PREVALENCE AND FACTORS ASSOCIATED WITH PULMONARY TUBERCULOSIS AMONG PRISONERS IN DAR ES SALAAM, TANZANIA, 2012.

By

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CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health Sciences a dissertation entitled **Prevalence and Factors Associated with Pulmonary Tuberculosis among Prisoners in Dar es Salaam, Tanzania, 2012** in partial fulfillment of the requirements for the degree of Master of Science in Applied Epidemiology of the Muhimbili University of Health and Allied Sciences.

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DECLARATION AND COPYRIGHT

I, **Vida Makundi Mmbaga,** declare that this dissertation is my own work and that it has not been presented and it will not be presented to any other university for a similar or any other degree award.

Signature…….…… Date…….....

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DEDICATION

This work is dedicated to my family, my husband Dr. Geoffrey Mmbaga for his immeasurable support, assistance and encouragement and to my children Edson and Eninka for bearing with my absence at the time I was needed most in order to make this work possible.

ABSTRACT

Tuberculosis (TB) is the disease caused by the bacterium called Mycobacterium tuberculosis which mostly affects the lungs but also other organs and tissues. It is estimated that about one third of the world's population is infected by Mycobacterium tuberculosis. The disease is the leading cause of death from infectious diseases in adults and responsible for an estimated 2 million preventable deaths each year. African region contribute about 26% of all deaths due to TB. Prisoners form a group of the society with a high risk of TB. Where studies have been done, the prevalence of TB among prisoners has been found to be up to 100 times higher than that of the corresponding non institutionalized population. In Tanzania, data on the knowledge on the prevalence and factors contributing to TB in prisons is limited. The data collected from TB surveillance system by the National Tuberculosis and Leprosy Program (NTLP) cannot be reliable for estimating the prevalence and risk factors for transmission of Pulmonary Tuberculosis (PTB) in prison populations. This study aimed at determining the prevalence of PTB among prisoners in Segerea, Dar es Salaam and associated factors.

Methods:

A cross section study was conducted in Segerea prison from December 2012 to February 2013. The study population consisted of prisoners. The study population was stratified by sex and prison cell to get proportional representation of both sexes and by prison cell. Prisoners who consented were interviewed using a structured questionnaire and asked to provide sputum for microscopic examination of Acid Fast Bacili. HIV test was done to those who consented. The dependent factor was the presence/absence of PTB while the independent variables included factors related social demographic, health, lifestyle and prison system. Data analysis was done using Epi info version 5.3.1. Prevalence of PTB was determined and Adjusted Odds Ratio(AOR) was calculated to ascertain the association between the dependent variable PTB and the explanatory variables.

Results: A total of 448 prisoners aged between 18 to 68 years were recruited. Males were the predominant group forming 401(89.7%) of the prison studied population. A total of 380(84.5%) were still on remand and had not being sentenced to jail terms, about half 194(43.3%) had stayed in the prison for less than one month. Out of 448, 16 had PTB, making a prevalence of 3.6% (95%CI=2.1-5.9). There was no significant difference in prevalence in respect to gender or among the age groups (p value= 0.2 and 0.4 respectively). A total of 441 out of 448(98.4%) consented to HIV testing and out of those, 34(7.7%) were HIV positive and six were TB/HIV co infected (17.6%). About half, 221(48.3%) of the respondents had history of smoking, two thirds, 278(60.7%) had history of consuming alcohol and 84(18.6 %) had ever used addictive drugs. The factors that were independently associated with development of PTB included HIV infection (AOR= 6.7, 95%CI=1.7-26.1), previous history of TB (AOR=5.9, 95%CI=1.5-22.6), smoking cigarettes for more than 5 years (AOR=4.5, 95%CI=1.3-15.0), under-nutrition[BMI<18kg/m^2](AOR=4.8,95%CI=1.3-16.8) and unemployment (AOR=5, 95%CI=1.57- 19.67). Although 391(87.3%) of the respondents were exposed to overcrowding, this did not contribute to PTB as one of the risk factors (OR=0.4, 95%CI=0.1-1.8, p=0.1)

Conclusion and Recommendations: This study has shown that the prevalence of PTB in prisons in Dar es Salaam is comparable to other studies and it is contributed by individual prisoner risk factors rather than prison system factors. Screening for TB before entry to prisons is recommended for early detection of cases. The results from this study have implications for individual management of PTB as well as collective impact on the prison community as one of the high risk groups.

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ACRONYMS

AFB	Acid Fast Bacili
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
cOR	Crude Odds Ratio
CTC	Care and Treatment Clinic
DTLC	District Tuberculosis and Leprosy Coordinator
EPTB	Extra Pulmonary Tuberculosis
HIV	Human Immuno-deficiency Virus
MMWR	Morbidity and Mortality weekly Report
MoHSW	Ministry of Health and Social Welfare
NTLP	National Tuberculosis and Leprosy Program
OR	Odds Ratio
PTB	Pulmonary Tuberculosis
RA	Research Assistants
TB	Tuberculosis
WHO	World Health Organization

CHAPTER ONE

1.0 Introduction

1.1 Background

Tuberculosis is a serious, but curable, infectious disease caused by a bacterium called Mycobacterium tuberculosis[1,2,3,4,5,6]. Most of the people with TB infections do not develop symptoms and are usually not infectious, and can remain so for some years till when their immunity becomes impaired as the case in individuals infected with Human Immuno deficiency Virus[7].

According to the sites of infection in the body, there are two main types of TB: the most frequent Pulmonary and extra pulmonary TB. The Pulmonary Tuberculosis can present with smear positive sputum or of smear negative PTB. The Extra-pulmonary Tuberculosis (EPTB) involves other sites than lungs including; meninges (TB Meningitis), TB of the bones (eg spine, hips, knees and other bones), lymph glands (mostly cervical), abdomen (lymph gland, and peritoneum). While PTB is most contagious, the EPTB does not spread easily from one person to another. Transmission occurs by airborne spread of infectious droplets[8].

The clinical manifestations of PTB are of gradual onset with cough for 2-3 weeks (with or without hemoptysis & expectoration) and fever as outstanding features. Other symptoms include chest pain, night sweats, chills, weight loss, loss of appetite, asthenia, wheezing and anorexia. A wide variety of signs have been reported including lymph node enlargement, crepitations, ascites, digital clubbing, hepatomegaly, splenomegaly, dyspnoea; and irritability[8,9,10,11].

Early identification and treatment of persons with PTB disease remains the most effective means of preventing disease transmission. Various methods are available for the disease detection; however the diagnosis of PTB in adults relies on bacteriological examination of sputum samples and chest radiographs[12,13].

1.2 Burden of Tuberculosis

1.2.1 Global burden of Tuberculosis

Globally, TB remains a major global health problem, despite the availability of highly efficacious treatment for decades. It is estimated that about one third of the world's population is infected by Mycobacterium tuberculosis, a factor that in combination with HIV infection contribute to increased morbidity and mortality[1,14,15]. · Worldwide the incidence of TB in the year 2009 was 9.4 million incidence cases and dropped to 8.8 million in 2010. The same trend of decrease has been observed as the absolute number of TB cases has been falling since 2006 and the incidence rate (per 100 000 population) has been falling by 1.3% per year since 2002[1,3,13,16].

In 1993, TB was declared by WHO as a global public health emergency and different strategies have been implemented to limit the spread of the epidemic including early case detection and treatment as one of the pillars of the TB control program. In 1991, WHO set targets for increasing case detection at 70% and treatment success rates at 85%[1,14]. Since 2001, there has been global movements setting up global targets for reductions in the TB burden lead by the Stop TB Partnership which is one of the Global TB initiatives, aiming to secure the world free of TB. The aim was to achieve the targets in line with the MDG goals by the year 2015. In addition to the above two strategies, it was aimed that by the year 2015, there should be a global reduction of prevalence and deaths of TB by 50% as compared to what was diagnosed in 1990 and also by 2050, reduction of the incidence of TB disease to less than 1 case per million population per year.[1] In Sub Saharan Africa (SSA) the incidence of TB was recorded as high as over 300 new cases of TB per 100 000 population in the year 2007[17]. In 2010, about 80% of reported TB cases occurred in the 22 high TB burden countries[1,18,19,20].

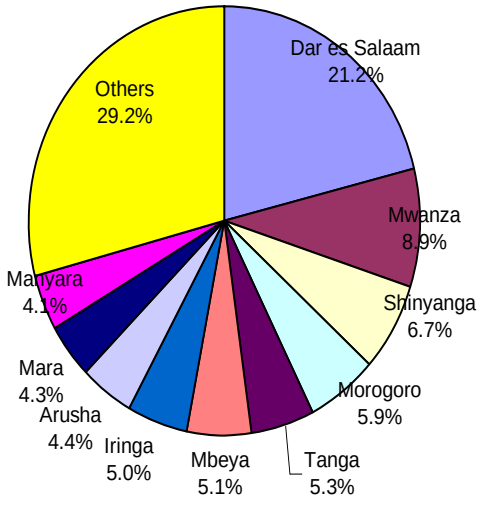
1.2.2 TB situation in Tanzania:

The WHO Global Report released in 2010 ranked Tanzania the 18th among the 22 high TB burden countries with an expected case load per year of 102,000 people. Over the last two

decades, there has been an annual increase in case notification of TB cases which is largely attributable to the HIV epidemic, population growth and urban overcrowding due rural-urban migration[21]. However, the incidence of TB per 100,000 populations has been declining from 190 in 2008 to 183 in 2009 and at 177 in 2010. Similarly, the total number of TB cases notified declined from 64,265 in 2009 to 63,450 in 2010 while the notification rate of new smear positive tuberculosis cases decreased from 59 to 57 per 100,000 for the same period of time. The number of new smear negative TB cases notified was 21,184 (33.4%) while new extra-pulmonary TB was 13,716 (21.6%). The highest number of TB cases notified in 2010 was in the age groups of 25-34 years and 35-44 years for both males and females[22].

Dar es Salaam is one of the most crowded cities in Africa with a population of about 3.8 million. It is the major contributor of TB cases notified in the country with 21.2% of all the cases reported in the country in 2010 (Fig.1). Other main contributors include the regions of Mwanza - 8.9%; Shinyanga - 6.7% and Morogoro - 5.9%[22].

Figure 1: Percentage distribution of Tuberculosis cases notified in Tanzania by region in 2010



Source: MOHSW: NTLP Report 2010

1.2.3 Tuberculosis in the Prisons

Prisoners are different from the normal homogenous segment of a society as they often come from disadvantaged and marginalized social groups, such as the urban poor, ethnic minorities, recent immigrants and injecting drug users, poorly educated and usually are among the social economically disadvantaged group[23,24,25,26,]. The prisoners have high possibility of entering the prison while already ill as compared to the general population as they may have unhealthy habits or addictions, such as alcoholism, smoking, and drug use, which contribute to their poor health and risk factors for developing TB. The specific features of prisoners necessitate specific approaches to tuberculosis control that are different from those used in the general population[16,23].

Although prisons are closed institution, the prisoners themselves are highly mobile inside the prison system from prison to prison, to other sections of the judiciary system, to the health facilities and finally to the community when they are released. All these movements bring the risk of spread of the disease within and outside the prison. It has been noted that transmission of PTB can occur more easily in the closed prison environment[2,23]. Also, it has been learnt from some previous studies that prison settings if well utilized can provide an ideal setting for improved prison health TB interventions. TB programs can take advantage of the nature and structure of the prison environment to provide better care of TB treatment as compared to the general population.

In Tanzania, to ensure that prisoners have the opportunity to receive the same health service as the general population, prisons health service is run by the Ministry of Home affairs but in collaboration with the Ministry of Health and Social Welfare. There is strong collaboration between the NTLP and the prison health care workers.

1.3 Problem statement

TB remains a major global health problem whereby it is the second leading cause of death (after HIV) from infectious diseases worldwide. In 2010, it has been reported that about 9 million people developed tuberculosis globally and about 1.4 mil deaths have been reported of which African region contributed to about 26% of all deaths due to TB [17]. Tanzania ranks 18th out of 22 highest TB burden countries in the world[1,2].

The TB burden is considered to be higher among prisoners. It is documented from other studies that most prisoners come from a high risk segment of the population where there is high prevalence of infectious diseases; therefore rate of importation of the infection into the prison facilities is considerably high[29].

Several risk factors for TB have been documented including long prison stay, low Body Mass Index(BMI), overcrowding, previous TB treatment, cough of more than or equal to two weeks and loss of appetite[29]. Others include poor nutrition, HIV infection, and duration of incarceration.[30]

Although there is rich amount of information on the state of prison health around the world, in East Africa and specifically Tanzania the magnitude of PTB and associated factors in prisons are largely unknown. The NTLP in Tanzania produces quarterly and annual reports on TB notification consistently but the reports do not provide information on special high risk groups like prisoners or the risk factors for TB. In addition, provision of systematic data on the magnitude of TB in the prison community is lacking in the country TB reporting system.

This study will therefore determine the magnitude and identify the factors contributing to transmission of TB in the prisons and give recommendations to the NTLP and the prison health services. Moreover, the results may serve as a baseline data on the prevalence of and factors for pulmonary tuberculosis among prisoners as well as a guide to other researches in the future.

1.4 Rationale for the study

There are several reasons why it was important to conduct this study among prisoners in Tanzania. Today, tuberculosis remains one of leading causes of death in many poor and developing countries. It is estimated that one third of the world's population is infected by *M. tuberculosis*[15]. The disease has been declared by WHO that it is a global emergency as it is out of control in many parts of the world. Globally about 9 millions cases have been reported of which 1.4 millions are deaths. Tanzania ranks 18th out of 22 highest TB-burden countries in the world[1,2]. In the year 2010, about 63,450 cases of all types of TB notified of which out of those 1,249(5.2%) died during treatment. Of importance is also its prevalence is higher among prisoners, which also poses a threat to control efforts of NTLP towards the control of TB in Tanzania.

This study will generate new information on the current magnitude of TB among prisoners as well as factors associated which will lead to ultimately to re- designing of the existing special programs for infectious disease prevention among vulnerable groups like prisoners . As prisoners ultimately, go back to their communities, any strengthening of the quality of care in prisons will in the end promote public health. The linkage could also assist in the follow up of patients and their treatments thus avoiding the dangers of Multiple Drug Resistant (MDR) TB. Moreover, the assessment of the magnitude will provide guidance on proper evaluation of services and health planning for the prison health services by both ministries responsible for health and the prison affairs.

1.5 Research questions

1. What is the prevalence of PTB among prisoners in Dar es Salaam?
2. What are the socio-demographic factors associated with PTB?
3. What are the health-related factors associated with PTB?
4. What are the lifestyle factors associated with PTB in the prison?
5. What are the system factors associated with PTB in the prison?

1.6 Objectives

1.6.1 Broad Objectives

To determine prevalence of PTB and factors associated with transmission among prisoners in Segerea prison in Dar es Salaam

1.6.2 Specific Objectives

1. To determine the prevalence of PTB among Dar es Salaam prisoners
2. To assess socio-demographic factors associated with PTB including age, sex, educational status, marital status, and occupation
3. To assess health related factors associated with PTB including nutritional status (BMI) and HIV Status.
4. To assess lifestyle factors associated with PTB in the prison including smoking, alcohol consumption, and addictive drug use, previous history of TB, TB contact and duration of incarceration.
5. To determine the system factors associated with PTB in the prison including Overcrowding, prisoners transfers and TB contact in prison

CHAPTER TWO

2.0 Literature Review

In the literature, TB transmission within the prison system has been well documented. Of recent, TB among prison populations has received increased attention by researchers due to the transient rising incidence of TB in the late 1980s in the United States and other countries due to increased TB services and also the disease been fuelled, in parallel, by the emerging HIV epidemic[15,38,39]. The DOTS strategy which was initiated in early 1990s has been the driving force towards broad international consensus on how to prevent and treat TB which has been documented to be very effective in different settings. One of the objectives of the Stop TB Strategy is to protect vulnerable populations from TB, HIV and drug-resistant TB[1,3].

It was until recently that prison health has been given attention and currently there is a bulk of recent publications and articles have focused on the TB situation in prisons in other regions apart from Sub-Saharan African countries where some countries have some limited data.[35] According to the study done in Zambia to study access to HIV and TB prevention and treatment, and denial of human rights in Zambian prisons, it was revealed that there were some disparities in accessibility to health services where by juveniles, female prisoners, pre-trial detainees and immigration detainees significantly less likely to access health services[40].

2.1 Prevalence of TB

People who are in closed communities such as prisoners are at high risk for tuberculosis and case rates are 5-10 times the general population[7,30,41]. In countries of the former Soviet Union the incidence rates of TB in prison was extremely high in the world whereby in one study in Russian and Georgia the prevalence was found as high as 4,560/100,000[42] and 5,995/100,000[43] respectively. In Karachi central jail, Pakistan the prevalence was as high as 3.8 times higher than the general population. In the same study the incidence of TB the prison was a high as 657 per 100,000.[44] In Thailand the prevalence of smear positive TB was as high 354.8/100000[45].

In Western Europe the incidence rates in Turkey and France were as high as 341/100,000[46] and 215/100,000[30] respectively while the data from South America in Brazil the prevalence was recorded as high as 2.5%[25]. Earlier other studies done in Asia aiming at determining the prevalence of TB infection and disease in prison population showed a wide range of the prevalence rates. In Pakistan a study done in Karachi Central Prison indicated that pulmonary tuberculosis incidence was a high as 657 per 100,000, a rate which is 3.75 times higher than general population[44].

In Africa there is a wide range of the rates of TB reported from various countries in their prison populations as it was studied in Zambia and Botswana, 4%[47][48] in Nigeria 2.4%,[28]) Uganda 10%[34], Malawi 5%[33], and Cameroun 3.5%[25]. In Malawi through a cross-sectional cell-to-cell survey done in Prisons to determine the period prevalence of smear-positive pulmonary tuberculosis (PTB); the prevalence for smear positive PTB was 0.7%[50], and in Ethiopia the prevalence was seven times higher than the general population.[37]. In PTB case-finding survey done among Prisoners in Central Prison of Yaounde, Cameroon, an unacceptably number of undetected PTB cases was noted and on TB screening about 1.2% were identified with PTB the cases that had been missed by the prison TB control programme[29].

In Tanzania, the prevalence was within the ranges found in other countries as it was found in a study done in Mbeya prisons using sputum microscopy and Gene-Xpert as laboratory investigations which reveled the point prevalence of 2.3%[52]. Currently, gene Xpert though it showed very promising results in Mbeya study, it is available in the country in a very few facilities and mostly under special programs or for research purposes.

In the year 2010, the Tanzanian NTLP surveillance data shows that about 39.0% of all new cases notified from the general population were smear-positive positive[22]. Similar findings were noted in the study done in 1994 whereby among cohort TB prisoner patients attended in Bugando Hospital in Mwanza, 40.7% had open smear positive type[53].

2.2 Predictors for transmission of TB

Health problems in prison, such as TB, are the result of a complex interaction between various factors which needs to be explored as a means of response to the infectious diseases as a whole. Multiple factors fuel the transmission of TB, HIV and other infectious diseases within prisons. The main reason for the high risk for Mycobacterium tuberculosis infection and active TB disease in prisons is the disproportionate number of inmates who have factors for exposure to the organism.

Literature shows that the risk factors for PTB in prisons are almost identical across all regions of developed and developing world. The common risk factors associated with PTB documented include severe crowding, poor nutrition, HIV infection, previous TB treatment and duration of incarceration.[29][30] Others include size of the prison population, government commitment and structure, duration of incarceration, gender and age[44].

Studies have shown that there are some variations between continents, countries and prisons as it was documented in various studies cited below. In Russia through a case control study utilization of raw milk, unemployment, poverty, overcrowding, illicit drug use, living with a relative with tuberculosis, and imprisonment were the identified risk factors[54]. In the same country but in a different prison the St. Petersburg, the risk factors among the detainees included narcotic drug use, low income, high ratio of prisoners per available bed, not having own bed clothes, and little time outdoors[55]. In Jeddah Saud Arabia, a study on the risk associated with tuberculosis in a prison, revealed the common risk factors being overcrowding, time spent in prison, diabetes mellitus and smoking[56]. A similar study in Barcelona showed that lengthy incarcerations and delays in identifying inmates with pulmonary symptoms were among the determinants towards TB transmission in Prison[57]. In Italy through a multicentre cross-sectional study it was noted that poor ventilation and unhygienic conditions, high mobility of inmates and inadequacy of TB control measures were the risk factors for increased PTB transmission the prisons[58].

Overcrowding has been the commonest challenge observed in prisons in many regions as it has been reported from several studies. Overcrowding has been mentioned by almost all the countries from Africa and elsewhere as it has been in Zambia[40] and Cameroon[35]. In Cameroun it is reported that the prisons are crowded such that one inmate occupies a surface area of less than $0.20m^{2.}$ [29]. In South Africa, very high rates of overcrowding up to 230% was observed in a study done to estimate the current TB transmission probability within prison cells[51].

Long prison stay has previously been associated with increased risk in TB transmission as it has been documented in several studies done in New York whereby one year of incarceration doubled the probability of developing active TB[59]. In Russia there was an increased transmission with incarceration for two years or longer as compared to those who remained in prison for less than one year[54]. A study in Botswana reported by MMRW among the risk factors included incarceration for more than 6 months[48]. However, contradicting findings were found in Nigeria whereby the duration of imprisonment did not influence the rates of infection, and in Cameroun, shorter duration of staying in the prison (less than or equal to 12 months) was found a risk factor[35].

In some countries prisoners have been reported to live under unhealthy environments and therefore suffer from malnutrition, intense psychological and physical stress[15,60]. In a study done in Brazil to study the nutritional status among prisoners, it was found that 10.2% the inmates had a BMI lower than 20 kg/m2 which is below the mean BMI in the general population of 24.4 ± 4.2 kg/m2. Several other studies have indicated low BMI as a risk factor for TB transmission as it was found in Camerooun Central Prison[35]. Other factors documented include but not limited to; young age, urban residence, having a cough for more than 4 weeks, and sharing a cell with a TB patient or a prisoner with chronic cough as it was documented in a study from Ethiopia[36].

2.3 TB and HIV

There is connection between prison conditions, tuberculosis, and HIV transmission[23]. People who are living with HIV have about 37 times more risk to develop TB than people who are HIV-negative[61][62]. According to WHO global TB reports 2011, it is estimated that about 13% of TB cases occur among people living with HIV[1]. There are several medical and scientific challenges associated with co infection between TB and HIV including difficulties in diagnosis of TB in HIV infected patients, infection control and managing the co toxicities between the drugs used in both diseases[63]. There is greater possibility of sputum examination being negative among PTB patients who are HIV positive which obviously results into under-diagnosis of sputum smear-positive PTB and over-diagnosis of sputum smear-negative PTB[2,6]. In 2009, TB accounted for one in four deaths among HIV-positive people. Yet TB is, in most instances, a curable disease[1,14].

Prisoners are considered as a population at high risk for both TB and HIV. Prisoners' immune systems can be affected by multiple factors that can make them more vulnerable to becoming ill with multiple diseases such as TB and HIV. These factors include but not limited to harsh conditions, physical stress, violence, unhealthy environments and uncertain and deteriorated family relationships[7]. It is recommended that HIV testing should be routinely offered along with sputum examination for AFB in HIV-prevalent settings for patients presenting with clinical features suggestive of TB[15,22,63].

The surveillance data for the general population in Tanzania calculates that in the year 2010, about 38% of all forms of TB patients were HIV co infected[22] which is much lower compared to the rates observed from the prison population Mbeya study; 70% of inmates being HIV co-infected[52]. An earlier hospital based study done in Bugando, Mwanza among prisoners admitted with TB using retrospective data, 25.9% of patients had both TB and HIV infection[53].

CHAPTER THREE

3.0 Methodology

3.1 Study area

The study was conducted in Segerea Prison, one among the four prisons that exist in Dar es Salaam city Tanzania. The other prisons in Dar es Salaam include Ukonga, Keko and Wazo. Segerea prison was selected among the other prisons due to its uniqueness in the nature of the composition of the inmates housed by the prison. It is the only facility that houses both males and females and moreover houses both remanded and sentenced prisoners thereby it is ideal to have a variety of factors than can be assessed for the association with PTB. The prison also houses the highest number of prisoners as compared to other prisons in Dar es Salaam and countrywide. It was build to accommodate 900 prisoners but currently houses an average of 1893 prisoners. There are 17 prison cells which house males and five for females. The prison has a dispensary which is mainly an outpatient clinic lead by an assistant medical doctor. In this prison there is no routine pre entry screening for TB, however patients who present to the clinic with symptoms suggestive of TB are investigated through other higher level health facilities with TB diagnostic capacity. Patients diagnosed with TB are initiated treatment under DOT nurse stationed at Segerea and in addition, the patients are kept in isolation at TB prison cell number 17. The dispensary has HIV counseling and testing services. In addition there are peer health educators among the prisoners to give health education and sensitize others to seek health services.

Segerea is in the city of Dar es Salaam which is located in the Eastern Coast shore of Tanzania at $6^0 48'$ south, $39^0 17'$ East and is the largest commercial centre in the country. The city borders with Coast Region in the North, West and South while to the East, the Indian Ocean. Total surface area of Dar es Salaam is 1,397 square kilometers. According to the 2002 National population and housing census; Dar es Salaam had a total population of 2,487,288

people. An average annual growth rate was 4.3 percent. In 2010 it was estimated to have 3.1 million people.[65]

The city has three local government areas or administrative Municipals namely Kinondoni to North, Ilala occupying the city center and Temeke to the South of the city. Segerea prison is located in Ilala Municipal but it houses prisoners from all the three municipals and sometimes outside the city. Dar es Salaam city constitute the highest burden of TB in the country occupying 21.2% of all the reported TB cases in 2010. Due to this high burden of TB cases Dar es Salaam, according the NTLP it is divided into four "NTLP regions" namely Ilala 1, Ilala 2, Temeke and Kinondoni. The NTLP regions are further subdivided into "NTLP districts" coordinated by District TB and Leprosy coordinators (DTLCs).

3.2 Study design

The study design was a cross sectional analytical conducted from December 2012 to February 2013 at Segerea Prison.

3.3 Study population

The study population comprised of prisoners aged 18 years and above who were residing in Segerea prison in Dar es Salaam during the study period.

Inclusion criteria:

- Any prisoner 18 years and above residing in Segerea prisons in DSM regardless of duration of incarceration
- Ability to give informed consent

Exclusion criteria:

- Any prisoner with language barrier (can not communicate in Kiswahili or English)

3.4 Sampling procedure and sample size

Sample size calculation was done using the prevalence of TB found previously in Tanzania among the prisoners. From an unpublished study done in Mbeya prisons Tanzania TB prevalence was 2.3%[52]

3.4.1 Sample size calculation

Using the formula: $\mathbf{n = \frac{Z^2 p(1-p)}{\varepsilon^2}}$ where,

z= standard normal deviate that corresponds to some significance level (e.g. if the significance level is set at 0.05, then z=1.96).

p = Expected prevalence of PTB in the study population.

ε = margin of error on p, Let's assume the ε= 1.5% = 0.015

Substitute the numbers: $n = \frac{1.96^2 X 0.023(1-0.023)}{0.015^2}$ = **384**

Additional 20% of the sample size was added to take care of non-participation; hence the desired sample size, n = **460**

3.4.2 Sampling procedure:

The study population was stratified by sex and prison cell to get proportional representation of both sexes and by prison cell. The list of names for all prisoners by sex and prison cell was obtained. Sampling with Probability Proportional to Size (PPS) procedure was used to select the individuals from each group. The study population (all prisoners) at Segerea was 1,488 prisoners of which females constituted 10.3% which is equivalent to 152 prisoners. According to the required samples size of 460 and the gender proportions a total of 47 females and 413 males were sampled (fig. 2). The proportions of individuals sleeping in different cells were calculated and the number of participants to be sampled from each cell

was calculated accordingly (Table 1). Systematic sampling technique was used to select the individuals from each prison cell by selecting every 3rd prisoner from the lists.

Fig. 2: Sampling of the study population at Segerea prison

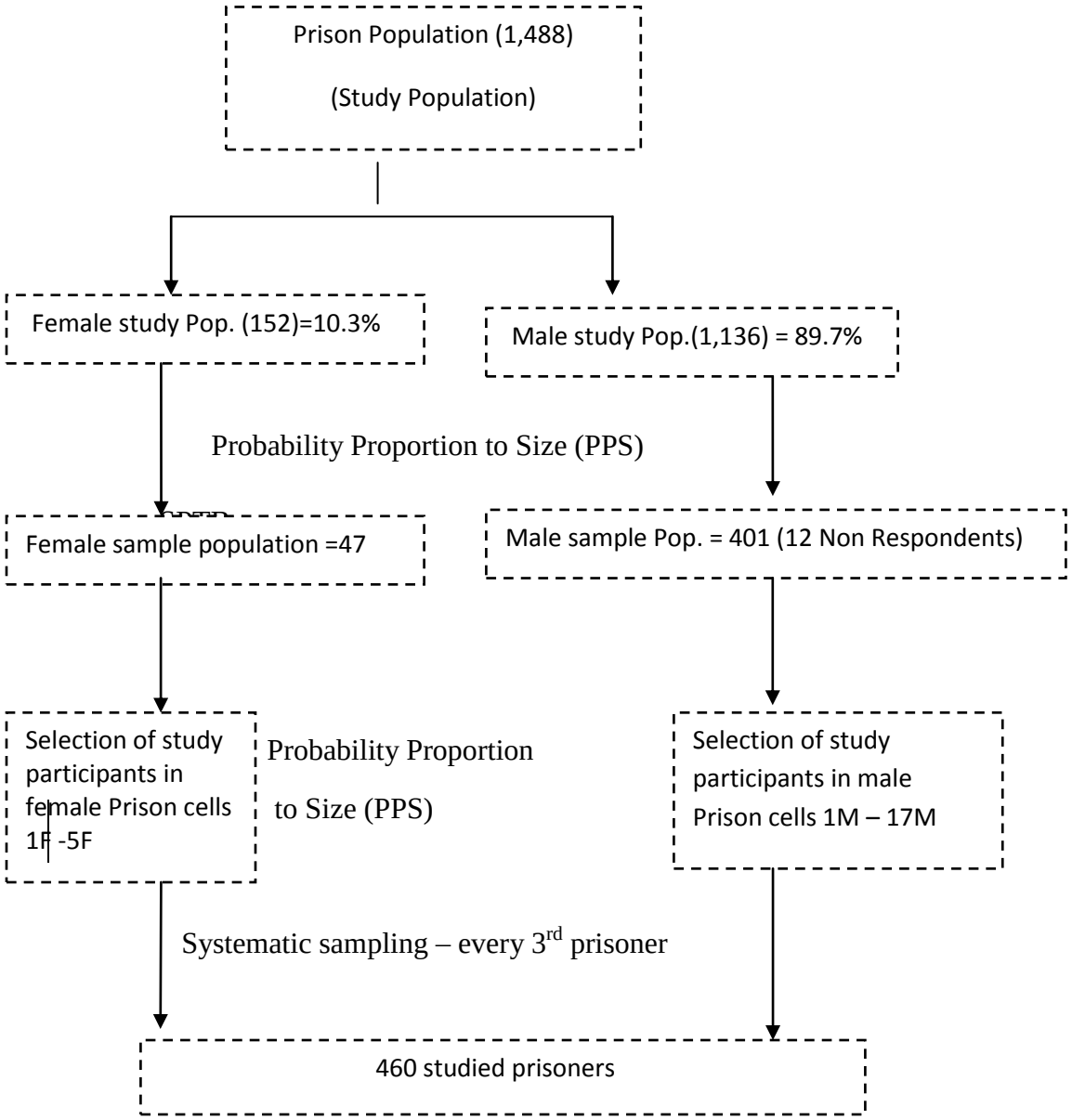


Table 1: Sampling with probability Proportional to size of study population from the prison cells

Prison Cell No.	Study Population of the prison cell	Sampled population from each cell
1M	95	30
2M	165	52
3M	61	20
4M	90	19
5M	150	48
6M	174	56
7M	17	5
8M	60	20
9M	98	33
10M	137	44
11M	83	26
12M	12	4
13M	59	16
14M	13	4
15M	54	16
16M	50	15
17M	18	6
1F	15	3
2F	36	10
3F	25	8
4F	25	8
5F	54	17
Totals	**1488**	**460**

3.4.3 Definition of terms used in this study

- **Pulmonary TB case:** A prisoner with two sputum smear positive for acid fast bacilli or on TB treatment basing on diagnosis of PTB as evidenced from the TB treatment card.

- **Smear positive PTB case:** –A prisoner with two smear examinations positive by direct microscopy for AFB

- **Spot Sputum:** Sputum specimen provided by the respondent at the time of attendance or interview

- **Prisoner: A**nyone held in criminal justice or correctional facilities during the study period. It included all categories of prisoners whether sentenced or still in remand.

- **Words used interchangeably in this study:**

  -Inmates and Prisoners

  -Incarceration and imprisonment

  -Convicted and sentenced prisoner

3.5 Data collection tools

Data collection tools included structured questionnaires and laboratory request forms for sputum examination and HIV test. The questionnaire was formulated in such a way that the measure accounted for all the elements of the variables, which were TB sputum, HIV results, BMI, and other predictors to ensure content validity. The questionnaire contained closed-end questions which were developed in English then translated to the local language Kiswahili which is spoken by most of the prisoners. The questionnaires were re-translated back to English to check if they would still give the same meaning as the initial English version. Pre-testing of the questionnaire with a selected sample of the target population was done prior to

conduct of the actual main study to see if the questions were clear and gave valid information and finally necessary adjustments or corrections of the tools were done accordingly.

3.6 Data collection procedure

Research Assistants (RAs) were recruited from the prison medical staff who are familiar with prison regulations so as to enhance accessibility into the prison. Three nurses one trained on HIV counseling and testing were involved as RAs. Two clinicians experienced in managing TB patients were also involved as RAs to conduct the interviews and supervise sputum collection. Two lab personnel were deployed to deal with the sputum microscopic examination at Muhimbili TB Laboratory. Training of the research assistants was conducted before the data collection process in order for them to familiarize with the data collection tools and study methodology. This initial exposure helped to improve data quality.

Recruitment of the study participants:

All sampled inmates were invited into the study regardless of duration of incarceration. Once selected for participation, each person was provided with a document containing a complete description of the study and consent forms. They were given enough time to read themselves, understand the description and the consent form and if they consented they were requested to sign the form. In case one was not able to read or write, the consent was presented orally in front of a witness proposed by the respondent. In case whereby the inmates opted not to participate into the study; additional subjects were invited to participate to replace them in order to achieve the desired sample size. Participation status was identified and recorded for estimating response rates.

3.6.1 Interviews, case ascertainment procedure and laboratory investigations

All participants were interviewed each individual privately using a structured questionnaire which included questions on social-demographic characteristics, past and family history of TB and other factors associated with PTB. Each questionnaire was identified by both the name of the respondent and an ID number assigned serially as they were being interviewed. After the interview measurement of weight (kg) and height (m) was taken for BMI

calculation. The body weight was determined using an adult balance and standing height was determined by letting individual to stand in front of a pre marked board with a scale. BMI was defined as weight in kilograms(kg) divided by height in meters squared (m^2) was calculated for each participant and the nutritional status was determined using categories of BMI as recommended by WHO. Participants who were on tuberculosis treatment during the time of interview were requested to show a TB patient treatment card for evidence that they were still on TB treatment and ascertain the type of TB. These patients already on TB treatment were counted as prevalent PTB cases even if their sputum turned negative for AFB. Patients who were found with other clinical features not related to TB were referred to the prison health facility for management.

After the interview, each participant was asked to produce two sputum samples; one on the spot and another one on the next day according the NTLP manual for Health Workers.[15][66] A sputum container with a wide mouth was provided so that the patient can expectorate easily inside the container without contaminating outside. This procedure was done under the RA supervision to avoid risk of transmission to others or contaminating the environment. The second sputum sample was collected in the next day at around 5 a.m under the supervision of the RA who had to be among the prison staff. The sputum samples were linked to the questionnaires through labeling with their corresponding names and ID numbers. Sputum samples were transported on the same day to TB reference laboratory at Muhimbili National Hospital for examination. The identification of tubercle bacilli microscopically was done by smears using the Ziehl-Neelsen staining method. This test has a reasonable diagnostic yield of about 40 % in non-cavitary and up to 80 % in cavitary disease. Individuals with at least 2 positive smear results were diagnosed as sputum smear-positive active pulmonary TB cases while the ones with discordant sputum results between the first and second sputum samples were considered as PTB negative but were referred to the health facility for further investigations.[67] All prisoners found positive for AFB were immediately presented to the District TB and Leprosy Coordinator (DTLC) for initiation of TB treatment.

All the prisoners selected for the study were offered HIV counseling and if consented, HIV testing was done using rapid test in accordance with the recommendations of the National TB/HIV policy guideline.[64] Those respondents who were sampled but denied HIV testing after counseling were included in the study without HIV test. HIV antibodies were detected using two rapid tests: Determine (Determine® HIV-1/2) and the positive cases were subjected to Unigold. When the two tests were positive, the inmate was considered positive for HIV. None of the cases in this study had discordant results, but in case there was any the plan was to use Western blot technique for confirmation.

3.7 Variables

3.7.1 Dependent variable

Diagnosis of Pulmonary Tuberculosis

3.7.2 Independent variables

- **Social-demographic factors:** Age, Sex, educational status, marital status and occupation.
- **Health related factors:** Nutritional status (BMI), HIV Status and previous history of TB treatment.
- **Lifestyle factors**: - Smoking, alcohol consumption, addictive drug use, live with TB patient, duration of incarceration.
- **System factors**: Overcrowding, transfer in from other prisons, TB contact in prison.

3.8 Data management

3.8.1 Data quality:

The filled questionnaires were checked for completeness before by the investigator at every end of the day. Daily data validation and completeness was ensured at field site and discussion with research assistants every evening after field work was done.

3.8.2 Data entry

Data entry and analysis was done using Epi info 3.5.1. Data checks were instituted. Data cleaning was done by running frequencies and cross tabulations to check for errors in data entry.

3.8.3 Data analysis

Statistical analysis focused on estimating the prevalence and identifying the risk factors for TB transmission among the prisoners. A "prevalent case" was defined as an individual who was on TB treatment or had two sputum positive for AFB. Continuous variables were reported using means and standard deviations while categorical data were reported as whole numbers and percentages. The Chi square test or Fisher's exact test was used to compare proportions.

Odds ratio and 95% confidence intervals were calculated to ascertain the presence of association between PTB as a dependent variable and various independent or explanatory variables. A difference was considered significant if $p<0.05$, or the 95%CI does not contain the hypothesized values. Variables found to be associated with PTB with $p<0.25$ value were re-examined under multivariate analysis using logistic regression to control for the confounders and assess the adjusted relationship between PTB and the associated factors.

3.9 Ethical consideration

Ethical clearance was obtained from MUHAS Institutional Review Board and publication committee. This ethical clearance was used to obtain permission from the MoHSW to contact prisoner officials under the Ministry of Home affairs.

A written consent was obtained from every respondent after explaining the purpose of the study and assured on confidentiality of information obtained from the study. For those individuals who were illiterate, a combination of recording and oral presentation in front of a witness who is not affiliated with the study and chosen by the respondent was performed.

Two Written documentation of consent forms were obtained and a copy was provided to the respondent.

Participants were assured of the confidentiality of the information and laboratory investigation results and that their participation in the study was voluntary and they were free to withdraw without any negative impact.

The participants' names were maintained for treatment purposes only for those patients diagnosed with TB and/or HIV. Prisoners who were diagnosed with TB were referred to the prison health facility for initiation of TB treatment according to the NTLP protocol. Those who were found HIV positive were referred to CTC for further management according to the WHO clinical stage of the AIDS.

CHAPTER FOUR

4.0 Results:

4.1 Characteristics of the study participants

This study recruited a total of 448 out of 460 prisoners who were sampled from Segerea prison, making a response rate of 97.4%. The respondents were predominately young whereby more than three quarters 351(78.3%) were at the age below 38 years with the youngest respondent being 18 years and oldest 68 years (median age was 31 years).

Table 2 summarizes the socio-demographic characteristics of the study population. Males formed 401(89.5%) of the study population. About 380(84.5%) were remanded prisoners, the rest were sentenced prisoners. Of the 448 study respondents interviewed, 194(43.3%) had stayed in the prison for less than one month. In regards to educational level more than two thirds, 313(69.9%) had attained primary level education and below or no formal education.

Table 2: Distribution of the study population according to socio-demographic characteristics (n=448)

Characteristics	No.	%
Sex		
Male	401	89.5
Female	47	10.5
Age groups		
18-28	191	42.6
29-38	160	35.7
39+	97	21.7
Marital status		
Single	186	41.5
Married	219	48.9
Co habiting	19	4.2
Ever married (widows and divorced)	24	5.4
Level of Education		
Below Primary	56	12.5
Primary	257	57.4
Secondary and above	135	30.1
Pre imprisonment Occupation		
None	24	5.4
Daily labourer	96	21.4
Employed	158	35.3
Self Employment/business	170	37.9
Duration of Imprisonment		
< 1 month	194	43.3
1- 6 months	138	30.8
Above 6 months	116	25.9
Imprisonment status		
Remanded	380	84.8
Sentenced	68	15.2

4.2 Prevalence of PTB

Out of 448, 16 had PTB making an overall prevalence of PTB of 3.6% (95%CI=2.1-5.9). Among the prevalent cases, 3(19%) were females while the rest 13(81%) were males. Six

(37.5%) of the prevalent cases were already on TB treatment at the time of data collection. Table 3 shows the prevalence of pulmonary TB according to socio-demographic characteristics.

Table 3: Prevalence of pulmonary TB according to socio- demographic characteristics

Characteristics	Number (n=448)	PTB +	Prevalence(95%CI)
Sex			
Male	401	13	3.2 (1.8-5.6)
Female	47	3	6.4 (1.3-17.5)
Age groups			
18-28	191	6	3.1 (1.2-6.7)
29-38	160	6	3.8 (1.4- 8.0)
39+	97	4	4.1 (1.1-10.2)
***Marital status**			
Unmarried	186	10	5.4 (2.6-9.7)
Married	262	6	2.3(0.8-4.9)
Level of Education			
Below Primary education	56	5	8.9(3.0-19.6)
Primary	257	8	3.1(1.4-6.0)
Secondary and above	135	3	2.2(0.5-6.4)
****Pre-imprisonment occupation**			
Unemployed	120	10	8.3(4.1-14.8)
Employed	158	2	1.3(0.2-4.5)
Self Employment/business	170	4	2.4(0.6-5.9)

*For marital status, single were classified as 'unmarried' while those who have ever got married (married, cohabiting, divorced and widowed) were classified as 'married"

** Respondents who had no any form of stable employment (reported none and daily labourers) were grouped as 'unemployed'

The prevalence of PTB was highest among the oldest age group 39 years or more (4.1%). As with the level of education, it can be seen that the predominant group was the least educated below primary level education had the highest PTB proportion (8.9%). The prevalence of PTB was high for the unmarried; 5.4% (95%CI=2.6-9.7). The prevalence of PTB in the unemployed group was higher 8.3% (95%CI= 4.1-14.8) than among the employed and self employed respondents.

Table 4 summarizes the prevalence of PTB by smoking, drinking and drug use habits prior to imprisonment.

Table 4: Prevalence of PTB according to lifestyle factors (n=448)

Characteristics	Number	PTB +	Prevalence	95%CI
Duration of smoking				
None-smoker	231	4	1.7	(0.5-4.4)
5 years and below	123	1	1.1	(0.0-5.8)
Above 5 years	94	11	8.9	(4.5-15.4)
No. of cigarettes/day				
None	231	4	1.7	(0.5-4.4)
5 or less	147	1	1.4	(0.0-7.7)
Above 5 cigarettes	70	11	7.5	(3.8- 13.0)
No. of Drinking days/week				
None	172	5	2.9	(1.0-6.7)
Below 7	128	5	3.9	(1.3-8.9)
Everyday	148	6	4.1	(1.5- 8.6)
Duration of addictive drug use				
Never used	366	4	1.7	(0.5-4.4)
5 years or less	35	1	2.9	(0.1- 14.9)
Above 5 years	47	11	10.6	(3.5-23.1)

The prevalence of PTB was high for prisoners who are cigarettes smokers and have smoked for more than five years; 8.9 % (95%CI=4.5-15.4), alcohol drinkers who drink every day; 4.1% (95%CI=1.5- 8.6) and for those who have used addictive drugs for more than five years; 10.6 %(95%CI=3.5-23.10).

Table 5 shows that the prevalence of PTB according to health and prison system factors. PTB prevalence was high among respondent with positive HIV status; 17.6 %(95%CI=6.8-34.5)0, and among those with BMI<18.5g/m^2 ; 15.1%(95%CI=6.7-27.6). Additionally the prevalence of PTB was high among respondents who had stayed for less than one month; 5.2%(95%CI= 2.5-9.3) and for those with history of living with a TB patient in the family; 9.4%(95%CI=4.2-17.7).

Table 5: Prevalence of PTB according to health and system related factors (n=448)

Characteristics	Number	PTB +	Prevalence(95%CI)
HIV status(n=441)			
Positive	34	6	17.6(6.8-34.5)
Negative	407	10	2.5(1.3-4.6)
Nutritional status			
Underweight(BMI <18.5)	53	8	15.1(6.7-27.6)
No underweight (BMI>= 18.5)	395	8	2(0.9-4.1)
History of TB contact in the family			
Yes	85	8	9.4(4.2-17.7)
No	363	8	2.2 (1.0-4.5)
History of TB contact in Prison			
Yes	70	6	8.6(3.2-17.7)
No	378	10	2.9(1.5-5.4)
Previous history (within one year) of TB			
Yes	25	7	28(12.1-49.4)
No	423	9	(1.0-4.1)
Overcrowding in prison			
Yes	391	12	3.1(1.7-5.4)
No	57	4	7.0(1.9-17.0)
Duration of imprisonment(Months)			
Less than 1	194	10	5.2(2.5-9.3)
1- 6	138	3	2.2(0.5-6.2)
More than 6	116	3	2.6(0.5-7.4)
Past History of imprisonment			
Yes	51	2	3.9(0.5-13.5)
No	397	14	3.5(2.0-6.0)
Transfer in from another prison			
yes	37	2	5.4(0.7-18.2)
No	411	14	3.4(1.9-5.8)

4.3 Factors associated with PTB

Factors associated with PTB were categorized into four major groups including social-demographic, health related, lifestyle and prison system related factors. The social demographic factors include age, Sex, educational status, marital status and occupation, while health related factors included nutritional status (BMI), HIV Status and previous TB treatment. Respondents who were single were regarded as 'unmarried' while any other marital status (married, cohabiting, divorced and widows) was regarded as 'married'. The lifestyle factors included smoking, alcohol consumption, addictive drug use, live with TB patient and duration of incarceration. Lastly the prison system factors included overcrowding, transfer in from other prisons and TB contact in prison.

Bivariate analysis

Bivariate analysis was used to assess crude association between various factors and PTB. Table 6 shows the results of bivariate analysis with the crude ratios. Respondents who had previous history of suffering from TB were 17.9 more likely to have PTB than those who denied such history (OR=17.9, 95%CI= 6.0- 53.5). Concerning association between PTB and HIV status, those respondents who were HIV positive were 8.5 times more likely to have PTB than the HIV negative group (OR=8.5, 95%CI=2.9-25.1), likewise those who had BMI less than 18kg/m^2 were 8.6 more likely to suffer PTB than those with higher BMI (OR=8.6,95%CI=3.0-24.0). Additionally, prisoners who had stayed in the prison for one month or more were less likely to suffer PTB than the group that has stayed for less a month (OR= 0.3, 95%CI=0.08-0.9). Respondents who had no any kind of employment or were daily labourers were 4.9 more likely to suffer PTB than those who were employed or self employed (OR=4.9, 95%CI=1.6-16.7).

On smoking, respondents who reported smoking cigarettes were 3.3 times more likely to be PTB positive than those reported not to smoke (OR=3.3,95%CI=1.1-10.4) and among smokers, those who smoke more than 5 years were 9.1 times more likely to be suffer PTB compared to those who have been smoking less than 5 years (OR=9.1,95%CI = 1.2-72.1). We

found that the risk of developing PTB was 4 times higher among addictive drug users than those who have not been using the drugs (OR=4.0,95%CI=1.3-10.1). There was no significant association between drinking alcohol before imprisonment and PTB (OR=1.4, 95%CI = 0.5-4.1), likewise overcrowding in the prison cells (OR=0.4, 95%CI=0.1-1.9).

Several other factors which were found not to have a significant association with PTB included age more 30 years (OR = 1.7, 95% CI = 0.6- 4.8), being a female (OR= 2.0, 95%CI= 0.5-7.4), unmarried (OR=2.4, 95%CI=0.8-6.8). Others included; transfer in from another prison (OR=1.6, 95%CI= 0.17-7.5, and past history of imprisonment (OR= 1.1, 95%CI=0.1-5.1).

Table 6: Bivariate analysis of factors associated with PTB in the prison (n=448)

Factors	Categories	Total studied	PTB +ve n (%)	cOR	95%CI
Age	Above 30	222	10 (62.5)	1.7	0.6- 4.7
	18 – 30	226	6(37.5)		
Sex	Female	47	3(18.7)	2	0.4-7.8
	Male	401	13(81.3)		
Marital status	Unmarried	186	10(62.5)	2.4	0.8-6.8
	Married	262	6(37.5)		
Pre imprisonment Occupation	Not Employed/Laborer	120	10(62.5)	4.9	1.6-16.7
	Employed/self-employed/Business	328	6(37.5)		
Previous TB history	Yes	25	7(43.8)	17.9	6.0- 53.5
	No	423	9(56.2)		
Nutritional status	Underweight (BMI < 8.5kg/m^2)	53	8(50.0)	8.6	3.0-24.0
	No Underweight (BMI > =18.5kg/m^2)	395	8(50.0)		
HIV Status (n=441)	Positive	34	6(37.5)	8.5	2.9-25.1
	Negative	407	10(62.5)		
Cigarette Smoking	Yes	217	12(75.0)	3.3	1.1-10.4
	No	231	4(25.0)		
Duration of smoking(217)	Above 5 years	123	11(91.7)	9.1	1.2- 72.1
	5 years and below	94	1(8.3)		
History of Drug use	Yes	83	7(43.8)	4	1.3-10.1
	No	365	9(56.2)		
Overcrowding (Area/person <3m^2)	Yes	391	12(75.0)	0.4	0.1- 1.9
	No	57	4(25.0)		
Duration of Imprisonment	Above one month	232	4(25.0)	0.3	0.08- 0.9
	1 month and below	216	12(75.0)		
Live with TB patient in the family	Yes	85	8(50.0)	4.6	1.7- 12.7
	No	363	8(50.0)		

4.3 Multivariate logistic regression analysis:

Further analysis with logistic regression was done to identify the factors that are independently associated with PTB. Five factors that emerged to be predictors of PTB among prisoners are as shown in Table 7.

Table 7: Multi- variate analysis of factors independently associated with PTB among prisoners in Segerea Prison after logistic regression

Variable	Number	Exposed to the factor	PTB +ve	PTB -ve	cOR	AOR	95% CI
HIV infection	441	34	6	435	8.5	6.7	1.72- 26.12
Previous history of TB	448	25	7	441	17.9	5.9	1.5- 22.69
Smoking More than 5yrs	217	94	11	206	9.1	4.54	1.30- 15.90
Underweight (BMI<18.5)	448	53	8	440	8.6	4.75	1.34- 16.8
Unemployed	448	120	10	138	4.9	5.56	1.57- 19.67

CHAPTER FIVE

5.0 Discussion

This study aimed at determining the prevalence of PTB among prisoners as well as whether the hypothesized factors are associated with transmission of PTB among prisoners. We found 3.6% prevalence of PTB in Segerea prison, indicating that there is an active transmission of TB among prisoners. We also found from this study that the factors that were independently associated with PTB in the study prison included HIV infection, previous history of TB, smoking cigarettes for more than 5 years, under-nutrition and unemployment. Ten out of sixteen prisoners found with PTB were residing in the prison cells undiagnosed meaning that the existing system of passive search for TB cases is somehow inefficient to prevent importation and transmission of PTB into the prison.

5.1 Prevalence of PTB

This study found that the prevalence of PTB is 3.6% (95%CI=2.1-5.9).This is consistent with other studies done in Tanzania. In the similar study done in Mbeya prisons the prevalence was 2.3% which is comparable to our study findings.[52] These results are also comparable with the other studies done in other countries which showed similar prevalence rates such as South America in Brazil; 2.5%.[25], Cameroun 3.5%,[25] Nigeria 2.4%,[28]), Karachi central jail in Pakistan; 3.9% [44], Zambia 4%[47], Botswana (4%)[48] and Malawi 5.1%.[33] However, higher rates of PTB prevalence have also been reported in Uganda 10%[34] and Ethiopia 10.4[81]. The variation in the prevalence rates in Rwanda and Uganda could be related to the differences in the prevalence of TB and HIV in the countries as well as differences in the various population samples and methodologies used. Moreover, the difference could also be due to type of prisons studied in these countries which might contribute to the prison factors which might have lead to the higher prevalence rates.

Our study did not show any significant association between specific age groups and PTB. In a study done in Pakistan, there was an increasing risk of reactivation of latent TB infection with

increasing age above 42 years [71]. In a study done in Malawi prison, it was found that PTB peaked at the age group 20s to 30s[67]. Our data contain small number of respondents in the age group 39 and above therefore lacks strong evidence to justify this association.

5.2 Factors associated with TB prevalence

Our study observed there was no difference in prevalence of PTB among females and males; although this can be due to the fact that there was smaller number of female population in the study prison as compared to men. However, a similar study done in Malawi prison also found no statistically difference in sputum positivity rates among the males and females.[67] Our study found higher sputum positivity rate among the prisoners who were unemployed, an association which was significant even under logistic regression. Similar results were observed in studies done among prisoners in Zambia[75], Estonia [73] and United States of America[63].

Several studies have associated long prison stay with increased risk in TB transmission as it was documented in studies from New York, [59] Russia, [54] Botswana.[48], Ethiopia[81] It is interesting to note that our study found that staying in the prison for more than one month was a protective factor which concur with findings from Cameroun that shorter duration of staying in the prison was a risk factor.[35] The fact that we found PTB even among those who stayed for a period of a month or less gives an indication that the prisoners entered the prison with the infection and overcrowding as a prison factor was not a main predictor of TB rather than individual factors. This could be contributed by the lifestyle and nature of the population that enters prison and that most come from a high risk segment of the population where there is high prevalence of infectious diseases. The same explanation also could apply to the findings obtained from this study that the PTB prevalence rate was higher in remand prisoners than among the convicted prisoners who are relatively have stayed for longer time than remanded prisoners. Similar findings were observed in Nigerian medium security prison whereby all the prevalent PTB cases were prisoners awaiting trials [29]. The presence of symptoms before entering the prison was not explored in this study but could have added

value to determine the possibility of importation of TB into the prison. This was not part of our objectives but could have supported the recommendations made towards prevention of transmission of TB in prison settings. An alternative explanation to high prevalence of PTB among remanded prisoners and those who have stayed for shorter duration could be that these groups are more exposed to sudden, intense psychological and physical stressful situation due to their ongoing trials which can lead to reactivation of latent TB infection. This also calls for more research on the effects of psychological stress among unconvicted prisoners on their health.

In our study 97% of the respondents had consented for HIV counseling testing which is very high degree of compliance in this closed institution. In this study we found higher prevalence of HIV in prison (7.7%) than the in the general population in Tanzania which was 5.1% in 2011[72]. This higher prevalence among prisoners is expected due to the nature of group which enters prison that is they are the group with high vulnerability to infectious diseases, subjected to drinkers, homelessness and high levels of substance misuse [23, 24]. HIV was also risk factor in TB in this study. It has been shown that Immunodeficiency like in HIV leads to rapid progression from TB infection to disease and increases the risk of re-activation of old infection into active disease. The immune-suppression resulting from HIV could be one of the factors that resulted in the high prevalence of TB in this study population as it was revealed that the prevalence of PTB among HIV positive was significantly higher than among the HIV negative even after logistic regression.

Our TB/HIV co-infection prevalence rate in this study is also in comparison with an earlier hospital based study done in Mwanza, Tanzania among prisoners admitted with TB whereby 25.9% of patients had both PTB and HIV co-infection[53]. The findings of TB/HIV co-infection in Mbeya prison study was 70% which was much higher than our findings. This could be contributed by the additional sputum examination method other than the single microscopy examination method used in our study. In Mbeya, the study used Gene X pert method which has higher sensitivity than the current conventional sputum microscopy

examination. When compared with other countries TB prevalence among HIV infected prisoners in our study was higher than reports from Maryland prison in USA; 1.3% [82] while it was lower than findings of 51% in Kenya[70], 30% in Ivory coast[80] and 47.4% in Ethiopia[81]. These differences could be contributed by differences in HIV prevalence as well as the methods for PTB detection in these respective countries.

Basing on the BMI $< 18.5 kg/m^2$ as a cut off point for under nutrition, the study found 15% of the TB positive prisoners were underweight. This factor showed a significant relationship with PTB in this study on bivariate analysis, a risk factor that remained significant predictor of PTB in a multivariate analysis as well. The same results were observed in other studies including Cameroun Central Prison[35]. However these results should be interpreted with caution because of the bi-directional relationship between tuberculosis and malnutrition whereby TB itself causes wasting. The cause-effect phenomenon between PTB and nutritional status cannot directly be determined as we cannot be certain which one preceded the other between the PTB and under-nutrition.

Overcrowding was not found to be significant associated with TB prevalence among prisoners in this study. Our study also showed that 87.3% of the prisoners are exposed to overcrowding and in addition three quarters of the PTB patients are in the crowded prison cells but unexpectedly, the PTB prevalence looks lower than among the group living in the well spaced prison cells. These findings are contrary to many studies done worldwide and in Africa whereby overcrowding has been strongly associated with PTB transmission in the prisons as it was documented in many African countries [40,35,51,74,75] and outside Africa; from India, Sri Lanka, Afghanistan, Thailand and Hong Kong[76], Brazil[77], Venezuela[78]. The possible explanation for these contradicting results can be due to the fact that in our study there were much fewer respondents living in the prison cells which are not crowded thus leading to small denominator therefore giving higher prevalence among prisoners in these cells.

Family history of TB contact and unemployment were also independently significant risk factors for PTB, a finding which concur with studies in Pakistan [44] and in Russia[54]. Transfer

in from another prison, sharing prison cell with a TB patient and past history of imprisonment, were not significant factors for development of PTB in this study, results which are contrary to the findings from Cameroun[35] and Ethiopia.[36]. Respondents who were consuming cigarettes, alcohol and addictive drugs had higher prevalence of PTB than the group not exposed to these factors. There was no statistical association between these factors and PTB except the respondents who were smoking for more than five years. This concur with many of the literature documenting that there is no evidence that alcoholism or smoking may increases the risk of developing TB[15]. Alternatively, they can be associated indirectly through other factors for example alcoholism can lead to behavior that predisposes an individual to acquire HIV infection, a risk factor for developing PTB.

This study has several strengths. The study had high response rate and also the prison chosen for the study represent a wider composition of the inmates housed by the prison. Moreover, it is the only facility that houses both males and females and in addition houses both remanded and sentenced prisoners.

There are also some limitations of this study which should be considered in the interpretation of these results. The cross sectional nature of this study precludes the statement of cause and effect, which brings some limitations while interpreting the cause-effect phenomenon between PTB as an outcome and its explanatory variables. We cannot be certain which one preceded the other between the PTB and some of the explanatory variable like HIV and nutritional status.

Although some studies have reported on the less sensitivity of microscopy that in more than half of the patients with active PTB no AFBs are seen on sputum stains, in our study we used only smear microscopy for diagnosing PTB due to available resources and logistics. The addition of x-ray and sputum culture would have led to more cases being diagnosed as from the NTLP surveillance data it has shown that about 40% of cases notified had PTB but sputum exam was negative. There was no opportunity to perform chest radiographs for the

sputum negative patients as it is recommended in the Tanzania TB testing algorithm. Chest radiograph is important especially for the HIV positive patients who have high chance of being sputum negative while they actually have PTB[15][68] This limitation was a result of impossible logistics of transferring prisoners to the facilities with such service mainly due to security reasons, possibilities to obtain a mobile X- ray machines had not been fruitful. Sputum culture could not be performed due to time required as compare to the timeline allowance to complete this work. Due to above limitation this study can compare results between different screening approaches but with caution.

Participation bias was anticipated in this study whereby those who opted not to participate in to the study could have different possibility of having TB and risk factors than those who participated. This type of bias was minimized by proper counseling, encouraging and follow up of the prisoners selected into the sample size to participate and thus we obtained a high participation rate.

Another type of bias which was anticipated was ‘volunteer bias’ whereby as it is documented in the literature that in some previous studies that, prisoners may fake the history of cough, or buy sputum from a known TB patient so as to gain benefits of being a patient which may include resting and special diet[2][23]. This bias was minimized by collecting sputum from the respondents under supervision of the research assistant.

Lastly, the generalizabilty of our findings will be dependent on the comparison and confirmation of our findings in other populations with relatively similar HIV and TB burdens.

CHAPTER SIX

6.0 Conclusion and recommendations

6.1 Conclusion

It is therefore concluded from this study that the prevalence of PTB in prisons in Dar es Salaam is comparable to other studies done in Tanzania and elsewhere and it is contributed by mostly individual factors rather than prison system factors. The main factors found to be associated with TB prevalence included unemployment, previous TB history, heavy cigarettes smokers, under nutrition and HIV infection which are the independent factors for PTB transmission. Although there is high degree of overcrowding in the prison, this was not associated with the high prevalence of PTB in the prison.

6.2 Recommendations:

In view of the findings of this study, the following recommendations are pertinent:-

6.2.1 We recommend that that there is need to establish a comprehensive TB screening services in the prisons which includes the provision of pre entry screening for infectious conditions like TB and active case finding should be given priority especially in the remand prisons. Special attention should be given to those prisoners reporting positive family history of TB and previous TB treatment as they have proved to be more likely to be infected.

6.2.2 We recommend the introduction of release plan including ‘medical hold’ for the TB patients diagnosed or still on treatment who are exiting the prisons so as to link them with the community health services to prevent spread into the community.

6.2.3 There should be awareness creation to the prisoners on risk factors as well as the symptoms of TB and the importance of presenting them to the health facilities once they are realized.

6.2.4 Intensify HIV counceling and testing services and HIV positive prisoners should be screened for TB.

6.2.5 Although this study has answered the question of PTB prevalence and the factors associated with transmission among prisoners, other questions related to the this subject remain unanswered like the presence and duration of TB symptoms before incarceration, and comparison of prevalence between remand and sentenced prisons. All these questions call for more research on TB in the prisons.

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8.0 Appendices

8.1 7.1 Appendix I: Questionnaire- English version:

I : Socio-demographic characteristics

Questionnaire No☐☐☐☐

Q1A) Name _____

Q1B) Imprisonment status 1. ☐Remand Prisoner 2. ☐ Sentenced prisoner

Q2. Sex 1. ☐Male 2. ☐Female Q3 Age **(**Yrs) ☐☐

Q4. Since which date have you been in the prison? ☐☐☐☐☐☐

Q5. Q6. Are you married? ☐ Single ☐Married ☐Cohabiting ☐ Divorced ☐ widow

Q6. What is your level of education? ☐ Below Primary ☐ Primary ☐Secondary ☐College and above

Q6B) For how many years in total you have been at school? ☐☐

Q7. Before you were imprisoned, what was your occupation? ☐None ☐ daily labourer ☐ Self employment/business ☐ Employed ☐ others (Mention) _____

II TB Symptoms:

Q8. What among the below symptoms you are experiencing?

	Symptoms	**Yes/No**	**Duration (Days)**
A	Cough for > or = l to two weeks duration		
B	Chest pain for more than 15 days		
C	Blood in sputum		
D	Fever		
E	Night sweats		
F	Un intentional weight loss		
G	Nyinginezo		

III. Risk factors:

Q9A). Cell No. ☐☐

Q10. Have you ever had tuberculosis disease in the past one year? 1. ☐Yes 2. ☐No (If no skip to Q 12)

Q11 A). If yes, are you currently on TB Treatment? 1. ☐Yes 2. ☐No (If no, skip to Q12)

Q11 B). If yes, is the TB treatment card available? 1. ☐Yes 2. ☐No (If no skip to Q12)

Q11 C). From the card note the date of start of TB treatment ☐☐☐☐☐☐ Duration had been on Rx ☐☐ (days)

Q12. Have you ever been imprisoned before? 1. ☐Yes 2. ☐No (If yes) How long ☐☐ (months)

Q13A). Have you ever smoked cigarettes or use any other type of tobacco products? 1. ☐Yes 2. ☐No 3. ☐Yes but I stopped (If no skip to Q14)

Q13 B). (If smokes), How many years have you been smoking since you started smoking ☐☐

Q13 C). How much average number of cigarettes do you or have you been smoking per day? ☐☐

13D) (If yes but stopped), How long since you stopped smoking ☐☐☐ months

Q14A). Have you ever used any of the addictive drugs 1. ☐Yes 2. ☐No 3. ☐Yes but I stopped (If no skip to Q15)

Q14B). (If uses addictive drugs), how many times do you use addictive drugs in one week? ☐☐

Q14 C). (If uses additive drugs), how many years have you been using the additive drugs? ☐☐

Q14 D). (If yes but stopped), How long since you stopped using the additive drugs ☐☐☐ months

Q14E) Which type of using addictive drugs have you been using? 1. ☐ injectables 2. ☐ smoking/snuffing/chewing 3. ☐ Others (mention) …….

Q15 A) Do you take alcohol? 1. ☐Yes 2. ☐No 3. ☐Yes but I stopped (If no skip to Q16)

Q15 B) If yes, how many times do you currently take alcohol in one week? ☐☐

Q15 C) If stopped, please mention how many years ago ☐☐

Q16A) Have ever lived in the same house with a person who suffered TB before imprisonment ☐Yes ☐ No 3 ☐ don't know

Q16B) While in this prison, have you ever lived in the same cell with an individual suffering from TB? 1. ☐Yes 2. ☐No 3 ☐ don't know

Q17A) Have ever lived in another prison other than this one for the current imprisonment? ☐Yes ☐ No

Q18) Weight ☐☐ Height ☐☐☐

Lab investigations specimens collected:

Q19) Sputum 1☐ Sputum 2 ☐ Blood for HIV test ☐

Investigation Results:

Q20 HIV test Biolinie: Positive Negative Not Done

Q21 HIV test Determine: Positive: Negative Not Done

Q22) Conclusive HIV test: Positive Negative Discordant Not Applicable

Q23) Sputum Microscopy 1: Positive Negative Not Done

Q24) Sputum Microscopy 2: Positive Negative Not Done

Q25 Conclusive PTB result: Positive Negative Discordant Not applicable

Initials of the interviewer _____ Telephone number _____

8.2 Appendix II: Questionnaire- Swahili version:

Dodoso la kutathmini ukubwa wa ugonjwa wa kifua kikuu na viashiria vya ugonjwa huo kwa wafungwa na mahanusu wa gereza la Segerea Dar es Salaam

I : Taarifa binafsi :

Tarehe ya usaili ☐☐☐☐☐☐ Namba ya dodoso ☐☐☐

Q1A). Jina la mshiriki _____

Q1B) Aina ya kifungo: ☐ Mahabusu ☐ Mfungwa

Q2. Jinsia 1. ☐Mume 2. ☐Mke Q3 Umri (Miaka) ☐☐

Q4. Tangu lini uliingia gerezani? ☐☐☐☐☐☐ idadi ya miezi ☐☐☐

Q5. Umeoa/umeolewa? ☐ Sijaoa/sijaolewa ☐Nimeoa/nimeolewa ☐Nilikuwa ninaishi tu na bwana/bibi ☐ Nimeacha/nimeachika ☐ Mjane

Q6A. Je, ni kipi kiwango chako cha elimu? ☐ Chini ya elimu ya msingi ☐ Msingi ☐ Sekondari ☐chuoni au zaidi

Q6B. Je, umekuwa shuleni kwa jumla ya miaka mingapi? ☐☐

Q7. Je kabla ya kuingia gerezani ulikuwa unafanya kazi gani? ☐ sikuwa na kazi ☐ Kibarua ☐ kujiajiri/biashara ☐ kuajiriwa ☐ Nyinginezo (taja) _____

II Dalili za kifua kikuu:

Q8. Je umewahi/unapata au unajisikia dalili zipi kati hizi zifuatazo?

	Dalili	**Ndio/Hapana**	**Muda (siku)**
A	Kukohoa kwa wiki mbili au zaidi		
B	Kuumwa kifua kwa wiki mbili au zaidi		
C	Kukohoa damu		
D	Homa za vipindi		
E	Kutokwa na jasho usiku		
F	Kupungua uzito/kukonda bila kukusudia		
G	Nyinginezo(Taja) ……		

III. Risk factors:

Q9A). Namba ya selo ☐☐

Q10. Je katika kipindi cha mwaka mmoja umewahi kuugua ugonjwa wa kifua kikuu? 1. ☐ Ndiyo 2. ☐Hapana (Kama hapana nenda Q 12)

Q11A). Kama ndiyo, Je kwa sasa upo kwenye matibabu ya kifua kikuu? 1☐Ndiyo 2☐ Hapana (kama hapana Q12)

Q11B). (Kama ndiyo) Je, unayo kadi ya matibabu? 1. ☐Ndio 2. ☐Hapana (Kama hapana nenda Q 12)

Q11 C). Kutoka kwenye kadi andika tarehe ya kuanza matibabu ya TB ☐☐☐☐☐☐ Muda aliotumia dawa za TB ☐☐☐ (days)

Q12. Je uliwahi kufungwa kwa wakati mwingine siku za nyuma? 1☐Ndio 2 ☐Hapana Muda gani ☐☐☐(Miezi)

Q13 A). Je umewahi kuvuta sigara au aina nyingine za tumbaku? 1☐Ndio 2☐Hapana 3 ☐ ndio lakini niliacha (Kama hapana nenda Q 13D)

Q13B)(Kama ndio anavuta), je umekuwa unavuta kwa miaka mingapi ☐☐ Q13C). Je unavuta sigara ngapi kwa siku moja? ☐☐

Q13D). (Kama ndio lakini aliacha), Je muda gani tangu umeacha ☐☐☐ miezi

Q14 A). Je umewahi kutumia madawa ya kulevya 1☐Ndiyo 2 ☐Hapana 3☐ ndio lakini niliacha (Kama hapana nenda Q 14D)

Q14 B). (Kama ndio anatumia), Je unatumia dawa za kulevya mara ngapi kwa wiki moja? ☐ ☐

Q14 C). (Kama bado anatumia), Je umekuwa unatumia dawa hizo kwa miaka mingapi? ☐ ☐

Q14 D). (Kama ndio laki aliacha), Je muda gani tangu umeacha kutumia madawa ya kuleva? ☐☐☐ miezi

Q14E). Umekuwa ukitumia dawa za kulevya za aina gani? 1. ☐za sindano 2. ☐ kuvuta/kunusa/kulamba 3. ☐ Kutafuna 4. ☐ Nyinginezo (Taja) …….

Q15 A) Je umekuwa ukitumia pombe ? 1 ☐Ndio 2☐hapana 3☐ Ndio lakini nimeacha (Kama hapana nenda Q16)

Q15 B) (Kama ndiyo anakunywa) Je unakunywa pombe mara ngapi kwa wiki moja? ☐☐

Q15 C) (Kama ndiyo lakini aliacha) , Je uliacha kunywa pombe miaka mingapi iliyopita ☐☐

Q16A) Je kabla ya kuingia gerezani umewahi kuishi nyumba moja na mgonjwa anayeumwa au kutumia dawa za kifua kikuu 1 ☐Ndiyo 2☐ Hapana 3☐ Sijui

Q16B) Je, hapa gerezani umewahi kuishi selo moja na mgonjwa wa kifua kikuu? ☐Ndiyo ☐ Hapana ☐ Sijui

Q17A) Je uliwahi kukaa katika gereza jingine kwa kifungo hiki cha sasa 1☐Ndiyo 2☐ Hapana

Q18 Weight ☐☐ Height ☐☐☐

Lab Investigations: Q19 Type of specimens collected: Sputum 1☐ Sputum 2 ☐ Blood for HIV test ☐

Lab investigation Results:

Q20 HIV test Determine ☐Positive ☐ Negative ☐Not Done

Q21 HIV test UNIGOLD: ☐Positive: ☐Negative ☐ Not Done

Q22 Conclusive HIV test: ☐ Positive ☐ Negative ☐Discordant ☐Not Applicable

Q23 Sputum Microscopy 1: ☐ Positive ☐Negative ☐ Not Done

Q24 Sputum Microscopy 2: ☐ Positive ☐ Negative ☐ Not Done

Q25 Conclusive PTB result: ☐ Positive ☐Negative ☐Discordant ☐Not applicable

Initials of the interviewer _____ Telephone number _____

8.3 Appendix III: Informed consent form – English version

Interviewee Name. ……. ……..

Consent to participate in a study

Greetings! My name is Dr**. Vida Mmbaga.** I am a postgraduate student at Muhimbili University of Health Allied Sciences (MUHAS). I am working on a study on "The Prevalence and risk factors associated with transmission of pulmonary Tuberculosis among Prisoners in Dar Es Salaam".

You have the option to take part in this study. The goals of this form are to give you information about what would happen in the study if you choose to take part and to help you decide if you want to be in the study.

If you decide that you would like to take part in this research study, you would sign this form to confirm your decision. If you sign this form, you will receive a signed copy of this form for your records.

Purpose of the Study:

The study is aiming at assessing the magnitude and the risk factors for transmission of pulmonary Tuberculosis in closed communities like Prisons. Tuberculosis is one of the diseases that is easily transmissible from one person to another. HIV is one of the most common risk factor for the transmission of TB therefore HIV status will be one of the factor that will be studied in this research. If we study the magnitude of the two infections and identify risk factors then we can learn more on how to prevent spread.

What is the purpose of this form?

- This form explains to you about the study and what is required from you if you consent to join this research study.

- Please read it carefully. Take as much time as you need.
- If you consent to participate in this study, you will be required to sign this form that you have agreed to participate in this study.

If I agree to join this study, what is expected of me?

Once you consent to participate in the study, you will be required to undergo an interview and physical examination for the possibility of having pulmonary TB by trained medical personnel. Also you will be asked will be asked to produce sputum twice for investigation of bacteria that causes TB. In addition, if you consent after pre counselling for HIV test, you will be requested to give blood for the HIV testing. About one ml of blood will be drawn from your vein using a small syringe for a single vial of blood. The post test counseling will be done to give the HIV test results. If one opts not to receive the HIV test results, then the decision will be respected and the results will be kept confidential.

What are Benefits and potential risks if I join the study?

Potential Benefits for You:

If you are found with Pulmonary TB you will be referred for further investigation to confirm the disease and then be started on TB treatment and other treatment accompanying TB management. Those who are found HIV positive will be counseled and referred to HIV care and treatment clinics (CTC) for further management.

Potential Benefits for Others:

We hope to use information we get from this study to benefit all the prisoners in the future. This would include an understanding of how big is the problem of pulmonary TB in the prison as well as HIV infection as one of the commonest risk factors for acquiring TB disease. We would understand the risk factors and the ways in which these diseases are transmitted and what can stop this transmission. From this information, we can propose practices in the prison that will reduce the rate of transmission of TB in prisons.

Potential risks:

The interview may include some questions that might seem sensitive or personal. You might feel uncomfortable answering some questions on the study. You are free to skip any questions you feel that you don't want to answer. Pain and bruising at blood draw site may be experienced.

Confidentiality, Right to withdraw and Alternatives:

All information collected from you will be confidential and will be used for the purpose of better health for you and for the prison community at large.

Participation in the study is voluntary. You would not lose benefits or be penalized if you decide not to take part in the study or decide to quit the study later. If you say 'Yes' now, you can still change your mind later.

Your decision not to participate or to withdraw from the study may not affect your right tights to care and treatment.

Note that: By signing this consent form, you do not give up any of your legal rights. The researcher(s) or sponsor(s) are not relieved of any liability they may have.

Who to contact:

If you have any question about the study, do not hesitate to contact the researcher, Dr. Vida Mmbaga

Muhimbili University Health and Allied Sciences,

P.O. Box 65001,

Dar es Salaam.

Tel: 0754 760 732.

Also you may contact the supervisors, Mr. Cyprian Makwaya (0713608099) of Muhimbili University Health and Allied Sciences or Dr. Janneth Mghamba (0754 371024) of Ministry of health and Social Welfare.

Also you may call **Prof. Mainen Moshi,** Chairperson of the Senate Research and Publications Committee, P.O. Box 65001, Dar es Salaam. Tel: 255 22 215 2489.

I would appreciate if you will agree and take part in this study

Signatures:

Do you agree to participate in the study?

I…….have read and understood the contents in the consent form. Willing and without any force, I agree I do not agree (Tick one) to take part in this study

Participant's signature: _____ Date _____

Witness's signature: _____ Date _____

Research assistant signature: _____ Date _____

8.4 Appendix IV: Informed consent form – Swahili version

FOMU YA RIDHAA YA KUSHIRIKI KWENYE UTAFITI

Namba ya Msailiwa…….

Ridhaa ya kushiriki katika utafiti

Salaam! Ninaitwa **Dr. Vida Mmbaga**, mwanafunzi wa shahada ya uzamili ya Epidemiolojia katika chuo kikuu cha Sayansi ya Afya na Tiba Muhimbili. Nafanya utafiti wa kutathmini ukubwa na viashiria vinavyosabaisha kusambaa kwa ugonjwa wa kifua kikuu katika magereza hapa Dar Es Salaam.

Madhumuni ya utafiti:

Utafiti una lengo la kupima ukubwa wa tatizo la kuenea kwa kifua kikuu katika magereza na kubaini viashiria vinavyochangia kuenea kwa ugojwa huo kwenye jamii kama ya watu wanaoishi pamoja kama magerazni. Kifua kikuu ni ugonjwa unaoenea kirahisi kutoka binadamu mmoja hadi mwingine. Pia kuwa na virusi vya ukimwi (VVU) ni kiashiria kikuu katika kuchangia kuenea kwa kifua kikuu hivyo uwezekano wa kuwepo kwa VVU utapimwa katika utafiti huu. Ikiwa tutakuwa na uelewa kuhusu ukubwa na viashiria vinavyochangia kuenea kwa aina za hizo mbili za vimelea vya kifua kikuu na VVU kwenye magereza,

Ni nini dhumuni la fomu hii?

- Fomu hii inatoa maelezo kuhusu utafiti huu na pia ni kitu gani unahitajika kufanya kama utakubali kushiriki katika utafiti huu.
- Tafadhali tumia muda wa kutosha kadri uwezavyo uisome kwa makini.
- Kama ukiamua kushiriki katika utafiti huu, utatakiwa kutia sahihi yako mwishoni mwa foumu hii kuonyesha kukubali kwako kushiriki katika utafiti huu.

Kama nikikubali kushiriki utaafiti huu nitahitajika kufanya nini?

Ukishakubali kushikiri katika utafiti huu, utaulizwa maswali na pia kupimwa mwili na wataalamu wa afya kuhusiana na uwezekano wa kuwa na ugonjwa wa kifua kikuu. Pia utatakiwa kutoa vipimo vya makohozi kwa siku mbili kwa ajili ya kupima vimelea vya bacteria vinavyosababisha ugonjwa wa kifua kikuu .

Vile vile huduma ushauri nasaha na kupima virusi vya ukimwi utatolewa na kama mtu akikubali kupima, a damu itachukuliwa kwa ajili ya kupima. Kiasi cha mililter moja (kijiko komoja cha chai) ya damu kitatolewa kwa kutumia sindano ndogo. Ushauri nasaha baada ya kupima VVU utatolewa pia. Kama mtu akiamua kutokutaka kupokea majibu ya VVU pia uamuzi huo utaheshimiwa na majibu yatahifadiwa kwa usiri.

Ni nini faida na madhara yanayoweza kutokana na ushiriki wako katika utafiti huu?

<u>Faida kwako binafsi:</u>

Ikiwa ukionekana kuwa na ugonjwa kifua kikuu cha mapafu utaunganishwa na kituo cha afya kwa kupewa rufaa ya kuhudhuria kwenye kituo cha afya cha sehemu husika kinachotoa huduma za kifua kikuu ili kupatiwa tiba pamoja na huduma nyiginezo zinazohitajika. Mshiriki atakayeonekana kuwa na VVU atapewa ushauri nasaha na kama ataafiki atapewa rufaa ya kuhudhuria kiliniki ya huduma na matibabu ya ukimwi kwa ajili ya huduma zaidi.

<u>Faida kwa jamii:</u>

Tunategemea kutumia matokeo ya utafiti huu kwa faida ya wafungwa wote kwa siku zijazo. Hii ni pamoja na kuelta uelewa wa ukubwa wa tatizo la kifua kikuu cha mapafu na pia VVU ambavyo ni mojawapo ya visababishi vikubwa vinavyochangia kuenea kwa ugonjwa wa kifua kikuu. Kuwa na uelewa wa visabashi na jinsi ugonjwa unavyoenea magerezani itatusaidia kujuanjia za kuzuia maambukizi hayo kuenea .

Madhara yanayoweza kutokea:

Usaili unaweza unaweza kuwa na maswali yanayugusa hisia au mambo binafsi. Unaweza kutokukujisikia huru kujibu maswali mengine. Uko huru kutokujibu maswali mengine kama unataona unakwazika kufanya hivyo. Pia wakati wa kutoa damu kunaweza kuwa na maumivu au mchubuko mahali panapochomwa sindano. Pia mara chache sana mtu anaweza kujisikia kinguzungu au kuzimia au kupata uambukizo sehemu iliyochomwa sindano.

Utunzaji wa siri, Haki ya kujitoa kwenye utafiti au la.

Taarifa zote zitakazopatikana katika utafiti huu zitakuwa ni siri na ziatatumika kwa ajili ya kuboresha huduma na utabibu katika jamii ya magerezani.

Haki ya Kujitoa/ kutoshiriki katika utafiti

Ushiriki wako katika utafiti huu ni wa hiari. Una hiari ya kujitoa katika utafiti huu wakati wowote hata kama ulikubali mwanzoni. Kujitoa kwako hakutaathiri stahili zako kwa namna yoyote ile.

Hata hivyo uamuzi wako wa kujitoa kwenye utafiti huu hauataathiri haki yako ya msingi ya kupata huduma nzuri za afya kama raia.

Zingatia kwamba: Kwa kutia sahihi fomu hii, hautauza haki yako yoyote ya kisheria. Watafiti au wadhamini wa utafiti huu hawawezi kujivua jukumu la kuhakikisha kuwa haki na stahiki za washiriki zinazingatiwa.

Watu wa Kuwasiliana nao:

Iwapo una suala lolote kuhusu utafiti huu, unaweza kuwasiliana na mtafiti, Vida Mmbaga wa Chuo Kikuu cha Sayansi za Afya na Tiba, Muhimbili, S.L.P. 65001, Dar es salaam. Namba ya simu: 0754 760 732

Pia unaweza kuwasiliana na wasimamizi wa utafiti huu, Mr. Cyprian Makwaya (0713608099 wa

Chuo Kikuu cha Sayansi za Afya na Tiba, Muhimbili, au Dr. Janneth Mghamba (0754 371024) wa Wizara ya Afya na Ustawi wa Jamii makao Makuu Da Es Salaam.

Pia unaweza kuwasiliana na **Prof. Mainen Moshi**, Mkurugenzi wa Tafiti na Machapisho, Chuo Kikuu cha Sayansi za Afya na Tiba, Muhimbili, S.L.P. 65001, Dar es Salaam. Namba ya simu 255 22 215 2489.

Nitafurahi kama utakubali kushiriki katika uatfiti huu.

Sahihi:

Je, Unakubali kushiriki katika utafiti huu?

Mimi ……Nimesoma na nimeelewa maelezo yaliyoandikwa katika fomu hii. Mimi kwamhiari yangu mwenyewe, bila kushurutishwa na mtu yoyote

☐ I agree ☐ I do not agree (weka alama ya V) kushiriki kwenye utafiti huu.

Sahihi ya Msailiwa : _____ Tarehe _____

Sahihi ya Shaidi: _____ Tarehe _____

Sahihi ya Mtafiti Msaidizi: _____ Tarehe _____