al.*, 2001).

Other diagnostic methods that rely on cellular immune response and are performed in vitro (such as lymphocyte blastogenic assays or γ-interferon tests) have been developed and used, with results that are comparable to those obtained with intradermal tests. A commercially available γ-interferon test for cattle has been recommended for use as a supplemental diagnostic test for *M. bovis* infection in cattle herds. Recently, a protein has been identified in the early phase of *M. bovis* infection in cattle. This may be important in the early detection of tuberculosis animals, before results of other tests are found to be positive. However, immunologic tests have been found to be unreliable in some species (e.g. elephants); isolation of the causative agent is then necessary for diagnosis. Mycobacterial culture is still considered to be the gold standard by which to confirm a diagnosis of tuberculosis. Because of the slow growth of *M. tuberculosis complex bacilli*, culture results
are usually obtained after 3 to 6 weeks. Recently, polymerase chain reaction techniques have been reported to be useful in the diagnosis of *M. tuberculosis* and *M. bovis* (Cousins, 2001).

A DNA probe has been developed for identifying *M. bovis* in formalin-fixed, paraffin-embedded tissues, and results of this analysis are available in a few days. Recently, a modification of this polymerase chain reaction assay was used to detect *M. avium*. The development of molecular techniques for differentiating strains of *M. bovis*, such as DNA fingerprinting (restriction fragment length polymorphism), has been useful in outbreak investigations in animals and humans to identify potential sources of infection or relatedness of strains (Health Department Republic of South Africa, 2014).

### 2.2.4 Treatments of Bovine Tuberculosis in Animal

The treatment of tuberculosis in cattle is not allowed in many other countries. When treatment is attempted, appropriate regimens must be followed; for elephants with *M. tuberculosis*-complex infections, this involves administration of doses of 3 drugs within a 15- month period, with concurrent testing for serum drug concentrations (Thoen *et al.*, 2009).

### 2.4.5 Control of Bovine Tuberculosis in Animals

Control programs for tuberculosis in animals are primarily focused on controlling infections with *M. bovis*. These programs can be considered as having 4 components: prevention, treatment, eradication, and surveillance. Disease prevention primarily focuses on reducing opportunities for animals to be exposed to the pathogen of concern and reducing the likelihood that an exposed animal will become infected after exposure. On cattle farms, the major source of *M. bovis* is infected cattle that either reside on the farm or are introduced to
the herd from another facility. Basic herd hygiene and biosecurity practices (e.g. routine testing for tuberculosis and quarantine of imported animals, manure management, maintenance of feed and water hygiene) have been found to reduce the risks of spread of *M. bovis* on cattle farms. It is also necessary to establish population control measures for wild reservoir animals (i.e. possums, badgers, and white-tailed deer) that may shed tubercle bacilli, contaminate feed and water (Thoen et al., 2009).

Although the main reservoir of *M. bovis* is cattle, reservoir animals infected with tubercle bacilli that interact with cattle may be the source of herd infections and significant production losses. Vaccination has been used in humans in some countries in which tuberculosis is prevalent in the population. Unfortunately, the BCG vaccine does not completely prevent infection in cattle or other animals. Moreover, vaccinated animals yield positive results on the tuberculin skin test, which precludes the use the BCG (Bacillus of Calmette and Guerin) of the vaccine in the United States or other countries with eradication programs. In several countries where *M. bovis* infection has been reported in wild animals, the BCG vaccine has been evaluated as an immunizing agent (Thoen et al., 2009).

Implementing a test-and-slaughter policy for those animals revealed positive in order to eradicate disease is practiced in some countries. After removal of all positive reactors in the herd, it is necessary to make sure that there is no continuous shedding of the organism on the farm by implementing proper sanitation measures. Environmental disinfection of the area using 5% phenol, iodine solutions with a high concentration of available iodine, glutaraldehyde and formaldehyde is very important to reduce the spread of the agent within the herd. Alternative strategies, programs based on slaughter house surveillance and trace back of tuberculosis animals to herds of origin is technically and economically more
appropriate. Measures to prevent transmission of infection are the primary objective to be achieved with trained public health personnel, public education, and proper hygienic practices (Thoen et al., 2009).

Monitoring for lesions consistent with tuberculosis by post-mortem examination of cattle carcasses at abattoirs is a critical element of tuberculosis eradication. However, meat inspection procedures are estimated to detect only 50% of cattle with tuberculosis lesions. Effective monitoring requires meat inspectors to show diligence, be well-trained, examine the correct tissues and submit granulomas for laboratory examination which should use histopathology (Cousins, 2001).

### 2.5 Social Economical Effect of Tuberculosis

Tuberculosis continues to be an important disease both in humans and animals as it causes mortality and economic losses worldwide. The occurrence of *M. bovis* in humans, domestic and wild animals confirms the zoonotic relevance of this disease (Thoen et al., 2009). The social economic impact of bTB includes that total cost spent on case study of the farm, cost on testing the farm, the cost on movement restrictions of the animals, cost on replacement of livestock, compensation and insurance payment which do not cover the cost of the farm as well as the long term cost incurred until the farm become stable (Butler et al., 2010).

#### 2.5.1 Loss of Income to the Farm

The social economic impact of bovine *tuberculosis* includes total cost spent for case study of the farms, cost for testing the farm, the cost for the movement restrictions of the animals, The cost of replacement of livestock, compensation and insurance payments which do not
cover the cost of the farm, as well as the longer term costs incurred until the farm becomes stable (Butler et al., 2010).

Related to the effect of the disease in humans, the family spends a lot of money seeking treatment and diagnosis. The disease destabilizes family projects for the entire 6 months during the course of treatment, loss of employment and loss of working hours during the disease. According to Sullivan (2010), 75% of economic burden fall among the adults from 15-54 years that lose about 3-4 months of work while on treatment. The considerable stigma and social rejection lead to 8-20% annual income spent on treatment cost and 20-30% of annual income in lost wage while pre-mature mortality is associated with serious dropping of social economic status of the nation (Sullivan, 2010).

Pertaining to the impact of bovine TB on human health and nutritional status, the loss of milk due to bovine TB directly affects the human nutritional status such as loss of weight, lack of protein and carbohydrates resulting in Marasmic-kwashiorkor and death. Good nutrition diet is essential for children’s growth and development of body maintenance and protecting them from infectious and non-communicable disease in adult life. Adequate nutrition and a healthy productive nutrition are increasingly recognized as an important pre-request for the poverty reduction, social development and improving children nutritional status for achieving the millennium development goals (MGDs) on eradication of extreme poverty and hunger (FAO, 2013).
CHAPTER THREE

METHODOLOGY

3.1 Research Design

The research design was a health facility-based cross-sectional study. Both qualitative and quantitative design approaches were employed. The quantitative approach was a health facility-based using self-administered questionnaire for HCWs and patients, while qualitative approach was based on Focus Group Discussions (FDGs) with HCWs, and patients, key informants interview and observation that involved assessing the knowledge, practices, and perception of HCW and patients towards prevention of tuberculosis transmission.

3.2 Selection of the Study Area

The study was carried out in Dar es Salaam at two healthcare facilities; Muhimbili National Hospital (MNH) which is within Ilala Municipality of Dar es Salaam. The hospital is the largest facility in Tanzania which serves as the National Referral and super specialized Teaching Hospital. The second study area was at Mwananyamala municipal and regional referral hospital located in Kinondoni Municipality in Dar es Salaam (Fig 3.1).

The two health care facilities were selected purposively due to the fact that the risk of contracting TB was considered to be high in these communities compared to other areas. Another consideration in selecting these areas was the kind of work conducted in those sections/wards of these facilities that predisposed workers and patients to TB infections including procedures such as bronchoscopy, laryngoscopy, sucking and intubating patients with blockage of airways as well as aspiration of babies’ sputum for testing TB. Further, the
selected hospitals were considered as good representatives of the other hospitals in Dar-es salaam. Each Municipality of Dar-es salaam has its Municipal hospital that operates as a regional referral hospital which receives patients from the respective municipality for the purpose of decongesting Muhimbili National Hospital. These hospitals are Temeke Municipal, Hospital for Temeke Municipality, and Amana Municipal Hospital for Ilala Municipality and Mwananyamala Municipal Hospital for Kinondoni municipality.

Sixteen (16) out of 192 sections/wards at MNH, and ten sections /wards were from the following clinical areas (healthcare delivery points); male and females TB wards (2), Intensive Care Unit, General Out Patient Department, New Out Patient Department, Emergence Medical Department, TB clinic (Infectious Disease Control- IDC), Mental Health Department and male and female infection wards (2). While other six sections were selected from the following clinical support sections/wards; Physiotherapy Department, Laboratory, Radiology Department, Laundry, Estate and Social welfare Department.

At Mwananyamala hospital, eight (8) out of 43 sections/wards were selected purposively for HCWs due to the fact that the risk of contracting TB was considered to be high compared to other areas. Again the reason for selecting those sections/wards was the kind of work conducted in those sections /wards that predisposed workers to TB infections. Five section/wards were from clinical services (healthcare delivery points), which were; Tuberculosis clinic, Medical wards (2), Out Patient Department, Methadone clinic and Emergence Medical Department. The other three sections /wards were from clinical support; Radiology, Laboratory and Physiotherapy Department.
Figure 3.1: Map of Tanzania showing Kinondoni and Ilala municipalities and location of Muhimbili and Mwananyamala hospitals (Insert) (Source: drawn using ArcGIS program)
3.3 Data Collection Methods

The following tools were used: Questionnaire surveys for patients and HCWs (appendix 7.1), list of six questions for FGDs for patients and HCWs (appendix 7.2), list of six questions for in-depth interviews (appendix 7.3), observation checklist for direct observation and review of hospital documents (appendix 7.4). Questionnaires and checklist questions for in depth interviews and FGDs for patients and HCWs care workers were developed by the investigator in English and were changed to Swahili the language spoken by the Nation and the responses were later translated into English for documentation and analysis.

3.3.1 Data Collection Tools

The study utilized structured questionnaires to collect the quantitative data. In collecting the qualitative data semi-structured and unstructured interview guides were used (appendix 7.1).

3.3.2 Testing of the Validity of Data Collection Tools for Consistency

In order to test the validity of the data collection instruments, the instruments were pre-tested in Mwananyamala TB clinic which was not included in the study. Debriefing was done to ask the respondents’ understanding of questions that appeared to cause difficulties during the interview and offer clarity and precision. Questions were adjusted according to the pre-test results in order to achieve better clarity.
3.4 Sample Size and Sampling methods

The sample size was purposely calculated from the following formula by Bartlett et al., (2014) since the study had the features of estimating the prevalence of TB hence there was not study done on the prevalence of TB in Dar-es-salaam.

\[ n = \frac{Z^2 \times P \times (1-P)}{D^2} \]

Where

- \( n \) = required sample size
- \( Z \) = Multiplier from normal distribution at 95% confidence interval (1.96)
- \( P \) = Estimated prevalence 50% (0.5)
- \( (1-P) \) =Probability of having no disease 50% (0.5)
- \( D \) =Precision of estimation, 5% (0.05)

\[ n = \frac{1.96^2 \times 0.5 \times 0.5}{(0.05)^2} \]

\( n = 384.16 \approx 384. \)

Therefore, the estimated number of participants that were included in the study was 384 HCWs and patients which were proportionally shared between the two categories of participants. The sampling proportion of HCWs and patients included in the study were based on the target sub-populations, estimated at 117 (30%) patients and 267 (70%) HCWs.
3.5 Sampling Patients and HCWs for Questionnaires

3.5.1 Sampling of Healthcare Workers

The simple random sampling technique was used in selecting both the patients and HCWs in order to make sure that all healthcare providers and clients were given an equal chance of participating in the study. The target population comprised Health care workers i.e. Doctors, laundry attendants, health attendants, cleaners, nurses, lab technicians, quality improvement team members, radiologists and social workers. Among those professions, only those persons who voluntarily accepted to participate in the study were recruited. Also patients who were on TB treatment from TB clinics were also recruited for the study due to the experience they have on TB infection related to health care seeking behaviour and perception of the community toward TB and stigma mitigation associated to TB.

A table with names and numbers of Health care workers from each unit was prepared to serve as a sampling frame. Computer-based random generating software (statistical programme for random selection of subjects and sample size computation was used to randomly select the required number of participants in each unit (Leo’n et al., 2003).

3.5.2 Sampling of Patients

Systematic random sampling was used to select patients for the questionnaire survey. Since the sample size was known, the researcher established from the outpatient TB clinic the average number of patients attending clinic per day. Sampling was done by randomly selecting the first respondent followed by other respondents selected after every third patient.
Questionnaires were randomly distributed to HCWs and patients who were available. Patients were given one hour to complete the questionnaire, while HCW were given one day (24hrs), and return the questionnaire. Researchers collected research data from Muhimbili National hospital and Mwananyamala hospital in the respective areas selected for study.

3.6 Sampling Patients and HCWs for FGDs

Ninety participants were selected for the FGDs. Six FGDs were for patients and three FDGs were for HCWs. Each group of patients and HCWs had 10 participants grouped according to gender and age. This was done because working with heterogeneous groups could hamper the quality of data collected (Grudens, Schuck, 2004).

Patients with TB and workers working within the selected areas of fifteen years and above were included in the study. Healthcare workers who were on leave were excluded in the study. In collaboration with the ward in-charges and head of sections schedule for FGD was formulated and participants were informed.

3.7 Observation Method

Direct observations at both hospitals were carried out using a Centres for Disease Control infection control guidelines (appendix 7.4). The researcher used observation skills to gather findings through activities that were taking place during the time of the visits. These included observation on how patients were kept in the wards and document precautions that were taken during patient care. This enabled the researcher to gain insight in assessing the extent to which both patients and HCWs were exposed to tuberculosis infection.
3.8 Review of documents

During the field work the researcher reviewed the records of HCWs who suffered from TB from the year 2011-2014 in both hospitals. Patients and HCWs were recorded in the special record book called MTUHA in Swahili (Mufumo wa Taarifa za Utendaji Huduma za Afya), that means the Health Information Management System (HIMS).

The books were kept in TB clinics under the custody of the officer in-charge. Likewise availability and accessibility of TB guidelines and protocols that were kept in consultations rooms and nurses’ stations were observed by the researchers. For the purpose of this study, only inferences and figures were extracted on site and documents returned immediately after use.

3.9 Statistical Analysis

Sampled data were compiled, evaluated and cleaned (checked for consistence and accuracy) before being entered in a Stata (version, and manufacturer). Any problems identified were rectified in order to maximize the quality of data generated. Statistical analysis was performed using Stata for descriptive and inferential statistics analysis basing on the following age categories; 15-29, 30-39, and 40-50 years. All variables were screened to describe the study population and the Chi square test (or Fisher’s exact test when appropriate) was used to compare the two groups of patients versus Health care workers. Statistical associations between the socio-characteristics, Knowledge, attitude and practices with those participants heard TB was identifies. Odds ratios (ORs) and exact 95% confidence intervals (CIs) derived using univariate linear regression analysis.
Qualitative data from FGDs were analyzed thematically and codes were created and assigned to categories according to the themes emerged in order to examine the relationships and trends in the data. To illustrate the views and perceptions reflected in the FGDs, the data were presented in the form of anonymous quotes, selected on the basis of their representativeness, appropriateness and revealing quality. A P-value of less than 0.05 at 95% Confidence Interval was statistically considered significant.

3.10 Ethical Considerations

Ethical clearance was sought from the Medical Research Coordinating Committee of the National Institute for Medical Research (NIMR), Tanzania (appendix 7.7), with collaboration of the Muhimbili National Hospital Executive Director and Director medical research from Muhimbili National Hospital (appendix 7.8), Medical in-charge Kinondoni Municipality of Dar-es salaam (appendix 7.9) and Medical in charge of Mwananyamala municipal hospital (appendix7.10).The following were the certificate numbers: NIMR/HQ/R.8a/Vol.IX/1857, Ref; MNH/TRC/2014/402, Ref: PF/K/14Vol.VI/ Ref; MH/INT/100/33. Regarding issues confidentiality, informed consents were obtained from participants (appendix 7.5). The names of the respondents were not included in this study and their contributions remained anonymous. Privacy was observed and unauthorized persons had no right to access data collected. Respondents were informed that their responses will be treated confidentially and that the data collected had to be used not only for academic purposes but also to TB case fatality in Tanzania and improve the public health and economic status of the nation. Consent was also obtained from questionnaires respondents and those who were involved in FGDs.
CHAPTER FOUR

RESULTS

4.1 Questionnaire Survey

4.1.1 Description of the study population

4.1.2 Socio-characteristics of study population

A total of 384 participants (117) patients and (267) HCWs) were interviewed about knowledge, attitude and practices of TB. Their median age (interquartile range, minimum and maximum) were 32 years (26-42, 15 and 50) and 38 years (3.0-46, 20 and 50) for the patients and healthcare works respectively. According to socio-characteristics of participants, the proportion of individuals for those aged 40-50 years and those aged 30-39 years were high in patients’ group compared to HCWs (36.7% versus 42.3%) respectively. However males patients were many in the patients’ group compared to male group in the Health care workers group (52.1% versus 37.9 %). The numbers of married patients was high in both Patients and Health care workers (52.1% versus 74.5%) respectively (Table 4.1).
Table 4.1: Socio-characteristics of study population patients versus Health care workers from three age groups 15-29, 30-39 and 40-50 years (N = 384 participants)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Patients (n=117)</th>
<th>Healthcare workers(n=267)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>47.9</td>
</tr>
<tr>
<td>Male</td>
<td>61</td>
<td>52.1</td>
</tr>
<tr>
<td>Age category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29</td>
<td>39</td>
<td>33.3</td>
</tr>
<tr>
<td>30-39</td>
<td>43</td>
<td>36.8</td>
</tr>
<tr>
<td>40-50</td>
<td>35</td>
<td>29.9</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>56</td>
<td>47.9</td>
</tr>
<tr>
<td>Married</td>
<td>61</td>
<td>52.1</td>
</tr>
<tr>
<td>Education attained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>61</td>
<td>52.1</td>
</tr>
<tr>
<td>Secondary</td>
<td>39</td>
<td>33.3</td>
</tr>
<tr>
<td>College</td>
<td>11</td>
<td>9.4</td>
</tr>
<tr>
<td>University</td>
<td>6</td>
<td>5.1</td>
</tr>
</tbody>
</table>

4.1.3 Knowledge, Attitude and practices (KAP) about TB

Patients who were aware of TB (Table 4.2) were significantly fewer than HCWs (17.1% versus 9.4 %, \( P=0.03 \)); in terms of duration before treatment, patients delayed at least 2 months more than health workers (76.1% versus 9.4%, \( p= < 0.001 \)); HCWs who stopped anti-TB drugs were significantly fewer than patients (5.2 % versus 7.7 %, \( P= < 0.0001 \)).
Table 4.2: Knowledge, Attitude and Practice about TB between patients and HCWs from three age groups; (n = 384 participants).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Patients (n=117)</th>
<th>Healthcare workers(n=267)</th>
<th>p-vale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>Heard TB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>97</td>
<td>82.9</td>
<td>242</td>
</tr>
<tr>
<td>NO</td>
<td>20</td>
<td>17.1</td>
<td>25</td>
</tr>
<tr>
<td>Duration before treatment &lt; 2 months</td>
<td>28</td>
<td>23.9</td>
<td>242</td>
</tr>
<tr>
<td>≥ 2 months</td>
<td>89</td>
<td>76.1</td>
<td>25</td>
</tr>
<tr>
<td>Stop anti-TB medicines No</td>
<td>106</td>
<td>90.6</td>
<td>34</td>
</tr>
<tr>
<td>Yes</td>
<td>11</td>
<td>9.4</td>
<td>3</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>27</td>
<td>23.9</td>
<td>55</td>
</tr>
<tr>
<td>Yes</td>
<td>90</td>
<td>76.1</td>
<td>212</td>
</tr>
</tbody>
</table>

4.1.4 Association between those who are aware about TB and Other Knowledge

Attitude and Practice Variables

In the patients group, (Table 4.3) those who stopped TB drug was significantly decreased among patients who were aware about TB compared to Health care workers who were aware about tuberculosis [OR= 0.6 (95% CI: 0.1-0.9), p=0.04].
Table 4.3: Association between heard TB and Socio-characteristics and KAP variables in Patients (n = 117 participants)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>%</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>61</td>
<td>83.6</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>39</td>
<td>89.7</td>
<td>1.1</td>
<td>0.5-5.9</td>
<td>0.39</td>
</tr>
<tr>
<td>College</td>
<td>11</td>
<td>72.7</td>
<td>0.5</td>
<td>0.1-2.3</td>
<td>0.39</td>
</tr>
<tr>
<td>University</td>
<td>6</td>
<td>50.0</td>
<td>0.2</td>
<td>0.0-1.1</td>
<td>0.07</td>
</tr>
<tr>
<td><strong>Duration before treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 months</td>
<td>28</td>
<td>71.4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 2 months</td>
<td>89</td>
<td>86.5</td>
<td>1.6</td>
<td>0.9-7.1</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Knowledge of TB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>27</td>
<td>85.2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>90</td>
<td>82.2</td>
<td>0.8</td>
<td>0.2-2.6</td>
<td>0.72</td>
</tr>
<tr>
<td><strong>Stopped anti TB medicines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>108</td>
<td>85.2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>55.2</td>
<td>0.6</td>
<td>0.1-0.9</td>
<td>0.04</td>
</tr>
</tbody>
</table>
In the healthcare workers, (Table 4.4) no any variable was influenced with heard of TB ($p > 0.05$).

Table 4.4: Association between heard TB and Socio-characteristics and KAP variables in HCWs (n = 267 participants)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>%</th>
<th>OR</th>
<th>95% CI</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>161</td>
<td>88.8</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>106</td>
<td>93.4</td>
<td>1.1</td>
<td>0.7-4.4</td>
<td>0.20</td>
</tr>
<tr>
<td><strong>Age (Years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29</td>
<td>58</td>
<td>87.9</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>96</td>
<td>90.6</td>
<td>1.3</td>
<td>0.5-3.8</td>
<td>0.60</td>
</tr>
<tr>
<td>40-50</td>
<td>113</td>
<td>92.0</td>
<td>1.6</td>
<td>0.6-4.5</td>
<td>0.40</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>68</td>
<td>86.8</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>199</td>
<td>92.0</td>
<td>1.1</td>
<td>0.7-7.1</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>199</td>
<td>92.0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>48</td>
<td>85.4</td>
<td>0.9</td>
<td>0.2-1.3</td>
<td>0.17</td>
</tr>
<tr>
<td>College</td>
<td>14</td>
<td>87.5</td>
<td>0.9</td>
<td>0.1-2.5</td>
<td>0.42</td>
</tr>
<tr>
<td>University</td>
<td>6</td>
<td>100.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Duration before treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 months</td>
<td>242</td>
<td>90.1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 2 months</td>
<td>25</td>
<td>96.0</td>
<td>1.1</td>
<td>0.3-20.4</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>Knowledge of TB</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>94.6</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>212</td>
<td>89.6</td>
<td>0.9</td>
<td>0.1-1.7</td>
<td>0.27</td>
</tr>
<tr>
<td><strong>Stopped anti TB medicines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td>36</td>
<td>100</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>
4.1.5 Knowledge on TB Infections among patients and HCWs

4.1.5.1 Signs and Symptoms of TB

A total of 384 participants responded to questions (Table 4.5). The majority were (56%) who indicated that the cardinal signs of TB included coughing, coughing blood, fever, night sweat, loss of weight, chest tightness, joint pains, coughing blood and difficulty in breathing. While (31%) of patients mentioned chest pain, fatigue, difficulties in breathing, fever, night sweat and coughing blood as the major symptoms of TB and (13%) of patients mentioned joint pains, chest pains, fever, loss of weight and coughing blood as the cardinal signs of TB.

Table 4.5: Views on Symptoms of Tuberculosis from three age categories (n = 384 participants)

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Symptoms of TB Infection</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cough, coughing blood, fever, night sweat, loss of weight. Chest tightness, joint pains, coughing blood and difficulties in breathing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chest tightness, fatigue, difficulty in breathing, fever, night sweat and coughing blood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Joint pains, chest pain coughing blood, coughing and fever and loss of weight</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Frequency</th>
<th>%</th>
<th>Frequency</th>
<th>%</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-29 years</td>
<td>60</td>
<td>60</td>
<td>24</td>
<td>24</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>30-39 years</td>
<td>74</td>
<td>53</td>
<td>44</td>
<td>31</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>40-50 years</td>
<td>80</td>
<td>54</td>
<td>50</td>
<td>34</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>
### 4.1.5.2 Views on mode of TB Transmission

A total of 384 participants responded to questions on TB transmission (Table 4.6). The majority of the respondents (56%) indicated; coughing, sharing food with infected person, singing together, overcrowding, coughing ,sneezing and eating the food that infected by TB were mentioned as the modes of TB transmission. While 29% of the respondents indicated that TB can be transmitted through coughing, sneezing and overcrowding. Yet 9.0% said TB can be transmitted by greeting, sharing clothing and the bathroom.

**Table 4.6: Views on Transmission of TB from three age groups (n = 384 participants)**

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Mode of transmission</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coughing, sneezing, overcrowding,</td>
<td>Sharing food with infected person sings together and eating TB infected food, coughing and sneezing, overcrowding.</td>
<td>Greeting, sharing clothes and the bathrooms</td>
</tr>
<tr>
<td>15-29 years</td>
<td>Frequency</td>
<td>%</td>
<td>Frequency</td>
</tr>
<tr>
<td>30-39 years</td>
<td>48</td>
<td>34</td>
<td>82</td>
</tr>
<tr>
<td>40-50 years</td>
<td>44</td>
<td>30</td>
<td>91</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>29</td>
<td>240</td>
</tr>
</tbody>
</table>
4.1.5.3 Knowledge on Prevention of TB Transmission

A total 384 participants responded to questionnaires (Table 4.7). The majority of participants (68%) indicated that TB can be prevented by covering mouth and nose when coughing and sneezing with a piece of cloth, early diagnosis, coughing through armpit, avoid overcrowding and attending to HCFs for proper treatments. Whilst (26) of the respondents said cough through arm pit when coughing, attend to HCF in time and avoid overcrowding, where by (6%) indicated that some people take local medicine for prevention measures of TB.

Table 4.7: Participants Views Prevention of Tuberculosis (n = 384 participants)

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Prevention of TB</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cover mouth and nose when coughing and sneezing, using piece of cloth, early diagnosis and attend to health facility for proper treatments. coughing through armpit, avoid overcrowding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29 years</td>
<td>Frequency %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>77</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>93</td>
<td>67</td>
<td>37</td>
<td>27</td>
</tr>
<tr>
<td>94</td>
<td>64</td>
<td>48</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>262</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

| 30-39 years    | Cough through armpit when coughing, attend to HCF in time, avoid, overcrowding |       |    |
| 97             | 100                                                                               |       |    |

| 40-50 years    | Take local medicine for prevention measures                                      |       |    |
| 148            | 100                                                                               |       |    |
| Total          | 384                                                                               | 100   |    |
4.1.6 Perception, Attitudes and Practices

Perception, attitudes and practice are the key factors that facilitate changes in human cultures and mental makeup of a person and daily practices among cultures of the different tribes.

4.1.6.1 Reason for Not Seeking Care to Health care facilities

A total 384 participants responded to questions (Table 4.8). The majority (40%) of them said hope symptoms would go away by themselves and Fear of what would be the diagnosis. Whereas (37%) indicated that some people fear for High charges of hospital services and other have negative attitude against HCFs. (23%) of the respondents indicated that people do not seek cure as they believed in witchcraft.

Table 4.8: Reason for Not Seeking Care to Health care facilities (n= 384)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Believing in Witchcraft</th>
<th>Hope symptoms would go away by themselves and Fear of what would be the diagnosis</th>
<th>High charges of hospital services and Negative attitude against HCFs</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-29 years</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ Primary</td>
<td>28</td>
<td>20</td>
<td>37</td>
<td>54</td>
<td>140</td>
</tr>
<tr>
<td>Secondary</td>
<td>21</td>
<td>38</td>
<td>23</td>
<td>42</td>
<td>11</td>
</tr>
<tr>
<td>College</td>
<td>28</td>
<td>21</td>
<td>52</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>University</td>
<td>13</td>
<td>20</td>
<td>40</td>
<td>62</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>23</td>
<td>152</td>
<td>40</td>
<td>142</td>
</tr>
</tbody>
</table>

384
4.1.6.2 Health Seeking Behavior

A total 384 participants responded to questions (Table 4.9) (47%) of them said they used to buy drugs to nearby pharmacies other prefer to use local medicine. Whereas (29%) indicated that some people prefer to go direct to the HCFs. (24%) of the respondents said they prefer to going for traditional healer and for prayers rather than HCFs.

Table 4.9: Health Seeking Behavior from three age groups (n = 384 participants)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Health Seeking Behavior</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Going for traditional healer and for prayers</td>
<td>Buy drugs to nearby pharmacies and other local medicine, going for players, other go to hospital</td>
<td>Other go to the hospital</td>
</tr>
<tr>
<td>15-29 years</td>
<td>%</td>
<td>30-39 Years</td>
<td>%</td>
</tr>
<tr>
<td>≤ Primary</td>
<td>33</td>
<td>24</td>
<td>69</td>
</tr>
<tr>
<td>Secondary</td>
<td>12</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>College</td>
<td>28</td>
<td>23</td>
<td>64</td>
</tr>
<tr>
<td>University</td>
<td>18</td>
<td>28</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
<td>24</td>
<td>182</td>
</tr>
</tbody>
</table>

4.1.6.3 Reason for delay in seeking treatment to Health care facilities

A total 384 participants responded to questions (Table 4.10, where by the majority (56%) of the respondents said that some people delay in seeking healthcare services due to fear for being terminated for work as well as stigma and discrimination among the community and HCFs. While (26%) of the respondents said that some people delay in seeking healthcare services due to their beliefs that they can be cured by traditional medicine and prayers as the
results they delay to start medicine and the disease is progressing and becomes serious since it presents with different symptom. Whereas (18%) of the respondents said that delay of investigation result, wrong diagnosis and advice from friend made some people delay to seek healthcare services.

Table 4.10: Reason for delay in seeking treatment from Health care facilities (n = 384)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Reason for delay in seeking care</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Believe that they can be cured by traditional medicine since TB presents with different symptom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ Primary</td>
<td>15-29 years</td>
<td>28</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>30-39 Years</td>
<td>51</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>40-50 years</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>140</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Secondary</td>
<td>39</td>
<td>28</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>51</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>College</td>
<td>28</td>
<td>23</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>51</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>124</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>University</td>
<td>15</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>51</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>29</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>26</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>56</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td>384</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

4.1.6.4 Factors Influencing TB Control at the HCFs

A total 384 participants responded to questions (Table 4.11), the majority (44%) of the respondents said that self and community discrimination as well as stigmatization stigma and discrimination were the major factors, (24%) indicated non-compliance to TB treatment and lack of sensitization as the major factors. Yet, (33%) marked that Non-compliance to TB treatment and poor community sensitization as well as traditional and spiritual seeker
as the major factors, and (23%) of the respondents in the study TB infection control malpractice and guideline inaccessibility in health care facilities as factors.

### Table 4.11: Factors Influencing TB control at the HCFs (n = 384 participants)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Prevention of TB</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TB infection control malpractice and guideline inaccessibility in health care facilities</td>
<td>Non-compliance to TB treatment and poor community sensitization and traditional and spiritual seeker</td>
<td>Self and community discrimination and stigmatization</td>
</tr>
<tr>
<td></td>
<td>15-29 years</td>
<td>%</td>
<td>15-29 years</td>
</tr>
<tr>
<td>≤ Primary</td>
<td>30</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>Secondary</td>
<td>12</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>College</td>
<td>27</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>University</td>
<td>19</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>23</td>
<td>127</td>
</tr>
</tbody>
</table>

#### 4.1.6.5 Reason for Stopping Treatment

Out of 14 patients who spotted taking anti BT (Table 4.12) (43%) of the respondents indicated that they stopped taking anti TB drugs because of drugs reactions, the 28.5%) said they got a temporally relief which made them stopping taking anti TB. while (28.5%) they went for traditional healers and players the behavior that makes people not attending to HCFs in time as the results they continue transmitting diseases to others.
Table 4.12: Reason for Stopping Treatment from three age groups  (n = 384 participants)

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Reason for Stopping Treatment</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drug reaction, temporal relief and prayer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temporally relief</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Traditional healers and prayers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-29 years</td>
<td>% 30 - 39 Years</td>
<td>% 40-50 years</td>
<td>%</td>
</tr>
<tr>
<td>≤ Primary</td>
<td>1 25 1 25 2 4 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>2 40 2 40 1 20 5 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td>2 50 1 25 1 25 4 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>1 100 0 0 0 1 1 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6 43 4 28.5 4 28.5 14 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2 FGDs, in-depth interviews and direct observation

Randomly selected individuals who met the criteria were included until the required number was met. Nine (9) FGDs were conducted, whereby six (6) FGDs were for patients and three (3) were for healthcare workers. Patients were grouped according to age and gender (female and male separately). FDG 1: Was for patients from 15-29 years. FGD 2: was for patients from 30-39. FGD 3: was for patients 40-50. All discussions made were recorded on a digital recorder and video and transcribed by the researcher using verbatim transcription in order to capture what, how and why aspects from the participants. The facilitator was assisted by a reporter to ensure good implementation and follow up of the study. Three FGDs were a skill-mix of healthcare workers and were grouped into gender and age: 2 FGDs from Mwananyamala Hospital and 1 from Muhimbili National Hospital. The format and recording of HCWs FGDs were the same as described above for patients.
Four (4) in-depth interviews were conducted according to a guide (appendix 7.3) whereby first interview was among Mwananyamala TB coordinators (2) who were coordinating TB services at the health centres in Kinondoni District these health centres serve as the branches of Mwananyamala hospital. Second in-depth interview was conducted with Mwananyamala TB clinic in-charges (2). The third was conducted with in-charges of medical ward 4 and 5 and the last in-depth interview was conducted with the Infectious Disease Control (IDC) clinic in-charge at Muhimbili national hospital. The discussions were conducted with a varying degree of openness using open ended questions. Consequently the notes were taken and interviews recorded as described above.

4.2.1 Knowledge of Participants about Tuberculosis

4.2.1.1 Definition of tuberculosis

4.2.1.1.1 Patients Views

The majority were able to define tuberculosis (Table 4.13) as the disease presented with coughing for two weeks, high fever, night sweat and loss of weight. However few failed to mention the causative microorganism such as the extract below from the interviews.

“TB is the disease caused by a virus [Middle age male].

Similarly, 45% of patients were able to mention symptoms of tuberculosis such as night sweat, high fever, cough for two weeks, coughing blood, loss of appetite and chest pains. An example of an answer from one of the people interviewed is;
"I experienced chest pains and irritating dry cough for about one month, and then I started coughing fresh blood. I went directly to Mwananyamala hospital where they identified tuberculosis infection" [Young group male]

The few patients were not able to differentiate TB symptoms with the symptoms of the other medical conditions such as;

‘TB presents signs like those of HIV’ [Young female].

**Table 4.13:** The Knowledge of Patients on Tuberculosis (n = 60 participants)

<table>
<thead>
<tr>
<th>Definition of Tuberculosis</th>
<th>15-29 year</th>
<th>30 - 39 Years</th>
<th>40-50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>The main themes</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Tuberculosis is the disease that presents with signs like those of HIV</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB presents with loss of weight, high fever, coughing night sweats</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>TB is the disease caused by a virus</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptoms of Tuberculosis</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Loss of appetite and loss of weight, loss of sleep</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Night sweating, coughing for two weeks, high fever</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Chest pain, general body weakness and headache</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Coughing blood</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years  F=30 and M= 30
### 4.2.1.1.2 Healthcare Workers Views

The majority who were interviewed in the study (Table 4.14) defined TB as a disease that is transmitted by *M. tuberculosis* as below; “*TB is the disease caused by M. tuberculosis and M. bovis that can be transmitted through air and ingestion of contaminated meat and milk from affected cattle; it affects lungs and other parts of the body*” [Muhimbili].

When further probed to define TB the majority of Health care workers were able to define TB as the disease which is presented with severe night sweating, coughing for two weeks, high fever, loss of weight and loss appetite, peritonitis, chest pain, heart palpitations, chest tightness, shortness of breath and pleural effusion. “*Some patients could present swelling of the neck, hemiplegia or peritonitis because of TB and as a result of ETB*” [Mwananyamala]

#### Table 4.14: The Knowledge of HCWs on tuberculosis at Mwananyamala (MNH) and Muhimbili hospitals (MRH) (n=30)

<table>
<thead>
<tr>
<th>The main themes</th>
<th>MNH</th>
<th>MRH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>TB is the disease that is presented with loss of weight, high fever, coughing and night sweats</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>TB is the disease caused by <em>Mycobacterium tuberculosis</em> and <em>Mycobacterium bovis</em> that can be transmitted through air and ingestion of contaminated meat and milk from TB affected cattle; it affects lungs and other parts of the body.</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>TB is the disease that is transmitted by air</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

*V*= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years  F=15 and M=15.
4.2.1.3 In-Depth Interview

During in-depth interviews informants defined TB as the disease caused by M. Tuberculosis and M. bovis that can be transmitted through air and through ingesting of not-well-cooked meat and unpasteurized milk.

“Pulmonary tuberculosis is the type of TB that is known by the majority of people compared to EPT even if all the types have impact on the human health” [IDC inches]

4.2.1.4 Direct Observation

The researcher managed to participate in health education sessions and the major component taught was tuberculosis infection. When health educators posed questions to patients on what they know about Tuberculosis, many of them were able to answer. However some especially those who attended for the first time were not able to answer the questions properly.

4.2.1.2 Signs and Symptoms

4.2.1.2.1 Patients views

The majority of Health care workers who were interviewed in the study (Table 4.15) stated the following signs and symptoms of TB; coughing for two weeks, high fever, severe night sweat, chest pains, chest tightness and shortness of breath. Some of the patients said coughing blood and loss of appetite, the other said TB is presented with accumulation of fluids in the chest and stomach. However 24% said swelling of the neck backache and paralysis.

“Some patients presents with weakness of lower extremities and end up with hemi-paralysis because of TB” [Female]
Table 4.15: The Knowledge of Patients on the signs and symptoms Tuberculosis (n = 60)

<table>
<thead>
<tr>
<th>The main themes</th>
<th>15-29 year</th>
<th>30 - 39 Years</th>
<th>40-50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coughing for two weeks, high fever, Loss appetite, severe night sweating</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Loss of weight, chest pain, chest tightness, shortness of breath</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Coughing  blood, loss of appetite</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>General body weakness, weight loss</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Chest tightness and chest pains</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>TB presents with accumulation of fluids in the stomach, swelling of the neck. backache and paralysis</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups  15-29 years, 30-39 years and 40-50 years  
F=30  and M= 30

4.2.1.2.2 Health Care Workers Views

When healthcare workers were asked about the signs and symptoms of TB (Table 4.16), 64% mentioned about severe night sweats, coughing for two weeks, high fever, loss of weight and loss of appetite. Others mentioned chest pains, heart palpitations, chest tightness and shortness of breath. More still, 30% of the HCW when probed many mentioned lymphadenopathy, peritonitis, pleural effusion, empyema, and meningitis, while 6% of them mentioned club figures, fatigue and impaired vision and severe headache.
Table 4.16: The Knowledge of HCWs on the signs and symptoms of tuberculosis (n=30)

<table>
<thead>
<tr>
<th>Signs and Symptoms</th>
<th>MNH</th>
<th>MRH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Severe night sweating, coughing for two weeks, high fever, loss of weight and loss appetite</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Chest pain, heart palpitations, chest tightness, shortness of breath</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>TB present with lymphadenopathy, peritonitis, pleural effusion, empyema and meningitis</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Coughing of blood and severe headache</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>General body weakness, nails becomes bluish and sometimes clubbed figures, poor vision and headache</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years  
F=15  and M= 15.

4.2.1.2.3 In-depth interviews

When the key informants were asked about the knowledge of the community and HCWs about to the signs and symptoms of TB, they said, most of the patients and HCWs at list had the knowledge of the signs and symptoms such as frequent coughing, severe night sweat, loss of weight due to loss of appetite and coughing of blood. However the informants reported that some patients when asked on the signs and symptoms of TB could not answer especially those who attended for the first time.

“TB lymphadenitis and hemi paralysis were the common symptoms presented in the patients who were suspected to have EPT [IDC clinic].
4.2.1.2.4 Direct Observation

The researcher observed posters and stickers on the walls in TB clinics which had information written on cardinal symptoms of TB such as coughing for two weeks, high fever, night sweats and loss of weight due to loss of appetite and Coughing blood.

4.2.1.3 Mode of Transmission

4.2.1.3.1 Patients Views

When it came to the mode of TB transmission (Table 4.17), the patients were asked to state some of the symptoms of TB they knew. In response, the majority of patients mentioned failure to cover the mouth and nose during coughing and sneezing, poor ventilation, staying closer to an infected person and spiting at open spaces.

Yet few of them were not sure on how an infected person can transmit TB infection to others. “TB is transmitted by sharps” [middle aged male].

While other mentioned overcrowding, overloading of town busses and other gatherings such as cultural dances, markets and show grounds as the other factors which can facilitates spread of TB infection.

“Mikusanyiko ya watu hasa kwenye maonyesho na ngoma (cultural dancing and show grounds)” [Old age male]
**Table 4.17:** The Knowledge of Patients on TB transmission and Prevention (n = 60)

<table>
<thead>
<tr>
<th>Mode of Tuberculosis</th>
<th>15-29 year</th>
<th>30-39 Years</th>
<th>40-50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>TB is transmitted by sharing of sharp instruments</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB is transmitted through air and poor ventilation</td>
<td>V V V V V V V V</td>
<td>V V V V V V V V</td>
<td></td>
</tr>
<tr>
<td>Failure to cover the mouth and nose during coughing and sneezing</td>
<td>V V V V V V V V V</td>
<td>V V V V V V V V V</td>
<td></td>
</tr>
<tr>
<td>Staying closer to an infected person and spitting at the open space</td>
<td>V V V V V V V V V</td>
<td>V V V V V V V V V</td>
<td></td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years F=30 and M=30.

**4.2.1.3.2 Healthcare Workers Views**

Responding to a question pertaining to the mode of TB transmission (Table 4.18), most of the Health care workers said that failure to cover the mouth and nose during coughing and sneezing, living in houses with small windows that cannot maintain fresh air, overloading of town buses and overcrowding.

“*Eating non-pasteurized milk and non-cooked meat from the infected milk is the other means of transmitting TB.*” [Mwananyamala].

Failure to use ventilators (N95 mask) during care of patient with active TB was the other element mentioned by the majority of HCWs. In addition, issues of overcrowding and putting together patients with different medical conditions in one ward were mentioned as the one way of TB transmission. Inavailability of TB guidelines and protocols at the health care facilities were the other means of TB transmission that were mentioned by some of
health care workers. It was also commented that, putting together patient with different medical condition is not fair for human health.

“There should be a separate ward for patients with active TB (suspect or confirmed tuberculosis) [Mwananyamala]

Pertaining to workers safety on TB transmission, HCWs said people are forced to do malpractice in patients care because of overcrowding of patients in the wards and lack of PPEs.

“The knowledge we have on TB is contrary to our practice. For example, the bed capacity of each medical ward is 25 patients, but the number of patients increases up to 50. In such situations TB infection control cannot be observed” [HCW Mwananyama]

Poor infrastructure of the hospital buildings was the other possible factor mentioned for TB transmission

“IDC clinic, consultations and patients waiting room had no natural ventilation. Sometimes patients were asked to stay outside to decongest the room” [Muhimbili]
**Table 4.18:** HCW’s knowledge on TB Transmission at Mwananyamala (MNH) and Muhimbili hospitals (MRH) (n=30).

<table>
<thead>
<tr>
<th>The main themes</th>
<th>MNH</th>
<th>MRH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Failure to cover the mouth and nose during coughing and sneezing, overcrowding</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>and overloading of town buses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living in a house with small windows and staying closer to an infected person</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Delay to attend to hospital in time, and non-compliancy to TB treatment guidelines</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Consuming not well-cooked food and unpasteurized milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure to use PPEs (mask N95 ) during care of active TB patient</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Overcrowding and putting together patients with different medical conditions</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Failure to isolate patients with signs of active tuberculosis and poor infrastructure of the hospital buildings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years  F=15 and M= 15.

**4.2.1.3.3 In-depth interviews**

Concerning the safety of Health care workers and patients in relation to TB transmission the key informants in in-depth interview explained that, coughing hygiene among patients especially those who were admitted for the first time was poor. The risk of getting TB infections seemed to be high among HCWs. The TB coordinators further explained that
getting TB did not mean that people were not knowledgeable but the working environment puts HCWs at risk of getting the infection.

“An example is when a patient can sneeze or cough directly at you while you are attending to him” [Muhimbili].

Another cardinal issue of concern was overcrowding. The wards incharges said,

“According to WHO TB guidelines, the space between patients should be three feet in between patients, but in our settings, patients with different medical conditions are kept within the same place, others placed on the floor and underneath the beds due to overcrowding” [Ward incharges].

Another factor is the poor infrastructure of IDC clinic “The buildings have no ventilation compared to number of patients attending” [IDC in-charge]

When we discussed about the knowledge of the community on TB transmission, TB coordinators, agreed that many of the patients who attended the clinic had at list the knowledge of TB but they had different perception of the issue of pasteurizing milk that the pasteurized milk is losing its quality and test.

“Our task is to change the community’s perception on consumption of pasteurized milk since the communities believe that the milk for making sour milk cannot be pasteurized otherwise the quality of the milk can be destroyed.” [TB Coordinator].
4.2.1.3.4 Direct observation

Coming to the researchers’ direct observations, patients with different medical conditions such as malaria, typhoid fever, diarrhea and suspected TB were admitted in the same medical wards. Some patients slept on beds and others on the floor. HCWs workers did not put on ventilators (N95 mask) during the care of patients with signs of active TB. Windows in the medical consultation rooms at Mwananyamala hospital were very small. The researcher also had an opportunity of see the infrastructure of DIC clinic. The small rooms with inadequate ventilation were observed. I also observed one healthcare provider who was giving counseling to a patient on treatment compliance which took about 10min in a small and non-ventilated room.

According to the documents reviewed, including patients register books (MUTUHA) and guidelines at healthcare facilities, it was noted that 50 HCWs from Muhimbili got TB from 2011- 2012 and a similar observation was noted for Mwananyamala where 10 Health care workers got TB in a similar situation. Related to availability of TB guidelines very few TB guidelines were observed.

4.2.1.4 Prevention of Tuberculosis

4.2.1.4.1 Patients Views

In response, the majority of the patients mentioned TB prevention as follows; covering mouth and nose during coughing and sneezing, schools and communities should be sensitized on TB infection prevention, maintain good aeration and fresh air. Yet, few patients said the following statement e.g.

“Infected persons should be isolated” [Middle age groups]
4.2.1.4.2 Healthcare Workers

In response to prevention, HCW stated that there was need to maintain environmental aeration and that new born babies should be vaccinated to prevent them from TB infection, the other aspect stated was covering the mouth and nose during sneezing, using a mask by those in care of active TB patients. Those who realize to have the symptoms of TB should report to the hospital, also the community and FCFs should avoid overcrowding. Avoid overloading overcrowding the town buses. Schools and Communities should be sensitized on prevention of TB, people should stop eating non-pasteurized milk and non-cooked meat, HCP with active TB should not be allowed to provide care to patients and that there should be a special ward for patients with active tuberculosis infection.

“There should be separate ward for patients with active TB (suspect or confirmed tuberculosis)” [Mwananyamala]

“Avoid consuming non-pasteurized milk and non-cooked meat” [Mwananyamala].

On how best they thought TB could be prevented, the majority of the participants gave diverse views and these included good ventilation should be maintained; Every person whether sick or not should cover the mouth and nose during sneezing and coughing, and HCWs should use ventilators (N95 mask) during care of patients with active TB, those with TB symptoms should report early at the healthcare facility, and patients with symptoms of tuberculosis should be isolated and that people should avoid drinking unpasteurized milk. Yet few HCWs said; “HCW with active TB have to be isolated”.

”Healthcare providers (HCP) with active TB should not be allowed to provide care to patients” [Muhimbili]
It was suggested that, during hospital constructions and renovations the hospital quality improvement (HQIT) team should be consulted.

“In major renovations of the hospital buildings the HQIT should be consulted to ensure that all requirements special for infection control are taken care of” [Muhimbili]

4.2.1.4.3 In-depth interview

During the in-depth interview with the key informants, it was pointed out that even though overcrowding was a national concern, it was not fair to turn back very sick patients because of overcrowding. Therefore, it was important to sensitize patients on coughing etiquette and minimize time for staying closer to patients with active tuberculosis.

However, during in-depth interviews it was explained that HCWs who were sick were excused in performing hard work and were given days (sick day offs) for rest while on medication. The other concern which was raised during the interviews with the key informants was the delay in the release of results of laboratory tests, such that it sometimes became difficult to confirm the results of some samples. This was because the samples were sent to Sokoine University of Agriculture (SUA) for confirmation, which could take a week or more. In such situations, patients were told to leave their phone numbers so that when the results were ready they could be contacted by phone to collect their results.

4.2.1.4.4 Observation

The researcher further observed that health education was conducted in the TB clinic and OPD every morning before commencement of service. But it was not observed in other healthcare delivery points. It could be better if health education could be conducted to all
healthcare deliveries points to make the message reach to many clients including the community.

4.2.2 Factors Hindering TB Preventive Practices in the Community and HCFs

4.2.2.1 Patients Views

The factors hindering TB preventive practices (Table 4.17) mentioned by the patients were putting patients with active TB with other non-infected patients. Having no culture of testing our health status and that the precaution on TB was not taken by the community.

“With this extended family of ours, our houses are always overcrowded we don’t know who is sick and who is not. A good example is that the young daughter of mine and me are already infected by TB, we are on anti TB”.

4.2.2.2 Health care workers views

Yet a fraction of the participants pointed out some of the reasons as follows; the majority of HCWs said that unavailability of ventilators (N95 mask; fear for being tested for TB and HIV and fear for being labeled by work mates and community (Table 4.19)

“When Health care workers noted that they have symptoms of TB they hide themselves and sometimes stop coming for work until the hospital decides to follow them at their homes” [Mwananyamala].

Medical examination as another factor that influences TB diagnosis and treatment seeking behavior among HCWs as that makes them fail to know their health status [Muhimbili].
**Table 4.19:** Factors hindering TB preventive practices among HCWs at Mwananyamala (MNH) and Muhimbili hospitals (MRH) (n=30).

<table>
<thead>
<tr>
<th>Factors hindering TB preventive practices</th>
<th>MNH</th>
<th>MRH</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Unavailability of personal protective equipment (PPEs) and TB guidelines</td>
<td>V</td>
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<tr>
<td>Overcrowding of patients in the wards</td>
<td>V</td>
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<tr>
<td>Mixing patients with different medical conditions</td>
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<td>Unavailability of special wards for patients with active tuberculosis</td>
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<td>Insufficient TB investigation apparatus at all healthcare levels</td>
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<tr>
<td>Self-medication (pharmacies) and street doctors (Chinese shops)</td>
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<tr>
<td>Fear for being stigmatized and discriminated by workmates</td>
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<tr>
<td>Inadequate sensitization of HCWs on tuberculosis infection</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>

V= themes and sub themes most mentioned in groups 15-29 years, 30-39 years and 40-50 years  F=15 and M=15

**4.2.2.3 In-Depth Interview**

During in-depth interviews with the key informants, informants agreed to have in availability of special PPEs including N95 mask for prevention of airborne pathogens such as TB.
However the issue of PPEs was explained that it was very expensive to buy N95 disposable masks for HCWs and for patients with active tuberculosis. However, coughing hygiene was emphasized.

4.2.2.4 Observations

Mwananyamala hospital has no special ward for TB patients with different medical conditions were kept in medical wards some case was on the floor. No plastic bags observed for transporting and putting dirty sheets for laundering after being used by TB patients. Observed Health Attendant (HA) sorting dirty sheets in medical without putting on PPEs. When it came to review of documents, there were neither plans nor records for HCWs who tested their health fitness.

4.2.3 Health Seeking Behavior against TB Treatment among HCWs and Patients

4.2.3.1 Patients Views

In order to examine health seeking behavior against TB treatment among HCWs and patients, the participants in the study were asked to describe the health seeking behaviors of the community and Health care workers in relation to prevention of tuberculosis transmission. The majority of patients said they went to buy medicine from the pharmacy shops for the first time, others sought traditional medicine, some went to hospital for the first time and few of them went for prayers (Table 4.21).

“I went to a pharmacy for the first time; I asked the seller if he could give me antibiotics for coughing and chest pains, but there was no relief after using them; I decided to go to the hospital. I did an X-ray and collected sputum for TB testing. Finally TB was revealed” [Middle age female].
Yet few participants drawn among the patients said that they used local medicine for the first time since the medicine was trusted by the community.

“The onset was high fever and a dry and irritating cough as if I have eaten chilli. I was advised to take local medicine hoping that after two days I will be fine, but as days went by the problem became severe. Then I decided to go to the hospital where I did a chest x-ray and it revealed that I had tuberculosis” [Young age male].

The results also indicated that other patients preferred going to traditional healers for checking their health fitness.

“For the first time I went to traditional healers at Bagamoyo District for checking if the illness was related to witchcraft since I lost a lot of weight within a short time. I had night sweats as if someone was pouring water on me. Coughing was nonstop. I bought medicine that did not give me any relief. My friend advised me to go to the hospital where I did a chest x-ray and collected sputum for TB testing. The following day I got the results and they revealed that I had tuberculosis” [Old age male].

Yet some participants (patient) said that people go to hospital when they find difficulties to get cure from the medicine they were using, which is not good.

“For the first time I used analgesics and cough expectorant for a long time. I didn’t get relief instead I kept on losing weight from day to day. My friend started their jokes that I had ngoma (HIV). So I decided to go to the hospital just to check for HIV. They checked and asked me to check sputum for tuberculosis where TB was revealed.” [Old age male]
4.2.3.2 Healthcare Workers Views

The majority of Health care workers said that HCWs preferred self-medication.

”For the first time I went to a pharmacy to buy drugs. I finished the purchased dose but that didn’t give me any improvement. I went to a staff clinic where they provided me with antibiotics and cough mixture but I didn’t feel any difference, instead the disease became severe. I decided to test for TB but was advised to test for HIV as well. It was revealed that I had TB” [Muhimbili]

4.2.3.3 In-Depth Interview

Then the key informants asked about the reason make people delay to seek care at the healthcare facility they said lack of awareness of TB infection is the major problem in the community.

“Generally we as healthcare providers we reach only to those patients who are coming to hospital, who are very few compared to the entire community, as the results the message does not reaches to many people. That is why those who attend to HCFs are those who are knowledgeable of TB infection not the community”[Incharges Mwananyamala]

4.2.3.4 Direct Observation

During field work the researcher observe the stapes of good coughing etiquette using the photos which were on the wall of CDC clinic. It was good practice that could be used to the community for teaching purposes.
4.2.3.2 Duration before seeking TB Care

4.2.3.2.1 Patients Views

When the participants were asked to state the time spent before commencing healthcare treatment the majority of the participants said that they spent about two to three months. Yet other participants said that they spent one month, four and a few up to five months. When further asked on their opinion, the majority said they delayed to seek medicine.

“I regret why I didn’t come early” [Male middle age]

Yet some participants (patients) strongly agreed that they were very late to seek treatment and the reason was lack of awareness.

“I don’t like to see people suffer because of ignorance, I’m ready to teach others about TB so that they won’t suffer the way I suffered.” [Man old age.]

4.2.3.2.2 Health Care Workers Views

The majority of HCWs spent one month before proper treatment because of self-medication from buying medicine to nearby pharmacies [Mwananyamala].

4.2.3.2.3 In-Depth Interview

According to information obtained from the patients, the informants were masked about the time patients spent before seeking healthcare to HCFs, most of the patients were one month to five months

“Most of the patients spent more than one month” [IDC]
4.2.3.2.4 Direct Observation

Passing patients files from the onset of the disease to the time patients started treatments were between one month to two months. All of the time patient were treated other illnesses before being referred to municipal hospital or to referral hospital.

4.2.3.3 Perception and the Attitude of HCWs and Patients Influence TB preventive Practice

4.2.3.3.1 Patients Views

The majority of patients said that the community believes much in local and traditional medicine since it was taken by the community as a medicine that is effective and cheap.

“When you pay a little money you get treatment” [middle age female]

While other patients said that the community perceived that Health care facilities delay in providing healthcare and the care given was expensive. While most of the medicine prescribed are not available. Whilst few patients said that the community needs good and effective services.

“I did Laboratory investigations at the nearby Health Centre; it took more than three weeks to get the results. They were asking me to wait. I really suffered” [Old age female]

When patients asked related to patients’ perceptions, some patients said that community believed that, TB is as a result of witch craft and could only be cured by traditional healers and not medical practitioners.
“I went first to a traditional healer (fundi) to check if the illness I had was related to witchcraft or bad spirit (pepo wabaya). I used traditional medicine but with no improvement. I decided to go to the hospital where tuberculosis was revealed [Old age man].

It was also indicated that the majority of patients felt that the community doubted the competence of HCWs.

“I went to a nearby health center where, I was diagnosed to have malaria and pneumonia; the drugs provided did not give me any relief. I went to another health center where they diagnosed Urinary Tract Infections (UTI). The medicines provided were not effective. I decided to go to the big hospital (Mwananyamala) where an x-ray was taken and it revealed that I had pulmonary tuberculosis” [Middle age female].

The patients further explained that they could not go to the hospital due to unaffordable medical charges.

“The charge for an x-ray is 15U and only not considering registration fee and other medical charges. Therefore, people decide to look for other alternatives” [Middle age female].

When further probed most of the patients said that the fear of testing for both TB and HIV makes people not seek care from Health care facilities (Table 4.18).

“Why are people with symptoms of TB tested for HIV instead of providing them with treatments? It makes people suffer more because of depression and it is not fair since testing for HIV is not mandatory” [Middle age female].
Yet the majority of patients said that buying medicine from a pharmacy and self-medication was easier and faster compared to seeking help at HCFs.

“When I feel like I am having an illness I just go to pharmacy shops and buy medicine; there is no need of me making all those rounds to HCFs” [Young age male].

4.2.3.3.2 Healthcare Workers Views

Many of the HCWs felt that it was very hard to work in such a risky environment. They further said that in case a person got tuberculosis it was acquired at his or her own risk.

“My friend got TB because of the work she was doing of aspirating sick children’s sputum for testing TB, but nothing has been done to compensate her” [Mwananyamala].

4.2.3.3.3 In-Depth Interview

During the in-depth interview on the reason makes patients attend very late to HCFs, the informants agreed that patients always are coming to the hospital in advanced stage of TB and when asked the reason of attending late to hospital they stated different reasoned that they tried to use medicine that they advised by their friends some were local medicine and others were antibiotics bought to nearby pharmacies, while others stated that they were treated malaria and typhoid fever for a long time however stated they were sent for traditional healers since the illness was taken as the witchcraft related (uchawi) [Incharges of TB clinic]

4.2.3.3.4 Direct Observations

Stigma and discrimination was the other reason observed to have the impact of not attending to HCFs. Clients were observed standing far from the drugs dispensing sections. When the
researcher asked them on the reason of standing far from where others were siting they responded to have escorted their relative to collect their drugs, but at the end the researcher observed them taking anti TB drugs using their own cards.
Figure 4.1: Flow Chart Summary of Factors for not Seeking Health Care to HCFs
4.2.3.4 Factors influencing delay in seeking diagnosis and treatment among HCWs and Patients

4.2.3.4.1 Patients Views

When the participants asked about the reason that made people delay in seeking diagnosis and treatment at the HCFs, The majority of patients highlighted many reasons included ignorance of the community on TB infection, advice from friends, delay in investigations and wrong diagnosis as the major reasons as it had elaborated below;

“Take these drugs you will be fine” [Young female]

Ignorance in the community was the other factor that was mentioned by the majority of patients.

“I experienced loss of weight high fever and persistent coughing. I went to nearby dispensary the medicine provided were not helpful, I used local medicine thinking that the symptoms will go away. I bought medicine from pharmacy shops, I didn’t get relieve. I went for traditional medicine. It was even worse. Then I decided to go to hospital where TB was revealed. All this suffering was because of ignorance [Old age female].

“For the first time I went to a dispensary. I did many rounds looking for effective treatments since they were giving me the drugs that did not show any improvement; finally they advised me to go to Mwananyamala where I did investigations and revealed that I had tuberculosis. [Middle age female]

Delay in the release of investigation results was the other factor that was more pronounced by the majority of participants
“Laboratory Investigation results take a long time and this makes people delay to start medicine” [Young female].

The majority of the interviewed participants also mentioned the other factor influencing TB transmission among HCWs and patient as different presentation of TB symptoms that mislead the patients.

“I never was coughing; I experienced sharp pains at the left side of the chest. I went to the hospital where I did an x-ray and TB was revealed”.

“I didn’t go directly for TB testing because the symptoms were as if I had cardiac problems. I spent many weeks looking for a cardiologist to review my condition, and he recommended a chest X-ray test. The results revealed that I didn’t have cardiac problems. From thereon I went to Bagamoyo hospital (the Costal regional hospital). I was examined by a cardiologist who noted pleural effusion and pericardial infection. I was advised to attend TB clinic for initiation of anti-TB therapy” [Old female]

“I experienced fullness of the stomach for one week; I took whatever I was advised to take but the distention was increasing day by day. I went to hospital where they aspirated fluid from the stomach and tested for TB after the test result they told me to start anti-TB medication because I had TB of the intestines”. [Old age female]

Yet some participants mentioned stigma and discrimination. Others complained of misdiagnosis and delayed confirmation of the condition they were suffering from.

“Because of poor understanding some relatives stigmatize and discriminate TB patients. They consider TB patients as useless people in the family” [Young female].
Yet few participants said they feared work termination after TB infection

“It depends where a person is working. In the private sector no one can tolerate to pay a sick person who is not working for six months taking into consideration that the private company is always sustained by its production.” [Young male].

4.2.3.4.2 Healthcare Workers Views

Healthcare workers were asked about the reason that made people not attending to HCFs in time, where the majority said; fear for being tested for TB and HIV and fear for being labeled by work mates and community, also fear for being terminated for work were the major reasons mentioned.

“When Health care workers noted that they have symptoms of TB they hide themselves and sometimes stop coming for work until the hospital decides to follow them at their homes” [Mwananyamala].

Yet a fraction of the participants pointed out unavailability of schedules for HCWs medical examination as another factor makes HCWs fail to know their health status and intervene in time [Muhimbili].

4.2.3.4.3 In-Depth Interview

During in-depth interviews with the key informants were asked the reason that made people not seeking healthcare at the healthcare facility in time. Believing in which craft, stigma related to TB/HIV, negative attitude against healthcare facilities and using the traditional medicine were the major reasons mentioned.
Provider initiation testing and counseling for HIV especially for those presents signs and symptoms of TB and HIV made people not prefer to use HCFs services because they knew once you present with coughing and fever you will be tested for HIV [Clinic incharge Mwananyamala]

There is a belief that people can suffer from HIV as the result of witchcraft and not medically related.

“Currently the community have the misconception that they are getting TB/HIV because of the witchcraft not medial related that is the reason made the majority of people not rushing to HCFs when they get sick, they better got for traditional medicine and prayer where they believe that they can treat witched TB/HIV. "TB/HIV of mine is because of being watched by the one of my relatives"””

4.2.3.4.4 Direct Observation

The researcher observed the poster at the wall of TB clinic that was written the list of complication for untreated TB including; meningitis, septicemia, dyspnea and TB pericarditis. This was the one way of sensitizing people who have already sick. But it could be better if could be a system of educating the community on TB transmission before being suffered as the way of preventive measures.
4.2.3.5 Clients Contact Seeking Healthcare

4.2.3.5.1 Patients

When respondents who participated in FGDs (Figure 4.2) were asked about places they went for seeking care before going to HCFs, four of them mentioned that they went to pharmacy for the first time then went for local medicine and lastly went to hospital. While ten of them went to pharmacy for the first time then went to health center and lastly went to the referral hospital. Six of them went to pharmacy for the first time then went for traditional medicine, then went for prayers and finally went to hospital.

Eight of respondents went directly to the hospital. While four of them went for traditional medicine for the first time finally they went to hospital. Two of them went to pharmacy, and then went to health center; they further went for traditional medicine and finally went to hospital. While four of them went to health Center then went to dispensary and finally went to referral hospital.

Other ten went to health center for the first time where they did several rounds and finally they went to a referral hospital. Six of respondents went for prayers for the first time, and then they went to health center and finally went to the referral hospital. The other six participants went to pharmacy for the first, and then went for prayers. They went back to pharmacy then finally went to the hospital. The majority of patients though they went to seek care in multiple places they lastly went to hospital. They still take the hospital as the last resort.
Figure 4.2: Pattern of contacts and routes made by patients in seeking healthcare by number
4.2.3.5.2 Healthcare Workers

The most HCWs when feel like having illness they rushed to buy drugs from pharmacy, but when the illness persisted, they go for HCFs services unless the illness is related to stigma associated to TB/HIV, while few of them mentioned to have been using Chinese herbs that demonstrated effectiveness to cure malaria and other infections

“Chinese herbs are very effective treatments for malaria compared to Museto (the current tablets for treating malaria)” [Muhimbili]

4.2.3.5.3 In-depth interview

When informants were asked on the reason made people delay to seek healthcare they said; the majority of patients who were interviewed about the places they went to seek care before they went to hospital, the majority responded to have been using Chinese herbs. Other went for traditional healers thinking the disease was related to witchcraft; other delayed at the level of Dispensary where there were no services to diagnose TB, others were busy treating malaria while other went for prayers.

4.2.3.5.4 Observation

The researcher managed to attend the conversation among health educator and patients during health education sessions on the impact of seeking care to multiple place where the majority said; transmitting infections to others, over spending more money for treatment, inducing fear to the family, the disease becomes serous, can’t work and can be terminated to work especially private sectors and sometimes death can occur.
4.2.3.6 Reasons for stopping taking anti-TB medicine

4.2.3.6.1 Patients

When patients asked about the reasons that made patients stop taking anti TB, most of them explained that they stopped taking drugs due to ignorance and negligence. Other said side effects of the drugs. They further explained that it took a long time to complete the course of treatment, some mentioned stigma and discrimination, other explained that in availability of food and other said temporally improvement makes patient stop taking medicine. While few said it was because of influence of friends and pursuance of leisure.

Big tablets are very strong, they make abdominal pains” [female from young group]

Yet some participants said that they stopped after having temporally improvements in their condition,

“You know these drugs are very effective, taking drugs just for one week one’s symptoms subside. People could stop drugs thinking that they have been cured” [Old male].

Yet few participants said that they stopped taking medication due to the drugs reaction;

“Some get drug reactions and decide to stop taking drugs” [Mwananyamala]

From the in-depth interviews very few participants said that the lack of food can make a person stop taking drugs.

“These drugs are very strong and make a patient feel hungry regularly; in case food is not available people decide to stop drugs” [Young age male]
When further probed to state some of the effects of delaying and stopping drugs diverse views were highlighted by participants. These are as outlined as disease becomes very severe, death, reoccurrence of the disease, dropping of the family income, spread infections to others, become a burden to the family, depression, drug resistance increases, orphan and street children, and drugs resistance.

4.2.3.6.2 Healthcare Workers Views

HCWs were asked the reasons made people stop taking anti TB, the majority mentioned the side effect of the drugs, temporal relief, advice from the family members and friend, self-stagnation, other said believing in witchcraft.

"Even if many patients are taking medicine the notion of having been witched is still there, that is why they stop taking medicine and found another alternatives” [Mwananyamala]

4.2.3.6.3 In-Depth Interview

When the researcher interviewed informants about the reason made patients stop taking medicine the majority said, side effect of the drugs especially abdominal discomfort due to in availability of food since this drugs need to be taken after having been taken some thing. Nature of work such as travellers does stop drugs in between the treatment course. Some mentioned stress and psychological problems make people stop drugs.
.2.3.6.4 Direct Observation

During the field work the researcher noted that the side effect of the drugs including abdominal pains were the major reason for stooping anti TB medicine. Observed patients who were complaining to nurses who were selling nutritious diet to patient at TB clinic that

“We are ready to take drugs but it is very painful to put these drugs in empty stomach. In stead of selling nutritious diet (lishe) to us, could you please convince the hospital to provide nutritious diet (lishe) to us without paying since many patients have no money to pay” [ TB patient]

Some said patient when feel temporally relief and decide to stop drugs.

4.2.3.7 Participants’ Recommendations

When the participants were asked what they would recommend in order to enhance the prevention of transmission of TB among HCWs and patients. The following were the recommendations;

a). The community should be sensitized on TB prevention using mass media,

b). TB testing should be improved at all levels (TB services),

c). Cost of medical service charges should be reduced from 10 USD to 5USD X-ray charges for those who have referral and those who have no referral should be the same (20 USD)

d). Rules and regulations in place for initiating and running pharmacy shops should be followed.

e). Public transport rules and regulations should be followed to reduce overcrowding of passengers.
f). Employer (Hospital management) should conduct medical checkup of HCWs.

g). Initiation of resource center for Health care workers

h). N95 mask should be available at the healthcare facilities.
CHAPTER FIVE

DISCUSSION

The objective of this study was to assess the practices, knowledge and perception of Health Care Workers and patients towards prevention of tuberculosis transmission. The study established that the patients and health care workers were knowledgeable since they were able to define tuberculosis, and mention TB symptoms, mode of transmission and its prevention. However the knowledge they had on TB could not prevent them from seeking healthcare by going for traditional medicine, going for prayers and buying medicine from the nearby pharmacies without doctors’ prescription. This study was different to that conducted by Gilani (2012) in Pakistan on perception of tuberculosis which found out that the knowledge of TB was insufficient in most aspects e.g. symptoms, diagnosis, treatment and transmission, and there were misconceptions about TB as well.

From the interviews conducted it was observed that failure to cover the mouth and nose during coughing and sneezing, overcrowding and overloading of town buses, living in a house with poor ventilation, staying closer to infected persons, drinking unpasteurized milk and eating not-well cooked meat from TB infected cattle were the possible ways leading to TB transmission.

The above results were in agreement with a study which was carried out in South Africa which found out that most respondents (89.2%) had appropriate knowledge of transmission, diagnosis and prevention of TB and majority of respondents recognized pulmonary TB as being potentially contagious, 118 (90.7%) recognized airborne spread as the mode of transmission (Bhebhe et al., 2014).
Similarly a study conducted by Biya et al., (2010) in Nigeria showed that many participants knew that TB could be transmitted by air but unlike in this study very few knew that drinking contaminated milk could transmit TB. This was similar to the study done by Malama and others (2013) in Zambia which noted that consumption of raw and soured milk is one of the common practices in the local communities. This, therefore, poses a health risks in the event that the milk is drawn from infected animals and physical contact with cattle and sharing of shelter/space is another common practice in these communities (Malama et al., 2013).

Pertaining to the attitudes and perceptions of the patient and HCWs on seeking healthcare and its influence to prevention of tuberculosis transmission practices, the results of this study established that ignorance and poor implementation of infection control in community and HCFs lead to lack of awareness of the community on TB infection transmission. The study also noted that the community/patients believed so much in local and traditional medicine. In addition, the patients had a negative attitude towards healthcare services. High charges of medical services were partly the reason behind not seeking healthcare at HCFs. The results of this study also reflected social isolation and fear of being tested for TB and HIV and thus a reason for not seeking healthcare at HCFs. This study was similar to the study done by Mackian (2003) in the United Kingdom. He found that economic status, access of quality of care, distance to assess healthcare, culture and family economic constraints were the main factors that made people fail to assess healthcare in time.

Similar to the study by Tarimo (2012) in Tanzania, the participants’ views in his study related to the reasons that made the community not seeking healthcare to HCFs were as, follows; symptoms will disappear on their own, using unprescribed antibiotics from the
nearby pharmacy shops, fear of being diagnosed with TB and HIV, financial constraints and previous bad experience in health care facilities. In addition Karampudi (2014) in India identified several reasons that made people not to attend to HCFs in time such as the individual’s perception of the disease, socioeconomic constraints and poor utilization DOTs.

In this study the other major reason noted was failure to attend at the HCFs in time due to the issue of stigma and discrimination. Also fear for what will be the investigation results as well as fear of being terminated from work was the other reasons. Similar to the study done by Maduike (2010) in Nigeria on stigma and discriminatory attitudes and practices towards HIV/AIDS who noted that social responses of fear, denial, stigma and discrimination aggravated the disease. Likewise discrimination has spread rapidly, increasing anxiety and prejudice against the group most affected.

Though the epidemic has triggered responses of compassion, solidarity and support, bringing out the best in people, families and communities, stigma is seen as a tool for social control which can be used to marginalize, exclude, and exercise power over TB patients and PLWH. In many societies, PLWH are often seen as shameful. Also in some societies, they are seen as personally irresponsible. Many societies have laws, rules and policies that can increase the discrimination and stigma (Maduike, 2010).

Also this study was similar to study conducted by Sikwese (2012) in Zimbabwe who noted that testing health status makes people fear what the diagnosis will be and this fear was based on what friends would say if they were diagnosed with TB, and fear of being thought to have AIDS, and as a consequence, being isolated. Respondent’s fears of being diagnosed with TB were associated with HIV because some of the physical symptoms of TB such as
physical frailty and extreme weight loss are similar to that of TB. Another fear was based on being unable to work properly again. Respondents held the belief that when a person has TB, his or her body becomes weak making him or her unable to work. Some respondents held a further belief that even after a person has been treated from TB, their health does not return to normal and that they are no longer as strong as they used to be (Sikwese, 2012).

Promoting awareness on the reduction of stigma and discrimination among patients and HCWs in the context of prevention of TB transmission was identified to be crucial in this study. This was similar to the study done by Chansa (2007) in Zambia on taking action against TB/HIV stigma and discrimination that emphasized that effective action against stigma and discrimination requires a strong understanding of the issues within organizations and actively address stigmatizing attitudes and practices that may exist within the organization so that the infected TB/HIV do not fear being stigmatized and discriminated (Chansa, 2007).

Patients who had heard of TB were significantly fewer than Health care workers who heard of TB. In terms of time spent before treatment, the patient delay for more than 14 days and this was considered as significant patient delay according to Tanzania MoHSW (2013). While in other studies the delay ranged from 20 to 30 days (Asha et al., 2001), in this study those who suffered from TB reported to health care facility after 14 days. However some patients delayed for at least 2 months more than the health care workers. According to the trend of stopping taking anti TB medicine, patients who stopped anti TB medicine were significantly higher than health workers. HCWs were more likely to complete the full course of treatment
The studies established that the major elements influencing TB transmission at HCFs and in the community were: living in the house with poor ventilation which does not permit fresh air to pass, overcrowding of family members in the same house, and overloading of town buses and inadequate sensitization of the community on tuberculosis infection.

The other factors identified to have influencing TB transmission at HCFs included putting together patients in same wards irrespective of the medical conditions, taking care of patients with active tuberculosis infection without using protection (using N95 mask), overcrowding of patients, poor ventilation due to poor infrastructure which did not support TB infection control practices, misdiagnosis as well as unavailability of protocols and guidelines at the healthcare facility.

According to the Infection Prevention and Control Best Practices for Long Term Care, (2007) in Canada, it was elaborated that, microorganisms carried in air remain suspended in the air for long periods of time and can be dispersed widely by air currents. These may become inhaled by a susceptible host within the same room or over a longer distance from the source client, depending on environmental factors (Canadian Committee on Antibiotic Resistance, 2007).

In availability of protective gears at the FCFs including ventilators (N95 mask) was the other factor considered to have influenced the spread of airborne diseases such as TB. Similar to the study done by CDC (2013) that identified, poor protective measures, living in crowded conditions as the factors contributing to TB transmission in the community and at the HCFs. Similar to the study done by Jesudas and Thangakunam (2013) in Bangladesh which emphasized that, knowing the risk to HCWs is of paramount importance in the global
fight against tuberculosis. They are at increased risk of contracting TB infection as well as developing the disease. This occupational risk is at alarming proportions in the low and middle income countries because of increased exposure and lack of preventive measures. Effective environmental and personal protective measures along with education of the patients and the HCW need to be carried out expeditiously to reduce the occupational risk of TB.

Pertaining to healthcare seeking behaviors on tuberculosis treatment among HCWs and patients, the results of this study were that the community did not prefer seeking healthcare at the Health care facilities due to their perception that they might not be cured. Instead they sought healthcare in multiple places such as buying medicine from the pharmacy shops, using local medicine and Chinese herbs, while other went for prayers. Going to hospital was considered as the last resort. The study also reveals that seeking healthcare in multiple places encouraged delay in seeking healthcare at HCFs. Patients spent one month and up to six months without commencing anti TB drugs.

In the study the factors that made people when feeling unwell not attend to HCFs including, going to additional medicine, using herbs, and buying medicine from nearby shops were identified. These results are similar to the study conducted by (Asha et al., 2015) in Philippines where the respondents ranked self-medication, local remedies, herbal products and traditional healing as a priority treatment method. The consequences of delay in seeking healthcare to Health care facilities were linked to a severe impact on health and social economic status of the community and public at large. Furthermore, the views form participants in the study explained the impact of stopping taking ant TB such as; high rate of patients hospitalized, spreading infection to family and community members, TB drugs
resistance, high mortality and morbidity rate, as well as increasing orphans and street children and thus contributing to social economic instability since the reproductive age are the most affected.

Similar to Stop TB Ministerial presentation done by WHO which was held at Amsterdam (2000) on economic impact of tuberculosis, it was reported that the economic impact of tuberculosis comes both from the size of the problem and from the fact that in developing countries the majority of the disease and death occur among the most economically active segment of the population.

Likewise, the economic impact of TB was recognized study done by (Malama et al., 2013) which realized that tuberculosis is an economical and public health threat in developing countries. However, very few studies quantify its economical and public health burden. Other studies suggested that the cost of controlling TB especially BTB always exceed the calculated benefits if considered from a purely monetary viewpoint. However, the benefits are likely to outweigh the costs if wider implications of BTB on humans, e.g. avoiding infirmity-related production losses (indirect costs such as time away from farming and on livestock) are taken into account (Malama et al., 2013).

Even if the results shown that the participants were knowledgeable, still the study noted the lack of community and HCFs’ awareness on TB preventive practices which needs serious sensitization of the public at large. Health Environmental management and availability of PPEs should be emphasized.

This view is similar to that expressed in Malaysia by Mokhtar et al., (2012) who established that the level of awareness on TB in community was still low even though they claimed to
know TB. In the study, upgrading the system of promoting awareness about TB via the most effective mass media was suggested.

This study is also similar to the study done by Sikwese (2012) in Malawi which identified that for a person to perform certain behaviors, he or she must know the issues and what the behavior is and how to perform it making knowledge a precursor to behavior. Similarly the Uganda National Guidelines for Tuberculosis Infection Control in Health Care Facilities, Congregate Settings and Households, emphasizes knowledge and implementation of TB control measures to remain the key factors in the effective management of community and healthcare-associated TB (UTIC, 2010).

Similarly the CDC TB infection control guidelines (2013) proposed the implementation of infection control measures at three levels: administrative measures (appropriate collection of sputum, screening of suspicious TB patients in waiting areas, screening of TB patients for HIV and TB infection control education). Environmental measures (isolation of TB patients using separable TB ward, avoidance of air circulation in non-infected ward, open window for ventilation and sunlight). Personal protective equipment by using appropriate respirator for airborne disease, usage of protective cloth and proper hand washing were recommended. The above views are in collaboration with the results of this study from the interviewed participants. According to the study done by Menon (2013) administrative Infection Control Measures and administrative control measures are the first line of defense against TB transmission and are meant to reduce patient exposure to infectious particles and decrease staff exposure.
The factors of stop taking anti TB medicine in between the treatment course were elaborated by the participants who participated in the study including; ignorance, poor income, side effect of the drugs long term taking drugs, negligence, inavailability of food and temporally improvement.

Similar to the study conducted by Chani (2010) in Namibia on factors affecting compliance to tuberculosis treatment who explained it including; communication difficulties, low literacy levels, inadequate knowledge and low awareness of TB disease, patient attitudes and beliefs in treatment efficacy, depression and other psychiatric illnesses, alcohol and substance abuse, unstable living conditions negative health provider attitudes, stigma and discrimination (Chani 2010).

The study conducted by Wenwei (2013) identified that the standard TB drugs have remained the same for the past 50 years, despite having limited efficacy in latent TB and MDR/XDR-TB. The long treatment periods and numerous side effects with poor efficacies arising from high dosage and drug-drug interactions upon co-administration with other chronic disease treatments such as HIV and diabetes have also complicated compliance to TB treatments and control of global epidemic. An ideal TB drug should therefore possess the following criteria: shorten treatment duration, target drug resistant strains, simplify treatment by reducing pill burden, lower dose frequency, and can be co-administered with HIV or diabetes medication (Wenwei 2013).
5.1 Conceptual Framework

A conceptual framework (Figure 5.1) shows the relationships of independent variables to dependent variables (service related factors, community related factors and disease related factors) the variables helped to show how they contribute to prevalence of tuberculosis from Health care workers and patients as described below: and supported by literature.

Figure 4.3: Shows the summary of the in service related, community related and disease and drugs related.
**Tuberculosis Infection Control malpractices**

The risk for TB among HCWs is consistently higher than the risk among the general population worldwide since TB considered as an occupational disease (Baussano et al., 2011). Health care workers contract and spread infections due to limited preventive measures including personal protective equipment and overcrowding of patients (bed occupancy is higher than bed capacity (Tietjen et al., 2003).

**Inaccessibility of TB guidelines in Healthcare Facilities**

Accessibility and utilization of TB treatment and prevention guidelines is crucial in prevention of tuberculosis transmission in Health care facilities and communities. These guidelines are used as references in infection prevention and control (Bhebhe et al., 2013).

**Non-compliance to National TB Treatment and Prevention Guidelines**

Non-compliance to national TB treatment and guidelines such as guidelines for prevention of TB in community and healthcare setting, is among factors that lead to increased prevalence of TB since provision of treatments (DOTs), clinical and laboratory diagnosis depend on what is indicated in TB treatment and prevention guidelines (Sakalle et al., 2014).

**Inadequate Community Sensitization on Control of TB Infection**

Inadequate community sensitization leads to lack of awareness of the Health care workers and community towards prevention of TB transmission. This results in high prevalence of TB infection among Health care workers and community in Tanzania (Lawn et al., 2011).
Stigma and Discrimination

Some TB/HIV infected people do not want to be identified; as a result they don’t seek medical services, which lead to spreading infection among family members and work mates (Hatheral and Newell, 2009).

Seekers of Traditional Healer

Due to inadequate sensitization on TB, the community has taken the illness as a result of witchcraft and superstition. Therefore, sick people seek care services from traditional healers resulting in delaying to initiate anti-TB treatment while continuing to spread infection to family and other community members (Tarimo, 2012).

Seekers of spiritual healing powers

Some communities believe that God has supernatural powers that never fail, individuals seek healing from prayer centres such as church meetings and crusades rather than hospitals. As a result, they delay to initiate treatment since they depend on healing powers from prayers. Delay in seeking early treatment leads to patient deterioration and spreading of infection to family members (Haram, 2008).

Co-infection, drug Interaction and Weaknesses related to drugs and Poor Nutrition

Patients with co-infections like HIV/AIDS and other chronic illnesses whose immune systems are compromised can easily develop active TB and drug reactions. It is very important to detect and treat co-infections (Eticha and Kassa, 2014). Weaknesses related to drugs, nutrition and drug adverse reaction can make patients stop anti-TB treatment and increase drug resistance. All these factors need serious intervention to reduce prevalence of tuberculosis in the population (WHO nutritional care and support guidelines, 2013).
CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Participants were knowledgeable about the cause, transmission, and presentations of TB. Even if they knew, there were many other factors that prevented or guided their health seeking behavior, with many preferring to go to pharmacies and using local medicine. Also the knowledge did not prevent them from going to Chinese shops, fear of what will be the diagnosis which is connected to TB/HIV association. Being knowledgeable on TB infection did not discourage them from their belief in traditional medicine, stigma, and discrimination, fear of losing employment, high cost of accessing TB services, delay in diagnosis, misdiagnosis, and delaying (more than one and up to six months) before seeking appropriate medical treatments. Even after getting treatments others still opted to stop medicine for reasons like going for alternative care, severe side effects, and stigma.

6.2 Recommendations

Based on the findings of this study on prevention of tuberculosis infection transmission in Dar-es salaam the following are the recommended strategies for improvement:

a) TB infection prevention and control strategies should be in place for sensitizing the community and HCWs on TB prevention. This should be improved to create awareness and acceptable behavioral patterns in seeking treatment and support.

b) Personal Protective equipment such as ventilators (N95 mask) should be made easily available and accessible at Health care facilities at all times. TB Guidelines and protocols Should be available and accessible at HCFs. They must be adhered to at all times.
REFERENCES


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http://www.reseracggate.net/publication/2543376512.

Sikwese, S.E., 2012. *Community Perceptions of Tuberculosis and People Diagnosed with Tuberculosis in a Rural Community in Malawi*. University of the Withwatersrand, Johannesburg. Available at:


WHO, 2006. *Guidance for National Tuberculosis Programmes on the management of tuberculosis in children.*, Available at:


WHO, 2001. *Infections and infectious diseases A manual for nurses and midwives in the WHO European Region*, Available at:


APPENDICES

Appendix 7.1: Structured Questionnaires

STRUCTURED QUESTIONNAIRE FOR PATIENTS AND HEALTH CARE WORKERS

Dear respondent,

My name is Niyonizigiye Astrida Marko; I am a master’s student from the University of Zambia. I am embarking on a study to: Assessing the practices, knowledge and perception of Health care workers and patients towards prevention of tuberculosis transmission in Dar es Salaam Tanzania (Muhimbili National hospital and Mwananyamala hospital Tanzania). Phone No +2550788854115 OR +260976264562. Email address - adelinotz@yahoo.com

Date of Interview ………………………………………

Instruction

Please you are not requested to write your name on this questionnaire

Read all the questions carefully in case of anything you don’t understand do not hesitate to ask the researcher using details above

Please tick the right answer in the brackets provided. Where you are required to answer in your own words, the spaces are provided.

Section A: Demographic Information

Q 1. Sex
1. Male [   ] 2. Female [   ]

Q 2. Age .............................................

Q 3. Marital status .................................

Q 4. Highest Educational attained


Q 5. Occupation

Q 6. What is your current occupation?

1. Formal employed [   ] 2. Informal employed [   ] 3. Not employed [   ]

Facility Name  ........................................

Section B: TB Related Knowledge

Q 7. Have you ever heard about Tuberculosis disease?

Yes [   ] 2. No [   ]

Q 8. Have you been suffered from tuberculosis?

1. Yes [   ] 2. No [   ]

Q 9. If yes, how many weeks or months did it take from the time you first feel sick and the time you went to Health facility

Q 10. Do you consider this time a delay or not

1, Yes [   ] 2. No [   ]
Q 11. What do you think is the cause of your delay to seek healthcare.

<table>
<thead>
<tr>
<th>No</th>
<th>Reason For Delay To Healthcare</th>
<th>Tick In The Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fear of what would be found in diagnosis</td>
<td>[   ]</td>
</tr>
<tr>
<td>2.</td>
<td>Hope that the symptoms will be go away by themselves</td>
<td>[   ]</td>
</tr>
<tr>
<td>3.</td>
<td>Fear of social isolation</td>
<td>[   ]</td>
</tr>
<tr>
<td>4.</td>
<td>Financial constrains</td>
<td>[   ]</td>
</tr>
<tr>
<td>5.</td>
<td>Poor health services</td>
<td>[   ]</td>
</tr>
</tbody>
</table>

Q 12. Is there any relative who suffered from tuberculosis?

Yes [   ] 2. No [   ]

Q 13. What are the symptom(s) that first made you to seek care for your illness.

<table>
<thead>
<tr>
<th>No</th>
<th>Symptoms</th>
<th>Tick in the bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cough, coughing blood, fever, night sweat, loss of weight</td>
<td>[   ]</td>
</tr>
<tr>
<td>2.</td>
<td>Chest tightness, fatigue, difficulty in breathing</td>
<td>[   ]</td>
</tr>
<tr>
<td>3.</td>
<td>Joint pains, chest pain, coughing blood</td>
<td>[   ]</td>
</tr>
</tbody>
</table>

Q 14. Where was your first place to seek care?

1. Traditional healer [   ] 2. Pharmacy shop [   ] 3. Hospital [   ] 4. Players

Q 15. Have you stopped taking ant TB medicine?

What are the reasons make some people do not seek healthcare facilities.
1. Hope symptoms would go away by themselves and the facility is too far [    ]
2. High charges of hospital services [    ]
3. Fear of what would be the diagnosis [    ]
4. Believe in witchcraft [    ]

Q 16. Are you taking ant TB drugs?
Yes [    ] No [    ]

Q 17. Have you stopped taking ant TB drugs? Yes [    ] No [    ]

Q 18. If yes what was the main cause of stopping taking the drugs?

<table>
<thead>
<tr>
<th>No</th>
<th>Reasons For Stopping Ant TB</th>
<th>Tick In The Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drug reaction</td>
<td>[    ]</td>
</tr>
<tr>
<td></td>
<td>Completed the dose</td>
<td>[    ]</td>
</tr>
<tr>
<td></td>
<td>Traditional healers and for prayers</td>
<td>[    ]</td>
</tr>
</tbody>
</table>

Q 18. Do you know how TB is transmitted? Yes [    ] No [    ]

If yes what is the mode of tuberculosis transmission?
Through coughing, sneezing, overcrowding [ ]

Through contact, sharing food with infected person, walking together and laughing [ ]

Share clothes, greeting and sharing the bathrooms [ ]

Q 20 Do you know factors influencing tuberculosis transmission
   Yes [ ] 2. No [ ]

Q21. If yes what is the Factors Influencing TB Transmission

<table>
<thead>
<tr>
<th>Factors Influencing TB Transmission</th>
<th>Tick in the Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB infection control malpractice and guidelines inaccessibility in healthcare facilities</td>
<td>[ ]</td>
</tr>
<tr>
<td>Noncompliance to TB treatment and community sensitization</td>
<td>[ ]</td>
</tr>
<tr>
<td>Stigma and discrimination</td>
<td>[ ]</td>
</tr>
<tr>
<td>Traditional and spiritual seeker,</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

Q 22. Do you know how TB can be prevented? Yes [ ] 2. No [ ]

Q23. If yes what is the preventive measures of tuberculosis?

<table>
<thead>
<tr>
<th>Prevention of Tuberculosis</th>
<th>Tick in the Bracket</th>
</tr>
</thead>
<tbody>
<tr>
<td>cover mouth and nose when coughing and sneezing, using piece of cloth, attend to health facility</td>
<td>[ ]</td>
</tr>
<tr>
<td>Don’t Cough through armpit when coughing</td>
<td>[ ]</td>
</tr>
<tr>
<td>Take local medicine for prevention measures</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

End

Thank you for devoting your time
Appendix 7.2: List of Questions for Focus Group Discussion Patients and HCWs

Q1. What do you understand on tuberculosis infection, transmission, symptoms and prevention?

Q1. Can you tell us why some people do not seek health care at the hospitals/health centers or dispensary?

Q3. After realizing that you are sick where you went to seek health services and why?

Q4. (a) If you didn’t go to health facility from the beginning, can you explain where you went?

(b) Can you explain time spent before seeking care to healthcare facility?

Q5. Do you know factors contributing to TB transmission at the workplace?

Q6. Explain the burden you experienced because of having this disease.

Q7. Any other comment please.

Appendix 7.3: List of Questions for Informants

Q1. How do you implement infection prevention and control at your health facility?
Q1. Can you tell us why some people do not seek health care at the hospitals/ health centers or dispensary

Q3. Does the health facility have enough personal protective equipment?

Q5. Can you tell as the reason for delay of investigations at your facility?

Q6 Do HCWS tested for their health fitness and how often?

Is there any HCW suffered from TB

What is the strategies do you have for decongesting patients at your healthcare facility?
### Appendix 7.4: Checklist for Observation: TB Infection Prevention and Control

<table>
<thead>
<tr>
<th>NO</th>
<th>HEALTH FACILITY FOCUSED ACTIVITIES</th>
<th>Observed</th>
<th>Not Observed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>DOT is implemented at HCFs</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Provision of health education to patients</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Training conducted to HCWS</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Availability and accessibility of TB guidelines and protocol</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Availability of personal protective equipment (N95 mask)</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Availability of infection control plan</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Data base for HCWs suffered TB</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Program in place for testing HCWs fitness in place</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Implementation of TB infection control in the ward e.g. overcrowding, coughing etiquette, disposal of sputum and other wastes, placement of patients and wards ventilation</td>
<td>[ ]</td>
<td>[ ]</td>
<td></td>
</tr>
</tbody>
</table>

DCD guidelines for TB infection prevention and control 2006
Appendix 7.5: Consent Form for Patients and HCWs

Title: Assessing the Practices, Knowledge and Perception of Health care workers and Patients towards Prevention of Tuberculosis Transmission in Dar es Salaam Tanzania.

1. Explanation of the Research

Dear respondent, my name is Niyonizigiye Astrida Marko; I am a Master’s student from the University of Zambia. I am embarking on a study to: Assessing the practices, knowledge and perception of Health care workers and patients towards prevention of tuberculosis transmission in Dar es Salaam the Structured questionnaires will be distributed to the participants for filling, while the checklist, recording and video shooting will be used during the Focus Group Discussion (FGD). You are kindly being asked to participate in this study.

2. Participants’ parents’/Guardians’ Rights.

Participation of parents’/guardian in this research project is completely voluntary. You have the right to say no or you may change your mind at any time and withdraw. You may choose not to answer specific questions or to stop participating at any time. Whether you choose to participate or not there will be no effect on your treatment and care.

3. Confidentiality

Your name is not included in this study and your contributions will remain anonymous. Privacy is observed and unauthorized persons will have no right to access information collected. Your responses will be treated confidentially and the data collected will be used not only for academic purposes but also for helping to design strategies to reduce TB case fatality in Tanzania and improve the public health.
4. Contact Information for Questions and Concerns

If you have concerns or questions about this study, please contact the researcher: Niyonizigiye Astrida Marko, Address; Box 65000 Dar es Salaam Tanzania, Email address adelinotz@yahoo.com, phone number; +255788854115+260976264562. Director General National Institute for Medical Research (NIMR P.O Box 9653, Dar-es – salaam Tanzania. Telephone number:+255222121400/255222121378,

Email: headquarters@nimr.or.tz

INFORMED CONSENT

Your signature below means that you have voluntarily agreed to participate in this research study.

____________________________________ _____________________________
Signature or fingerprint of the parent/guardian……………………………………

Signature of Researcher …………………………………

Place …………………………………………………

Date ……………
Appendix 7.6: Letter of Research Proposal Approval

THE UNIVERSITY OF ZAMBIA
SCHOOL OF VETERINARY MEDICINE
OFFICE OF THE ASSISTANT DEAN (POSTGRADUATE)

Telephone: 293727
Telegram: UNZA LUSAKA
Telex: UNZALU ZA 44371b
Fax: 293727/2939552
School Fax: 293727
Vet. Clinic Telephone: 291515

18th August, 2014

Director General
National institute for medical research,
P.O.Box 9653,
Dar-es-salaam
Tanzania,

Dear Sir/Madam,

RE: APPROVAL OF RESEARCH PROPOSAL AND REQUEST FOR SUPPORT

At the meeting of the School Board of Graduate Studies held on 26th June, 2014, the research proposal of Ms Niyonizigiye Astrida Marko entitled ‘Assessing the practices, knowledge and perception of healthcare workers and patients towards prevention of tuberculosis transmission in Dar-es-salaam Tanzania (Muhimbili National Hospital Tanzania)’, was tabled and discussed. Following the deliberations the research proposal was subsequently approved by the Board.

On behalf of the Board, I wish to request your institution to assist her carry on with her research activities accordingly. I thank you in advance.

Hang’ombe B. M (PhD)
Assistant Dean (PG), School of Veterinary Medicine

cc: Director - DRGS
     Dean – School of Veterinary Medicine
     Course Co-ordinator – MSc OHAE
Appendix 7.7: Ethical Clearance Letter

THE UNITED REPUBLIC OF TANZANIA

National Institute for Medical Research
P.O. Box 9653
Dar es Salaam
Tel: 255 22 2121400/390
Fax: 255 22 2121380/2121360
E-mail: headquarters@nimr.or.tz
NIMR/HQ/R.Ra/Vol. 1/X/1857

Ministry of Health and Social Welfare
P.O. Box 9083
Dar es Salaam
Tel: 255 22 2120262-7
Fax: 255 22 2110986

21st November 2014

Niyonziyiye A Marko
The University of Zambia,
School of Veterinary Medicine, Dept of Disease Control
C/O Prof. M I Matee
MUHAS, P O Box 65001
DAR ES SALAAM

CLEARANCE CERTIFICATE FOR CONDUCTING MEDICAL RESEARCH IN TANZANIA

This is to certify that the research entitled: Assessing the practices, knowledge and perception of health care workers and patients towards prevention of Tuberculosis transmission in Dar es Salaam, Tanzania (Marko N A et al.), has been granted ethical clearance to be conducted in Tanzania.

The Principal Investigator of the study must ensure that the following conditions are fulfilled:

1. Progress report is submitted to the Ministry of Health and the National Institute for Medical Research, Regional and District Medical Officers after every six months.
2. Permission to publish the results is obtained from National Institute for Medical Research.
3. Copies of final publications are made available to the Ministry of Health & Social Welfare and the National Institute for Medical Research.
4. Any researcher, who contravenes or fails to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine. NIMR Act No. 23 of 1979, PART III Section 10(2).
5. Sites: Mulwindhi National Hospital, Mwananyamala Hospital, Dar es Salaam.

Approval is for one year: 20th November 2014 to 19th November 2015.

Name: Dr Mwelecele N Malececa
Signature
CHAIRPERSON
MEDICAL RESEARCH
COORDINATING COMMITTEE

CC: RMO
DID
DMO

Name: Dr Margaret E Mhando
Signature
As CHIEF MEDICAL OFFICER
MINISTRY OF HEALTH, SOCIAL WELFARE
Appendix 7.8: Permission Letter to Conduct Research at MNH

MUHIMBILI NATIONAL HOSPITAL

Cables: "MUHIMBILI"
Telephones: +255-22-2151367-9
FAX: +255-22-2150534
Web: www.mnh.or.tz

Postal Address:
P.O. Box 65000
DAR ES SALAAM
Tanzania

Date: 19th December, 2014

In reply please quote:
Ref: MNH/TRC/2015/403

TO
NIYONIZIGIYE ASTRIDA MARKO

RE: PERMISSION TO CONDUCT RESEARCH AT MNH NO: 403

You have been granted permission to conduct research at MNH

<table>
<thead>
<tr>
<th>Name of Researcher</th>
<th>Niyonizigiye Astrida Marko</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Title</td>
<td>Assessing the practices, knowledge and perception of healthcare workers and patients towards prevention of tuberculosis transmission in Dar Es Salaam, Tanzania</td>
</tr>
<tr>
<td>Type of Research</td>
<td>Cross sectional and case study</td>
</tr>
<tr>
<td>Supervisor</td>
<td>Dr. Rose N. Likwa</td>
</tr>
<tr>
<td></td>
<td>Dr. Andrew M. Phiri</td>
</tr>
<tr>
<td></td>
<td>Prof. J B Muma</td>
</tr>
<tr>
<td></td>
<td>Prof. Mecky I Matee</td>
</tr>
<tr>
<td>Valid Between</td>
<td>Dec 2014 – May, 2015</td>
</tr>
</tbody>
</table>

Please note that:
- The above named has been allowed to conduct the started research.
- Please accord him/her and his/her assistants the necessary assistance/cooperation.
- You are expected to present a copy of your final report to the HTRCU.

Note:
Publication of your findings needs permission from the management of MNH

Sincerely,

DR. Fanaja Chiwanga
Ag: Head, Teaching, Research and Consultancy Coordination Unit
Appendix 7.9: Research Permit by Municipal Council

KINONDONI MUNICIPAL COUNCIL
ALL CORRESPONDENCES TO BE ADDRESSED TO THE MUNICIPAL DIRECTOR

Tel: 2170173
Fax: 2172606

In reply please quote:
Ref. No. PF/K/14 Vol.VI/1

Health Facility I/C.
Mwananyamala Hospital
Kinondoni Municipal.

REF: RESEARCH PERMIT

Refer to the above heading:

DMO office is pleased to inform your health facility that Niyonzigye Astrella Ma
which is from Zanzibar School of Veterinary, pursuing Msc.
Has been given a permit to perform the research work in your facility stating
from 19/12/2014 to 31/03/2015 the research is titled
Assessing knowledge and perception of healthcare
workers and patients towards prevention of TB transmission
in Dar es Salaam.

Kindly receive & provide the necessary assistance in order to enable the
student/organization to fulfill the activities comfortably.

Best wishes,

[Signature]
Research Coordinator,
Kinondoni Municipal Council

MGANGA MKUU W NKAINI
MAKAMASHI VU NA MKAINI

NB: Please share research report with MMOH Office at the end of your study.
Appendix 7.10: Permission of Conducting Research at Mwananyamala Hospital

KINONDONI MUNICIPAL COUNCIL
THE OFFICE OF MEDICAL OFFICER INCHARGE

THE OFFICE OF MEDICAL OFFICER INCHARGE
MWANANYAMALA HOSPITAL
P.O. Box 61665.
DAR ES SALAAM

Ref. MH/INT/100/33
DATE: 22ND DECEMBER, 2014.

To Head Department/Unit,

OPD, CTC, Physiotherapy, Internal Medicine (Medical wards) & MOPD,
TB Clinic, Laundry and Estate,

Mwananyamala hospital,

RE: PERMISSION CONDUCTING RESEARCH IN YOUR DEPARTMENT/UNIT.

Niyonizigiywe Astrida Marko is a student of Zambia School of Veterinary MSC given a permission doing her/his research for duration of 3 weeks (from December 2014 to January 2015) on those above units and Department respectively.

During research will involve questionnaire to the staff as well as patients on knowledge and perception towards TB Transmission.

Please your Assistant will be needed to full fill her needs.

Thanks.

Dr. Kariamela Wandi
For Medical Officer Incharge
MWANANYAMALA HOSPITAL