

**FACTORS AFFECTING THE UTILIZATION OF PULMONARY TUBERCULOSIS  
CONTACT TRACING SERVICES IN MULANJE AND CHIRADZULU DISTRICT  
HOSPITAL IN MALAWI**

By

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A dissertation submitted in partial fulfilment of the requirements for the degree of Masters  
Science in Epidemiology with Implementation Research

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I, Caroline Masangalawe, hereby declare that this research work being presented for the Masters of Science in Epidemiology with Implementation Research degree, has not been previously submitted either wholly or in part for the same purpose at this or any other University nor is it being currently submitted for any other degree.

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## CERTIFICATE OF APPROVAL

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## ABSTRACT

Tuberculosis (TB) remains a serious threat to the public health especially in the sub-Saharan African countries. The World Health Organisation (WHO) in 2016 estimated that there were 10.4 million incidents of TB cases globally. Malawi is also burdened by TB disease. Currently, WHO recommends contact investigation in high-risk populations for low and middle income countries. However, in the vast majority of countries, it is either not undertaken or not implemented. Malawi, also adopted this policy from WHO. This cross sectional study was aimed at determining factors affecting utilization of contact tracing services in Mulanje and Chiradzulu district Hospital among pulmonary TB patients in Malawi. It took place within a period of November 2016 to February 2017 with a sample size of 404 participants.

The results showed that 44.8% of the index cases brought at least one household contact for screening. All health workers involved in this study informed patients about contact tracing. On the determinants of TB contact tracing, participants coming from Chiradzulu district hospital had a lower chance of bringing household contacts for screening than those from Mulanje (AOR 0.4, 95%CI. 0.18, 0.9 P=0.03). The participants who were between the ages of 26-35 had lower chance of bringing their house hold contacts for screening compared to those who were between 18-25 years of age (AOR 0.3, 95%CI. 0.14, 1.11, P=0.031). Participants who were informed about contact screening during their hospital visits, had an increased chance of bringing at least one household contact for screening than those who were not informed (AOR 7, 95%CI 1.64, 26.8, P=0.008) while wives had a high chance of bringing their husbands and children than the husbands. (AOR 8, 95%CI 1.1, 68.3, P=0.044).

This study concludes that less than half of the TB patients brought at least one household contact for screening. This shows that there is poor adoption of this innovation. Majority of health workers were trained in how to do contact tracing of pulmonary TB patients and reported that they do inform patients about the availability of these services. However, majority TB of patients reported that they are not informed about these services. This shows some discrepancy from the two groups of participants in this study. We recommend the use of opinion leaders through community sensitization on the importance of this service so that they patients should be able to inquire for it themselves. We also recommend a fidelity study to evaluate if health workers carry out contact tracing program accordingly.

**Key words:** Contact investigation; underutilisation; determinants; Tuberculosis

## **DEDICATION**

To the person who has ever believed in me and pushed me to reach my potential, my late father Mr Laston Masangalawe. This is for you.

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To my mother Mrs Maria-louis Masangalawe, thank you for your patience. I know it has not been easy for you without enough support from me while I was studying. To siblings thank you very much, for the emotional support that you rendered to me. Gratitude goes to my main supervisor Dr Gershom Chongwe and co-supervisor Dr Monde Muyoyeta for your continuous guidance throughout the period of my study.

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## **LIST OF ABBREVIATIONS**

AOR	Adjusted Odds Ratio
HIV	Human immunodeficiency virus
MDR	Multi-drug resistant
LTBI	Latent TB infection
TB	Tuberculosis
WHO	World Health Organization
XDR	Extensively-drug resistant
UNZABREC	University of Zambia Biomedical, Research Ethics Committee

## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

Tuberculosis (TB) remains a serious threat to the public health especially in the sub-Saharan African countries. Transmission is almost exclusively through the air from a patient with pulmonary disease (PTB). Transmission among household contacts is greater when the case has smear positive tuberculosis (Crampin et al., 2008). Other factors known to increase transmission among contacts include closeness with the patient, overcrowded living conditions, bacillary density in respiratory secretions and degree of lung field involved (Singh et al., 2013).

The World Health Organisation (WHO) in 2014 estimated that there were 10.4 million incidents of TB cases globally, of which 5.4 million cases were among men, 3.2 million cases were among women and 1.0 million cases were among children. Almost three-quarters of these cases were in the African region (WHO, 2016).

As it is with many other countries in the sub-Saharan African region, Malawi is also burdened by TB disease. In 2014, there were 17,723 new and relapse cases reported. WHO estimates that only 78% of all TB cases are diagnosed in Malawi and also six in ten people with TB are also infected with HIV (USAID, 2016). By 2012, Malawi Case notification rate was 128/100,000 for all forms of TB against the WHO estimated incidence of 163/100,000. For new smear positive cases, case notification was 55/100,000 against the WHO estimated incidence of 132/100,000 (MOH, 2012a).

As a way to fight against this disease, WHO in 2014 developed an 'End TB strategy' which aims at 95% reduction of TB related deaths by the year 2035. This strategic plan has three pillars the first one is about integrated patient centred care and prevention where the contact investigation strategy falls. The second pillar is on making bold policies and supportive systems and the last one is on intensifying research and innovation. Tuberculosis contact investigation involves systematic and active investigation of TB infection and disease in TB contacts. This contribute to early identification of active TB, thus decreasing its severity and reducing transmission of TB to others, and identification of latent TB infection (LTBI), to allow preventive measures (WHO, 2015a).

It is estimated that 2–3 persons would be infected by a smear positive case before its detection in developed countries, as against 4–5 persons in the developing countries because of higher number of close contacts. It was observed in some studies that contacts of a tuberculosis patient are 10 to 60 times more likely to have the disease than the general population, and approximately 10-14% of all notified cases have been detected by contact screening (WHO, 1991)

Currently WHO recommends contact investigation in two high-risk populations for low and middle-income countries. These populations are under-five children and HIV-infected persons, or when a TB patient has any of the following characteristics: sputum smear positive pulmonary TB, multidrug-resistant TB (MDR-TB) or extensively drug resistant TB (XDR-TB) (Chakhaia et al., 2014).

High prevalence and incidence rate of TB has been found in several studies that were done on contact investigation among the contacts of smear positive TB patients (Fox et al., 2013). In a systematic review and meta-analysis that was performed by Fox et al. (2013) they found that the prevalence of active TB in all contacts was 3.1%, bacteriologically proven TB was 1.2% and latent TB infection was 51.5%. These findings indicate that with no contact tracing many TB cases would be missed out.

Though contact tracing is recommended by WHO, it is commonly done in high-income countries with low TB burdens and in settings in which a TB elimination policy is implemented. In most low- and middle-income countries, it is included in national policies to control and prevent TB. However, in the vast majority of countries, it is either not undertaken or not implemented (Buseh et al., 2006).

Malawi, which is a low-income country, also adopted contact investigation as one of its strategies in the fight against tuberculosis. However, the policy is not followed in most hospitals (MOH, 2012a). Nyirenda et al. (2006) reported in their retrospective audit of routine practice in Malawi that hospital-based contact screening is poorly utilised despite attempts to raise awareness on the importance of contact investigation. They reported that attendance rate at the contact clinic was 7.7%. Out of 1438 adults with smear-positive PTB registered, only 111 brought their under-five children for screening. In their article, they recommended the need to increase and improve uptake of contact training involving health centres and educating

health workers. They also pointed out that a big challenge is to convince PTB patients on the potential benefit of child contact screening.

This study was framed within the field of implementation research whereby we were looking at the adoption of this ongoing innovation of TB contact tracing services by pulmonary TB patients in these two districts. Innovations, means a new practices, programs, or policies that we try and test and try again to enter them into social work profession and social work academic training and research communities from all directions and sources (Peters et al., 2013). A review of the literature on utilisation of contact tracing showed that there is poor adoption of this innovation. It was therefore found necessary to explore the determinants of underutilisation of contact investigation services in Malawi among pulmonary TB patients.

## **1.2 Problem statement**

Despite the fact that household contact screening is recommended by the Malawi National TB control office, services are poorly offered by health workers as well as underutilised by TB patients. Additionally, many health workers are not even aware of the rationale for contact screening (Nyirenda et al., 2006). Population at risk of getting TB includes under-five children and HIV positive patients. Hence, this group of people are supposed to be the priority when it comes to being investigated for TB if exposed. However, in Malawi it seems not to be the case. A study done by Claessens et al. (2002) in Malawi also found that only a few of smear-positive pulmonary TB patients do bring their under-five children for screening as recommended by MOH. In their study, they found that 40% of patients with smear-positive PTB had young children living at home. However, only a small proportion were informed about the need for childhood screening, and of those who were informed screening had been conducted in just over half of the families. This information shows that there is a problem with contact tracing services in Malawi that need to be addressed.

TB contact tracing in sputum positive patients, is an essential part of active case finding since patients with smear positive TB are responsible for up to 90% of the transmission occurring in the community. Thus, early detection of active tuberculosis and provision of preventive therapy is essential to reduce the death rate and interrupt transmission of TB (Pothukuchi et al., 2011). There is a need to look deeper into what could be the underlying cause for low utilization of contact tracing services by TB patients in Malawi.

### **1.3 Justification of the study**

Evidence has shown that contact tracing is underutilised in Malawi. Despite this, there is limited information on the determinants of underutilisation of this service among TB patients as well as the factors affecting implementation of this policy. Evaluating the experience of contact investigation from the patients' perspective could help the National TB Control Program to understand the way in which their policies operate on the ground and identify the shortfall. The findings from this study will help the Malawian national TB control program in identifying the main factors hindering utilisation of contact tracing services among TB patients and their household contacts. If these factors can be identified, there can be an improvement in TB case notification and ultimately TB prevention, in the end improving the way the contact-tracing program is delivered and thereby strengthen the TB control program in Malawi.

### **1.4 Research question**

- What could be the potential reasons for sputum positive patients not to adhere to contact screening program?

### **1.5 Overall objective**

To identify factors affecting tuberculosis contact tracing of sputum positive patients.

### **1.6 Specific objectives**

1. To determine the proportion of TB patients that bring their contacts to the clinic for screening.
2. To assess the level of knowledge on contact tracing and TB in general among the TB patients
3. To determine factors that influence sputum positive patients to bring their contacts for screening.
4. To determine the proportion of health workers in the TB department who are knowledgeable on TB contact tracing and inform patients about it.

### **1.7 Operational definitions**

#### **Smear – positive pulmonary TB**

The presence of at least one acid fast bacilli (AFB+) in at least one sputum sample in countries with well-functioning external quality assurance system.

#### **TB Contact Investigation**

It is the systematic and active investigation of TB infection and disease in TB contacts.

**Household contact**

Any person who has been staying in the same house with a smear –positive pulmonary TB patient for a period of 3 months

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Individual factors

Patients' general knowledge on tuberculosis as well as on contact tracing appeared to be an important factor influencing contact tracing in most of the articles that were reviewed. In an educational intervention conducted in Nigeria by (Ekwueme et al., 2014) it was found that at baseline, both study and control groups had erroneous social-cultural beliefs about TB but after the interventions, there was a tremendous improvement among the study group on the general knowledge of TB. Contacts of the study group who brought their patients for screening after intervention increased tremendously comparing to control group. Tornee et al. (2005) also found that good knowledge on TB was significantly associated with household contact screening adherence of TB patients.

A systematic review done on global cultural variations in knowledge, attitudes and health responses to tuberculosis stigma by Chang and Cataldo (2014) identified a broad range of causal attributes for TB across countries and cultures. These causal attributes included beliefs such as TB being caused by exposure to cold air, smoking, nutritional deficiency, being sexually transmitted as well as being a food-borne disease. They reported that scientifically unfounded beliefs regarding TB transmission were associated with negative attitudes toward treatment and preventive measures of TB where TB contact tracing is also included.

Similar findings were observed in a qualitative study that was done in USA Kansas city on contact tracing by Shrestha-Kuwahara et al. (2003). They concluded that understanding the purpose of the contact investigation and seriousness of TB facilitated naming contacts, while miscommunication and misconceptions about TB hindered the process. This is also in line with what was found in an Ethiopian cross sectional study that was conducted on Household Contact investigation. In this study, it was found that patients who took health education from health care worker had accurate information about TB and were three times more likely to adhere to contact screening as compared to patients who did not take health education. In a nested case control study on barriers to adherence with tuberculosis contact investigation conducted in Vietnam they also observed that cases were less likely to understand that TB was caused by an infectious organism comparing to controls (cases were patients and the contact who did not attend the scheduled visit and controls were those who attended).

## **2.2 Health systems related factors**

Accessibility was one of the common factors identified as one of the barriers to contact tracing. In a study on factors affecting TB household contact screening adherence by Tornee et al. (2005) done in Bangkok Thailand, distance between TB patient's homes to the health care contributed to a delay in the diagnosis of tuberculosis among TB contacts. They reported that participants who were living close to the TB clinic were 11 times more likely to bring their household contacts to the TB clinic than those living far from the TB clinic. In their article Fox et al. (2015) on Barriers to adherence with tuberculosis contact investigation in Vietnam, they also identified distance as one of the factors affecting adherence to contact tracing. Of the participants in the study, 41% identified the distance between the clinic and their house as a barrier to participation. Quarter of contacts in this study lived over 10 km from the screening clinic. They point out that one of the considerable solution could be a more decentralised approach to screening, particularly in rural areas.

Another factor related to health systems that was found to affect adherence of TB patients to contact tracing was patients' satisfaction to the services that were offered at the TB clinic. Though different studies used different grading criteria to measure patient's satisfaction, the overall finding in the studies was that most patients were not satisfied with the services offered. This had a negative impact on contact tracing services. For instance, Gebregergs and Alemu (2015) reported that only a third of the patients were very satisfied with service delivered at TB clinic and this was associated with poor adherence to contact tracing program. Their study was looking at Household Contact Screening Adherence among Tuberculosis Patients in a Northern Ethiopia.

Fox et al. (2015) in Vietnam highlighted inadequate resources as one of the factors that was affecting adherence to the contact-tracing program. They reported that 45% of districts required contacts to travel more than 500 metres from the district clinic to access external radiology facilities.

### **2.3 Psycho-social-cultural and economic factors**

The type of relationship that existed between a TB patient and a contact had a strong effect on whether the patient will adhere to the program in most of the articles that were reviewed. In a cross sectional study that was done in Portugal on contact tracing by Josaphat et al. (2014) it was found that patients tended to identify to the health workers their relatives and partners rather than the fellow employees when it comes to contact investigation.

This was similar to what was found in a study by Gebregergs and Alemu (2015) which reported that the type of relationship that exist between the household contact and TB patient was significantly and independently associated with adherence. However, Tornee et al. (2005) found that adherence of TB patience to contact tracing program was not significantly associated with the type of relationship between the household and the contact i.e. whether it was mother daughter or father son relationship.

Fear of being discriminated against and stigmatised was one of the social factors identified in the literature that was reviewed. According to Fox et al. (2015) perception of discrimination against TB in the community was more common among cases. In some of the responses from the cases some of them stated that they would prefer to be examined in a private hospital because they were worried about discrimination from other people towards themselves and their families. They argued in their paper that with the recent WHO policies that provide a framework for the expansion of TB screening, fear of contagiousness may also lead to discrimination against people with TB and increase their sense of alienation from society.

A systematic review on stigmatisation related to TB reported that there are many fears associated with disclosure of TB diagnosis in relation to social status and marriage prospects, hence people tend to hide their diagnosis from their contacts. However, the same article reported that disclosure encourages support from the family and friends (Chang and Cataldo, 2014). This suggests that there is limited sensitization worldwide despite this disease having been around for centuries.

Religious and cultural beliefs were also found out to be among the factors that affect contact tracing programs. In the study that was conducted in Ethiopia it was reported that Muslims were two times more likely to adhere to contact screening as compared to Christians. They attributed these findings to the use of holy water and herbal medicine for treatment of tuberculosis among Christians (Gebregergs and Alemu, 2015). On the other hand Fox et al.

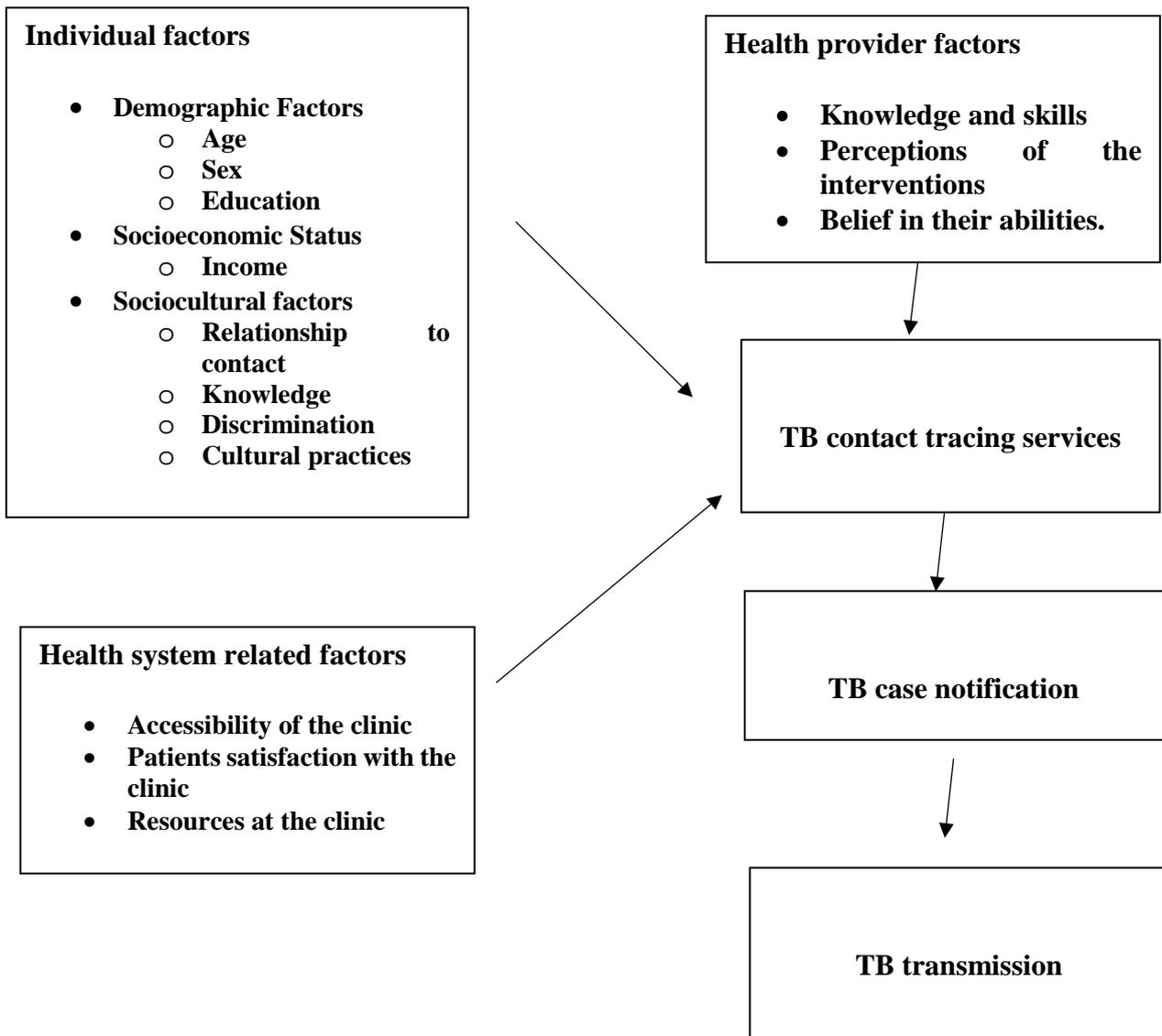
(2015) found out that cultural beliefs had a negative impact on contact tracing. In their study they found out that a higher proportion of cases also held a mistaken traditional belief that a non-infectious 'exhaustible' form of TB could cause the disease. The cases also believed that Vietnamese traditional medicines alone could work.

Work related issues and income were also among the factors identified to be associated with contact tracing. For instance, Gebregergs and Alemu (2015) found that family income of a patient plays a crucial role in adherence to household contact screening as patients with higher family income were more likely to be adherent. Although TB diagnosis and treatment are provided freely at the community level. They attributed this finding to the fact that people with lower incomes might not afford cost of transportation to bring household contacts since most people walked over 10 kilometres to the clinic. Fox et al. (2015) reported that 43% of the cases found difficulties taking time off work or study to attend the appointment for TB screening.

## **2.4 Conceptual framework**

Figure 1 shows a conceptual framework that was developed from the reviewed literature. Demographic factors such as age of the patient sex and education help one to understand the importance of contact tracing and act in a certain manner. The literature reviewed showed that having a higher education and being female is associated with bringing TB household contacts for screening. Ultimately, this has a bearing in increasing TB case notification, and in the long run reducing transmission. Low social economic status has also the same bearing on contact tracing (Gebregergs and Alemu, 2015).

Health facilities that are accessible with minimal waiting time and with more resources including adequate staff for TB screening tend to have a positive bearing in contact tracing services. This is also the same for TB clinics that have knowledgeable and skilled health workers with positive abilities and beliefs for TB contact tracing (Tornee et al., 2005).



**Figure 1. TB Contact tracing conceptual framework**

## **CHAPTER 3: METHODOLOGY**

### **3.1 Study design**

This was a cross sectional (descriptive and analytical). This study design was suitable for this study because the main aim of this study was to look at determinants of utilisation of contact tracing at one point in time.

### **3.2 Study setting**

The study took place in the two district hospitals, namely Mulanje and Chiradzulu which are found in the southern region of Malawi. The Southern region was selected because 60% of all TB cases in Malawi comes from this region and these two districts are also among the top ten districts with high reported cases of all forms of TB (MOH, 2012c). Chiradzulu district had a population of 252,000 in 2010, 90% of whom earned their living by farming. Mulanje district is also located approximately 85 kilometres East of Blantyre, Malawi's Commercial Capital. The total area for the district is 2056 square kilometres, which is 2.2 percent of the total area for Malawi. The district has a population of 525, 429 people (MOH, 2008). These two district were selected because they also reported high cases of TB as well.

### **3.3 Study population**

We had two sets of study population, the first set included all pulmonary TB patients above 18 years who presented at the health facility and who had been taking anti-TB drugs for at least two weeks. The second group included all health workers who have been working in the TB department during the period of the study.

### **3.4 Inclusion and exclusion criteria**

The inclusion criteria were all sputum smear positive patients and multi –drug resistance TB patients 18 years old and above who have been on medication for at least two weeks or more. Patients who were having difficulties in breathing, on intravenous infusion, and in a coma were excluded.

All health workers working in the TB ward were included in the study. Part time health workers were not included in the study.

### 3.5 Sampling and sample size considerations

A minimum sample size of four hundred and four participants was obtained using the single-population proportion formula for finite populations ( $n = (z_{1-\alpha/2})^2 \cdot p \cdot (1-p) / d^2$ ). This number was obtained assuming a 95% confidence level, a 5% margin of error and 10% possible non-response rate. We assumed 30% of the patients to be adherent on review. This 30% was used based on a similar study that was conducted in Ethiopia which found out that 30% of the TB patients were adherent to contact tracing (Gebregergs and Alemu, 2015). All the patients attending the clinic who met the criteria were selected to be part of the sample. Sample size in the two study sites was divided according to proportion to size.

Systematic random sampling was used to select the sample from the population. The pulmonary TB patient registry was used as our sampling framework. Every fourth person in the registry was selected after selecting the first one at random. The study participants were selected by the principal investigator (PI) and the research assistants after being trained. All the selected participants accepted to take part in the study.

In order to get the proportion to size, the estimated number of new smear positive TB patients per month prior to the data collection were obtained from each district hospital. This formula was used to find the sample size required for each hospital. Thus, we multiplied the estimated monthly new cases of sputum smear positive TB patients for each hospital by the overall estimated sample size then divided by the sum of the two monthly estimated new cases of sputum smear positive TB patients. On the health workers, all the health workers working in the TB unit were interviewed.

### 3.6 Ethical considerations

Autonomy of the patients was not compromised since before participating in the study, participants were given detailed information about the study including possible risks or benefits. The information sheet and consent found on the appendices in both English and Chichewa was communicated to the participants who were illiterate or have visual problems.

Participants were also required to give written informed consent. No study participant was coerced to take part in the study and they were at liberty to quit at any time. Codes were used on the questionnaires and data was stored in locked cabinet to ensure confidentiality and

privacy. Before starting data collection, a support letter was obtained from the local authorities (Malawi ministry of health) and health facility administrator. The study protocol was also reviewed The University of Zambia Biomedical Research Ethics Committee (UNZABREC) (reference number 015-06-16) as well as the National Health Science Research and Ethics Committee in Malawi (1679).

### **3.7 Data collection**

Data was collected using a structured questionnaire in a one to one interview. Before administering it to the participants, the questionnaire was piloted first to test for validity and reliability. In the end, 404 pulmonary TB patients were interviewed. From Mulanje there were 205 and 199 were from Chiradzulu. All health workers working in the TB ward and clinic in these two hospitals were also interviewed except a few who were on leave. In total 23 workers were interviewed. Data was collected from mid November 2016 to early February 2017.

Sections of the questionnaire for the pulmonary included social- demographic questions, health care systems related questions and psycho-social related question. The questionnaire was translated into Chichewa for better understanding of the participants. Participants were targeted from the TB clinic when they come to collect their medications. Some patients who missed their clinic day (didn't come to collect medication), were followed into their homes and interviewed from there. In Malawi, when a person is found with pulmonary TB he is given a notification note which he is supposed to give to all the household members that he has been living with for the past 3 months to come to the hospital for TB screening. The screening of the households involves history of symptoms of TB and physical examination. If the person has the signs and symptoms then he is supposed to go for chest x-ray and submit sputum for screening. Under-five children and HIV positive household members are supposed to take isoniazid as a prophylaxis (MOH, 2012b).

Only those patients who had been selected by systematic random sampling beforehand were approached for one to one interview. The TB registry was used as a sampling framework for selecting participants. The participants were recruited by the PI and the other four research assistants that were trained by the PI. All TB patients accepted to be part of the study.

For the health workers their questionnaire apart from the demographic data included questions on their duration in the TB ward, if they had undergone training on TB contact tracing, their

knowledge on prophylactic medication for population at risk of TB, availability of x-ray machine at their institution and if they do inform patients about the availability of the services. The health workers were interviewed during their free time using a different data collecting tool from the patients.

### **3.8 Data management and analysis**

Data was entered in SPSS using double data entry and was analysed using Stata version 13. Before the actual analysis, data cleaning was done whereby improperly entered and duplicated data was sorted out. The proportion of patients who brought their contacts for screening was calculated. For normally distributed data, the mean was calculated while median was used for skewed data. Univariate logistic regression was used to show associations between selected variables and the primary outcome. Multiple logistic regression analysis was used for variables that had a P value of less than 0.05 in the univariate analysis in order to adjust for confounding and also depending on what was found to be significantly associated to the primary outcome in literature. A stepwise backward elimination approach was used to come up with the final model. The primary outcome was the proportion of TB patients who brought at least one or more contacts for screening.

## **CHAPTER 4: RESULTS**

### **4.1 Results**

The median age for the pulmonary TB patients was 34 years old (IQR 27-42) with the oldest being 76 and youngest being 18 years of age.

Table 1 shows the socio demographic characteristics of the participants. Half of the respondents, (50.7%), were males. Majority of the participants were Christians (93.6%). Most of the participants went as far as primary school level in terms of education (56.2%). In terms of occupation status most of the study participants were farmers (36%) followed by business people (30.5%). Out of the patients interviewed, 71% of them earned less than \$25 dollars (< 185,000 Malawian kwacha in a month).

**Table 1: Socio-demographic characteristics of TB index cases in Chiradzulu and Mulanje district between November –February 2016-17 (n =404)**

<b>Characteristics</b>	<b>N</b>	<b>Percentage</b>
<b>District</b>		
Mulanje	205	50.7
Chiradzulu	199	49.3
<b>Sex</b>		
Female	199	49.3
Male	255	50.7
<b>Marital status</b>		
Never married	81	20.1
Divorced/widowed	65	16.1
Married	258	63.8
<b>Age group</b>		
18-25	77	19.1
26-35	154	38.1
36-45	102	25.3
46+	71	17.6
<b>Religion</b>		
Christian	378	93.6
Muslim	26	19.5
<b>Level of education</b>		
No formal education	79	19.5
Primary	227	56.2
Secondary/Higher	98	24.3
<b>Occupation</b>		
Student	28	6.9
Business	123	30.5
Salaried employment	37	9.2
Unemployed	71	17.5
Farmers	145	35.9
<b>Monthly income</b>		
<\$25	287	71
\$25-\$250	88	21.8
>\$250	29	7.2

### **Health systems characteristics**

Table 2 shows the results of health care system related characteristics. From the participants that were interviewed, 59.2% (95%CI:0.54, 0.64) of them took over 30 minutes to get to the hospital while it took less than an hour for the majority of them to receive care at the hospital (75.5%, 95%CI: 0.71, 0.79). Walking was the most frequently used mode of transport (44.3%, 95%CI: 0.40, 0.5). Half of the participants did not pay for transport (54.5%, 95%CI 0.49, 0.59). In this study, 91.3% (95%CI: 0.88, 0.91) participants reported that they were given general education on TB before starting the treatment. Out of the participants interviewed 92.8% (95%CI: 0.89, 0.94, 0.1) were very satisfied with the services offered to them. Only 26.3% (95%CI: 0.22, 0.3) were not informed about contact tracing services.

**Table 2: Health care system related characteristics of TB index cases in Chiradzulu and Mulanje district between November –February 2016-17 (n =404)**

<b>Characteristic</b>	<b>N</b>	<b>Percentage</b>	<b>95% Confidence interval</b>
<b>Distance ( time taken)</b>			
< 30 minutes	165	40.8	0.36, 0.45
>30 minutes	239	59.2	0.54, 0.64
<b>Waiting Time</b>			
< 1 hour	305	75.5	0.71, 0.79
> 1 hour	99	24.5	0.20, 0.27
<b>Transport mode</b>			
Foot	179	44.3	0.40, 0.50
Bicycle	124	30.7	0.26, 0.56
Public transport	101	25	0.21, 0.29
<b>Transport fair paid</b>			
No	220	54.5	0.49, 0.59
Yes	184	45.5	0.40, 0.50
<b>TB education</b>			
No	35	8.7	0.06, 0.11
Yes	369	91.3	0.88, 0.91
<b>Satisfaction with services</b>			
Not at all	22	5.5	0.01, 0.03
Satisfied	7	1.7	0.011, 0.012
Very satisfied	375	92.8	0.01, 0.1
<b>Informed about screening</b>			
No	106	26.3	0.22, 0.3
Yes	298	73.7	0.2, 0.7

### **Proportion of TB patients who brought at least one household**

Proportion of pulmonary TB patients who brought at least one household contact for screening was 44.8% (95% CI: 0.39, 0.49). Reasons that were given by the TB patients who did not adhere to the program include, not knowing about the service (57%), household member being busy (19%) fear of being discriminated (5%), not seeing the importance of it (14%), hospital being too far (2%) and lack of transport (3%).

### **Participant's general knowledge on TB**

Of the 404 participants interviewed, 87% of them reported that TB can be spread from coughing (by someone with TB). On the cause of TB, 82% of them knew that TB is caused by an infectious organism. All the participants in the study knew that TB can be cured by taking TB treatment from the hospital accordingly. Only 37% of the participants knew that under five children are among the high-risk groups for TB.

### **Health worker's knowledge on TB contact tracing**

Table 3 shows information about the health workers that were interviewed. In total 22 health workers were interviewed. Out of them 12 were from Mulanje district hospital and 10 were from Chiradzulu. Their average age was 37.9 with the youngest being 31 years of age and the oldest being 65 years of age. On education level, 18 of them completed their secondary school education and only one had a university degree. 36.6% of them have been working in the TB unit for about 5 to 10 years. Out of the 22 health workers that were interviewed 19 of them reported that they went for TB contact tracing training. All health workers reported that they do inform their patients about contact training.

On the availability of the x-ray machine, four of them reported that in their institution it only works three months in a year. Only one person reported that he /she doesn't know the prophylactic treatment for TB as well as people the group of people who are supposed to get this prophylactic drug. On the availability of TB drugs also one person reported that he doesn't know anything about it.

**Table 3: TB unit health worker’s knowledge on TB contact tracing in Chiradzulu and Mulanje district between November –February 2016-17 (n=22)**

<b>Characteristics</b>	<b>N</b>	<b>Percentage</b>
<b>District</b>		
Mulanje	12	54.5
Chiradzulu	10	45.5
<b>Sex</b>		
Male	18	95.2
Female	4	4.8
<b>Level of education</b>		
Secondary	18	81.8
Diploma	3	13.6
College degree	1	4.6
<b>Years worked in TB unit</b>		
Less than a year	3	13.6
Between 1-5 years	8	36.4
Between 5-10 years	8	36.4
Over 10 years	3	13.6
<b>TB contact tracing training</b>		
Yes	19	13.6
No	3	86.4
<b>Inform patients on contact tracing</b>		
Yes	22	100
No	0	0
<b>X-ray machine working</b>		
Works all the time	18	81.8
3 months of the year	4	18.2
Doesn’t work at all	0	-

Knowledge on TB prophylactic drug		
Yes	21	95.5
No	1	4.5
Knowledge on eligible Group		
Under-five & HIV positive	21	95.5
Don't know	1	4.5
Knowledge on the Drug used		
Isoniazid	21	95.5
Don't know	1	4.5
Availability of TB drugs		
Yes	21	95.5
Don't know	1	4.5

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## **Factors associated with utilization TB contact tracing program among pulmonary TB patients**

Table 4 shows factors that were associated with utilization of TB contact tracing program among pulmonary TB patient after bivariate and multiple logistic regression. In the bivariate logistic regression analysis, contact screening adherence was significantly associated with the district where the participants were coming from, age of the participant, monthly income, distance to the hospital, if they paid for transport, if they had basic TB education before initiation of TB medicine, whether they had been informed about contact tracing and the type of relationship they had with members of their household

The covariates that were included in the model includes the district where the participant were coming from, age, religion, level of education, monthly income, distance to the clinic, TB education to the patient before initiation of medication, patients who were informed about TB screening and the type of relationship that existed between the patient and household contact.

Religion and level of education was included in the multiple logistic regression despite being found not to be associated with adherence to contact tracing in the bivariate analysis because the literature that was reviewed (Gebregergs and Alemu, 2015, Fox et al., 2015).

From the analysis it shows that the participants who were coming from Chiradzulu district hospital had a less chance of bringing household contacts for screening than those from Mulanje (AOR 0.4, 95%CI. 0.18, 0.9 P=0.03). The participants who were between the ages of 26-35 had low chance of bringing their house hold contacts for screening compared to those who were between 18- 25 years of age (AOR 0.3, 95%CI. 0.14, 1.11, P=0.031). It is also noted that participants who were informed about contact screening during their hospital visits, had an increased chance of bringing at least one household contact for screening than those who were not informed (AOR 7, 95%CI 1.64, 26.8, P=0.008) and wives had a high chance of bringing their husbands and children than the husbands. (AOR 8, 95%CI 1.1, 68.3, P=0.044).

**Table 4: Factors that were associated with utilization of TB contact tracing program among TB index cases in Chiradzulu and Mulanje district between November –February 2016-17 (n=404)**

Characteristics	Crude OR (95% CI)	P value (Crude OR)	Adjusted OR (95% CI)	P value (Adj. OR)
<b>District</b>				
Mulanje	1(ref)	–	1(ref)	-
Chiradzulu	0.5 (0.33, 0.74)	0.001	0.40 (0.18, 0.9)	0.03
<b>Sex</b>				
Female	1(ref)	-		
Male	1.1 (0.68,1.49)	0.975		
<b>Age of index case</b>				
18-25	1(ref)		1(ref)	-
26-35	0.5 (0.2, 0.8)	0.007	0.34 (0.14, 1.11)	0.031
36-45	0.5 (0.2, 0.9)	0.039	0.51 (0.1, 1.3)	0.246
<46	0.4 (0.2, 0.9)	0.009	0.50 (0.1, 1.32)	0.023
<b>Marital status</b>				
Never married	1(ref)	-		
Divorced/widowed	1.1 (0.57,2.2)	0.741		
Married	1.7 (1.04,2.9)	.036		
<b>Religion</b>				
Christian	1(ref)	-	1(ref)	-
Muslim	0.9 (0.40, 2.00)	0.792	0.90 (0.2, 3.91)	0.897
<b>Level of education</b>				
No formal education	1(ref)	-	-	1
Primary	0.71 (0.78, 2.2)	0.302	2.2 (0.71, 5.69)	0.182
Secondary/ Higher	0.52 (0.1, 2.9)	0.463	1 (0 .27, 3.7)	0.997
<b>Occupation</b>				
Student	1(ref)	-		
Business	0.37 (0.16,0.87)	0.222		
Salaried employee	0.44 (0.16,1.20)	0.11		
Housewife	0.37 (0.15,0.91)	0.032		
Farmer/piece work	0.75 (0.32, 1.7)	0.5		
<b>Monthly income</b>				
<\$25	1	-	1	
\$25-\$250	0.5	0.002	0.86 (0.29, 2.48)	0.774

>\$250	1.5	0.282	2.17 (0.44,10.64)	0.337
<b>Distance</b>				
<30	1	-	1	-
>30	0.7(0.4, 1)	0.041	0.70 (0.32, 1.52)	0.367
<b>Waiting Time</b>				
< 1 hour	1	-		
> 1 hour	0.7 (0.44, 1.12)	0.14		
<b>Transport mode</b>				
Foot	1	-		
Bicycle	0.76 (0.47, 1.2)	0.233		
Public transport	0.4 (0.39,0.66)	0.246		
<b>Transport paid</b>				
No	1	-	1	-
Yes	0.6 (0.4, 0.8)	0.005	0.57 (0.26,1.28)	0.177
<b>TB education</b>				
No	1	-	1	-
Yes	3 ( 0.3 ,7.7)	0.009	0.2 (0.03, 1.17)	0.075
<b>Informed about screening</b>				
No	1	-	1	-
Yes	17 (8, 36.1)	0.001	6.64 (1.64, 26.8)	0.008
<b>Relationship with index case</b>				
Wife & children	1	-	1	-
Husband & children	9.5 (1.2, 74.3)	0,032	8.44 (1.1 ,68.3)	0.044
Children	2.6 ( 0.9, 7.4)	0,76	.1.83 (0.7, 7)	0.143
Father	2.5 ( 0.3, 21.5)	0.393	3 ( 0.4, 3)	0.215
Mother	1.1 (0,3, 3.8)	0.866	6 (0.1,2)	0.761
Siblings	0.7 (1.2, 74.3)	0,771	0.7 (0.2, 2.3)	0.813

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## 4.2 Key findings

- Out of the 404 pulmonary TB patients that were interviewed, 44.8% brought at least one household contact to the hospital for TB screening

- The main reason that was given for not bringing their household contacts for those who did not bring any was that they were not aware of the availability of the services.
- Majority of the TB patients were aware of the transmission of TB and treatment but less than 40% knew about the population at risk.
- Factors that were found to be significantly associated with bringing at least one household contact to the hospital included the district where the patient was coming from, age of the patient, whether the patient was informed about the availability of the services, and being a wife.
- Out of the 22 health workers that were interviewed, 19 went for TB contact tracing training
- All health workers were knowledgeable on high risk populations with regards to TB and the drug used as prophylaxis
- All health workers reported that they inform patients about the availability of TB contact tracing services.
- Most of the patients reported not having been informed about TB contact tracing by the health workers

## CHAPTER 5: DISCUSSION

This study describes the multiple factors that affect the utilisation of TB contact tracing in a two districts in Malawi thus Chiradzulu and Mulanje district hospital. In this study, close to 45% of the participants reported having brought at least one household contact for screening to the hospital. This finding is higher than what was found in a similar study in Ethiopia, where one third of the participants reported complying to contact tracing (Gebregergs and Alemu, 2015) . However, our finding was slightly lower than what was found in Thailand, where 52% reported bringing contacts to the hospital for screening (Tornee et al., 2005). The possible explanation to this it could be because they are all low and middle income countries (WHO, 2010). Countries in middle and low income countries do not follow TB household contacts like in the case of high income countries (WHO, 2015b). This is a missed opportunity to diagnose latent TB and to find TB cases since recent infection is high risk for progression to TB. Based on the number of patients who were found with TB in a two-year cohort study conducted in India, it was suggested that household contacts of index PTB cases carry a high risk of being diseased. Active household contact investigation is therefore a powerful tool to detect and treat tuberculosis at early stages and the only method to control TB in high-TB-burden countries (Singh et al., 2013).

The main reason that was identified in this study for not bringing their contacts for screening was that participants did not know about the services, followed by the household contact not having time to come to the hospital. This data was in direct contradiction with the data that was collected from the health workers. In this study, 100% of the health worker's reported that they do inform TB patients about contact screening and 86% of them were trained in how to carry out this program. Similar findings were noted in a study conducted in Botswana, where most of the health workers reported to have undergone training in TB contact tracing but still their health care facilities were not achieving the national TB contact tracing targets (Tlale et al., 2016).

A similar study conducted in Zambia on TB screening in children also observed that only 32.4% of the participants living with under-five children were aware of TB contact screening (Chabala et al., 2017). It is possible that the participants were informed and chose to neglect the information or they were not informed at all.

As previously identified from the other studies, there are so many factors that affect contact investigation programs which include individual, social-cultural and health system related factors (Gebregergs and Alemu, 2015).

In this study, location/the district where participants were coming from was identified to be significantly associated with TB patients adhering to contact tracing program. In spite of the fact that these two districts have similar cultural and social characteristics, patients who were coming from Chiradzulu district hospital were less likely to bring their household contacts for screening than those who were coming from Mulanje district hospital. Some of the possible explanations for this discrepancy could be the different health system-related factors that were identified in these two areas. For instance, in Chiradzulu, 15% of the patients were not given health education by the worker compared to only 2.5% for the patients in Mulanje. In their study (Gebregergs and Alemu, 2015) they also found out that health education by health worker was an important determinant of adherence to household contact screening. They reported that patients who took health education were three times more likely to adhere to contact screening. This shows the importance of education. In a study on tuberculosis knowledge, attitude and health seeking behaviour conducted in Uganda, it was pointed out that health education on transmission and curability of TB had a positive impact on health seeking behaviour (Chabala et al., 2017).

Patients being informed about contact tracing services at the hospital was another important factor that was identified in this study. It was found that patients who were informed about the services were six times more likely to bring their household contacts for screening than those who were not informed. In a study by (Ekwueme et al., 2014) it was reported that that patients who lacked information on tuberculosis cannot say much on the symptoms and signs of TB such as chronic cough as a marker for identifying a potential TB case which may lead to failure in notify the TB case to the relevant health worker. This shows still the importance of health education to TB patients. The type of information that is delivered to them is what matters most.

On the social factors, in this study it was found that wives are more likely to bring their husbands and children to the hospital than the husbands. However, this was contrary to what was found in a study conducted in Thailand (Tornee et al., 2005) where they found that the kind of relationship with the index case was not significantly associated with adherence to

contact tracing program. Another social factor that was identified to be significantly associated with adherence to contact tracing program was age. Patients who were between the ages of 26-35 were less likely to bring their contacts for screening compared to those who were between 25- 18.

### **5.1 Limitations**

There are some limitations that should be taken into account on the findings of this study. Firstly, the study was cross-sectional and therefore we cannot make any causal inferences. Secondly, there might have been elements of social desirability bias from participants on the question pertaining to whether they were satisfied with the services or not. Thirdly, the setting was only limited to rural districts, because these were the areas with high prevalence rate of TB in Malawi. Despite these limitations, the relatively large sample size enabled the study to provide robust estimates that can be generalizable to areas with similar characteristics.

## CHAPTER 6: CONCLUSION

The proportion of TB patients who brought household contacts to the hospital for screening was low in this study. Social economic and health systems related factors were identified to be significantly associated with utilisation of TB contact investigation. Majority of the pulmonary TB patients were not aware of the population at risk of TB. Lack of knowledge on TB and TB contact tracing was one of the main reasons identified for TB patients not adhering to the program. This is the case despite the majority of the health workers being trained on how to offer these services and reporting that they inform patients about the availability of these services. Therefore, promotion of health education on general knowledge on TB including the importance of TB contact tracing to the community using the opinion leaders is recommended.

### 6.1 Recommendations

From the finding of this study, it shows that there is poor adoption of the innovation of contact tracing of pulmonary TB patients. The main reason that was given was poor awareness of the services among the patients. Classical diffusion paradigm by Rodgers can be used to analyse and find a way on how to improve adoption of this innovation. Classical diffusion paradigm is described as a process through which an innovation is communicated through certain channels over-time among the members of a social system (Dearing, 2009).

- I. The adopters in this case which are the health workers needs to be motivated and educated about the importance of this service so that they should see the need to offer these services to the users.
- II. There is a need to promote the importance of household screening of pulmonary TB patients among the local informal opinion leaders, who in the end will be able to diffuse the information to their people. In the end, the patients will be able to ask for these services at the hospital. Hence, change will occur in a positive manner if the end users in this case the pulmonary TB patients are well-informed and will correctly seek out the intervention.
- III. Health education on the availability and importance of these services can be communicated to the society through the media, mass campaigns as well as social mobilisation.

IV. Special focus should be given when providing TB health messages to community members aged between 36-45 years of age to encourage more of them to utilise contact tracing services at the health facilities.

Given the discrepancy between health workers' self-reported adherence to WHO contact tracing guidelines, versus patients' reports that they are usually not informed of the availability of these services, a study on implementation fidelity of the guidelines on TB Contact tracing should be conducted in these two hospitals

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## **APPENDICES**

### **Appendix A: Participant information sheet**

**Study title: ‘Factors affecting implementation of tuberculosis contact tracing’**

**Principal Investigator: Caroline Masangalawe**

**IRB NO:**

This is a questionnaire survey to assess the factors that affect implementation of TB contact tracing in Malawi. We request and require your consent from you to participate in the study. The principal investigator is Caroline Masangalawe, a student in masters in epidemiology at university of Zambia and the supervisor id Dr Gershom Chongwe and Dr Monde Muyoyeta

#### **Aim of the study**

The Main aim of the study is to identify factors affecting utilization of tuberculosis contact tracing services among TB sputum positive patients. This will be achieved by acquiring information about their knowledge on TB in general and TB contact tracing. We believe that the findings from this study will help the national Tb control program to dress the problems that will be identified hence improve on fight against TB.

#### **Study Procedure**

If you will accept to take part in the study you are going to be interviewed using a structured questionnaire in a private place alone. The question will be about personal information and knowledge on TB and TB contact tracing. The interview will take about 20 minutes.

#### **Risks**

There is no physical risks associated with this research. However, some information that you are required to give might be sensitive to the health workers be assured that the information that we get from you will not be shared with anyone outside the research team.

#### **Benefits**

By participating in this research you will help researchers in understanding why contact tracing services are not carried properly in Malawi and the information will help improving TB contact tracing services hence increase identifying new cases of TB.

### **Right to Withdraw**

Participation is voluntary and you are free to withdraw at any point during the study. You are not going to be penalised.

There is no form of payment from this study

### **Any questions regarding the study contact**

If you have further questions you should contact **Caroline Masangalawe** at **+265 999 566 288**. Email address: [carolthoko@gmail.com](mailto:carolthoko@gmail.com) or

The University of Zambia Biomedical Research Ethics Committee office for any ethical queries. The Ethics Committee contact information is:

Address:        Ridgeway Campus

                  P.O. Box 50110

                  Lusaka, Zambia

Telephone:    +260-1-256067

                  Fax:        + 260-1-250753

                  E-mail:    unzarec@zamtel.zm

Thanks you very much

Any question?

**Appendix B: Consent form**

**I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study on factors affecting implementation of TB contact tracing. I understand that my participation is voluntary and I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.**

**I understand that sections of any of the data collected from me during the study, may be looked at by responsible individuals from University of Zambia. I give permission for these individuals to access my records.**

**I agree to take part in the above study.**

_____	_____	_____
<b>Name of Participant</b>	<b>Signature</b>	<b>Date</b>

_____	_____	_____
<b>Name of Person taking consent</b>	<b>Signature</b>	<b>Date</b>
<b>(if different from Principal Investigator)</b>		

_____	_____	_____
<b>Principal Investigator</b>	<b>Date</b>	<b>Signature</b>

## Appendix C: Data Collection tool 1(patients)

### Social demographic data

1. Sex  
Male   
Female
  
2. Age
  
3. What is your marital status
  - a. Married
  - b. Single
  - c. Divorced
  - d. Widow
  
4. What is your religious group
  - a. Christian
  - b. Muslim
  - c. Other (specify).....
  
5. How far did you go with education
  - a. No formal education
  - b. Primary education
  - c. Secondary education
  - d. Tertiary education
  
6. What is your occupation
  - a. Student
  - b. Farmer
  - c. Business man
  - d. Work with the government
  - e. House wife
  - f. No work
  - g. Others (specify).....
  
7. How much income do you make in a month?
  - a. <25\$
  - b. 25& - 250\$
  - c. >250\$

### Health care system related factors

1. How long did it take to reach the clinic

- a. <30minutes
  - b. >30minutes
2. How long did they wait to be attended to
- a. <1hour
  - b. >1hour
3. How did you travel to the hospital
- a. By foot
  - b. By a bicycle
  - c. Public transport
  - d. Personal vehicle
  - e. Other .....
4. Did you pay for transport when coming to the hospital?
- a. Yes
  - b. No
  - c. If yes how much
5. Were you given health education by a health worker on TB after being diagnosed?
- a. Yes
  - b. No
6. Are you satisfied with the services that are offered here
- a. Not at all satisfied
  - b. Slightly satisfied
  - c. Moderately satisfied
  - d. Very satisfied
  - e. Extremely satisfied
7. Were you informed about bringing your household contacts to the clinic for screening?
- a. Yes
  - b. no

### **Tuberculosis contact tracing related questions**

1. How many people have been living with in the same house for the past 3months?
  - a. None
  - b. More than 1
  
2. How many of them did you bring for screening after being diagnosed with TB?
  - a. None
  - b. 1
  - c. >1
  - d. All
  
3. What is the type of relationship between you and people you brought for screening
  - a. wife and children
  - b. husband and children
  - c. children(child) only
  - d. father
  - e. mother
  - f. others (specify)
  
4. If none why is it so?
  - a. Did not know
  - b. Contact had no time
  - c. Fear of being stigmatised and discriminated against
  - d. Didn't see the importance
  - e. Others (specify)

## **Knowledge and attitude on TB**

1. How is TB transmitted?
  - a. Sneezing
  - b. Talking
  - c. Sharing utensils
  - d. Sleeping in the same bedroom
  - e. Hugging and kissing
  - f. Sharing the same toilet and bathroom
  - g. Sexual intercourse
  - h. Other (specify).....
  
2. TB is caused by
  - a. An infectious organism
  - b. Living in an hygienic environment
  - c. Inherit from parents
  - d. Others (specify).....
  - e.
  
3. Which group of people are at risk of developing TB?
  - a. Children
  - b. Tobacco smokers
  - c. HIV positive
  - d. People with poor nutrition status
  - e. Others specify
  
4. TB can be completely cured if someone is taking
  - a. Western medicine for TB
  - b. Traditional medicine
  - c. Cannot be cured
  - d. Others (specify).....



b. No

10. If yes which group of people are supposed to be given the prophylactic drug

- a. Under-five children and HIV positive patients
- b. Pregnant women
- c. Others

11. Which drug is used for prophylaxis

- a. Isoniazid
- b. Rifampicin
- c. Pyrazinamide
- d. Ethambutol
- e. Streptomycin
- f. others

12. is this drug usually available in this hospital TB unit?

- a. yes
- b. no

## Appendix E: Participant information sheet Chichewa version

**Study title: ‘Factors affecting implementation of tuberculosis contact tracing’**

**Principal Investigator: Caroline Masangalawe**

**IRB NO:**

*Inu mukupemphedwa kutenga nawo mbali pa kafukufuku wokufuna kumvetsetsa mfundo komanso njira zokhudzana kalondolondo wabale omwe apezeka ndi chifuwa chachikulu chamakhololo. Amene akutsogolera kafukufukuyu ndi Caroline Masangalawe yemwe ndi wa ku Sukulu ya ukachenjede ya mdziko la Zambia motsogozedwa ndi Dr. Gershom Chongwe komanso Dr. Monde Muyoyetsa.*

### **CHOLINGA CHA KAFUKUFUKU**

*Cholinga cha kafukufukuyu ndi kufuna kumvetsetsa zambiri zokhudzana ndi magwiritsidwe nthito a njira zolumikizirana ndi abale a anthu omwe apezeka ndichifuwa chachikulu chammakhololo. Tikhala tikufunsa mafunso wokhudzana ndi m'mene iwo amawadziwira matendawa komanso m'mene amalumikizirana ndi wopereka chithanzizo pamene apezeka ndi chifuwa chachikulu. Tikukhulupirira kuti zotsatira za kafukufukuyu zidzagwiritsidwa ntchito ndi bungwe lalikulu lowona za matenda a chifuwa chachikulu pamene akugwira ntchito yolimbana ndi matendawa.*

### **NDONDOMEKO YA KAFUKUFUKU**

*Ngati muvomereze kutenga nawo mbali pa kafukufukuyu, tikufunsani mafunso ndipo tikukutsimikizirani kuti zonse zimene tikambirane ndi zachinsinsi. Tifuna timve zambiri zokhudzana ndi inu komanso matenda a chifuwa chachikulu ndi zina zokhudzana ndi matendawa.*

### ***PALIBE CHIOPSEZO CHILICHONSE PA KAFUKUFUKUYU***

*Tifuna kukutsimikizirani kuti pamene mukutenga nawo mbali pa kafukufuku ameneyu, palibe chiopsezo chilichonse pathupi lanu komanso pamoyo wanu ndipo mukhale omasuka chifukwa zonse zimene tikambirane sizidzalengezedwa kulikonse koma zithandizira pantchito yokhayo yokhudzana ndi kafukufukuyu.*

### ***PHINDU LA KAFUKUFUKU***

*Pamene mukutenga nawo mbali pa kafukufukuyu, muthandiza wochita kafukufuku kuti amvetsetse zifukwa zimene zikupangitsa kuti njira zofufuzira ndi kulumukizana ndi anthu amene apezeka ndi matenda a chifuwa chachikulu zisamagwiritsidwe ntchito mokwanira. Zotsatira za kafukufukuyu zidzagwiritsidwa ntchito popititsa patsogolo ntchito yofufuza ndi kulumukizana ndi anthu amene abale awo apezeka ndi chifuwa chachikulu kuti alandire chithandizo choyenera.*

### ***UFULU WANU PA KUTENGA MBALI***

*Kutenga mbali kwanu pa kafukufukuyu sikokakamiza koma mayankho anu ndi wofunikira kwambiri*

*Pamene mutenga nawo mbali pa kafukufukuyu, palibe malipiro ali wonse amene mulandire.*

*Ngati pali mafunso kapena ndemanga zokhudzana ndi kafukufukuyu, lumikizanani ndi akuluakulu pogwiritsa ntchito zotsatirazi:*

**Caroline Masangalawe** at **+265 999 566 288**. Email address: carolthoko@gmail.com.

The University of Zambia Biomedical Research Ethics Committee office for any ethical queries. The Ethics Committee contact information is:

Address: Ridgeway Campus  
P.O. Box 50110  
Lusaka, Zambia

Telephone: +260-1-256067  
Fax: + 260-1-250753  
E-mail: unzarec@zamtel.zm

Or

National Health Sciences Research Committee  
Ministry of Health, P.O. Box 3037, Lilongwe 3, Malawi  
Tel: +265 1 726 422/418. Email: *mohdoccentre@gmail.com*

***Zikomo kwambiri. Ngati pali mafunso kapena ndemanga, khalani omasuka kuyankhula tisadayambe kucheza kwathu.***

***Appendix F: kuvomeleza kutenga nawo mbali pakafukufukuyu:***

***Ndawerenga mokwanira chikalata chokhudzana ndi kutenga mbali pa kafukufukuyu ndipo ndapatsidwa mpata woyankhulapo kapena kufunsa mafunso pamene ndingafune kutero. Ine ndikuvomereza kutenga nawo mbali pa kafukufukuyu ndipo ndamvetsetsa kuti kutenga mbali kwanga ndi kosakakamizidwa komanso ndikhoza kutsanzika nthawi iliyonse ngati kungafunike kutero.***

***Ndamvetsetsa kuti zimene ndifotokoze pa kafukufukuyu zikawonedwa ndi kugwiritsidwa ntchito ndi akuluakulu a ku sukulu ya ukachenjede yaku Zambia. Ndikuvomereza kuti akuluakulu amenewa akawone ndi kugwiritsa ntchito zimene ndifotokoze.***

*Ine ndikuvomereza kutenga nawo mbali pa kafukufukuyu.*

\_\_\_\_\_

<b>Dzina la otenga mbali</b>	<b>Signature</b>	<b>Tsiku</b>
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<b>Name of Person taking consent</b> <b>(if different from Principal Investigator)</b>	<b>Signature</b>	<b>Date</b>
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<b>Principal Investigator</b>	<b>Date</b>	<b>Signature</b>
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## Appendix G: Data Collection tool Chichewa version 1(patients)

### Social demographic data

8. Sex
- Male
- Female
9. Muli ndi zaka zingati
10. Kodi muli pa banja?
- 11.
- a. Okwatira/okwatiwa
  - b. Sali pabanja
  - c. Banja linatha
  - d. Wamasiye
12. Ndinu achipembedzo chanji?
- a. Chikhilisu
  - b. Chisilamu
  - c. Ngati muli a zipembezo zina, tiuzeni.....
13. Sukulu munalekeza kalasi yanji?
- a. Sindinaphunzileko
  - b. Analekezela ku primary
  - c. Analekezera ku sekondale
  - d. Anafika ku koleji
14. Mumapanga chani pa moyo wanu wa tsiku ndi tsiku?
- a. Ali pa sukulu
  - b. Ulimi
  - c. Bizinesi
  - d. Kugwila ntchito mboma
  - e. Mzimayi wapakhoma
  - f. Samagwila ntchito ina iliyonse
  - g. Ntchito zina, Tiuzeni
15. kodi pa mwezi mumapeza ndalama zingati?
- a. Zosapitilira MK18500
  - b. Zapakati pa MK18500 ndi MK185000

c. Zoposera MK185000

**Health care system related factors**

8. Ndi ntunda wautali bwanji kukafika kuchipatala chapafupi
  - a. Nthawi yosakwana mphindi makumi atatu
  - b. Nthawi yopitilira mphindi makumi atatu
  
9. Zimatenga nthawi yaitali bwanji kuti muthandizidwe?
  - a. Osapitilira ola limodzi
  - b. Kupitilira ola limodzi
  
10. Kuti mukafike ku chipatala, mumayenda bwanji?
  - a. Kuyenda pansi
  - b. Kuyenda pa njinga
  - c. Kuyenda pa ma galimoto olipilitsa
  - d. Kuyenda pa galimoto yanu
  - e. Njira zina. Tiuzeni.... Ngati zilipo
  
11. Munalipila ndalama iliyonse ya thiransipoti pobwera ku chipatala kuno?
  - a. Eya
  - b. Ayi
  - c. Ngati munalipila, ndi ndalama zingati
  
12. Atakuyezani matenda a chifuwa chachikulu, alangizi azaumoyo anakupasanipo uphungu wina uliwonse okhuzana ndi matendawa?
  - a. Eya
  - b. Ayi
  
13. Ndinu okhutira ndi mmene mukulandilira chithandizo pa chipatala pano?
  - a. Sindili okhutira
  - b. Okhutira pang'ono
  - c. Okhutisidwako
  - d. Okhutira
  - e. Okhutira kwambiri
  
14. Munauzidwapo zokuti mubwere ndi achibale amene mumakhala kuti nawononso azawayeze matendawa?
  - a. Eya
  - b. Ayi

### **Tuberculosis contact tracing related questions**

5. Pa miyezi itatu yapitayi, mumakhala anthu angati mnyumba mwanu?
  - a. Palibe
  - b. Oposera mmodzi
  
6. Ndi angati mwa anthu omwe mumakhala nawo pa nyumba panu omwe anabwerapo ku chipatala kuno kuzayezedwa ngati ali ndi matenda a chifuwa chachikulu?
  - a. Palibe
  - b. Mmodzi
  - c. Oposera mmodzi
  - d. Onse
  
7. Ndi ubale wanji omwe ulipo pakati pa inu ndi anthu omwe mumakhala nawo omwe anabwera kuzayezedwa matenda a chifuwa chachikulu?
  - a. Mkazi ndi ana
  - b. Mzibambo ndi ana
  - c. Mwana/ana okha
  - d. Mzibambo
  - e. Mzimayi
  - f. Ena, tiuzeni
  
8. Ngati palibe, ndichifukwa chani?
  - a. Sitimadziwa
  - b. Anthu analibe nthawi
  - c. Kuopa kuti azasalidwa mmudzi
  - d. Sitimaona ubwino wake
  - e. Zina zoonjezera. Tiuzeni

### **Knowledge and attitude on TB**

5. Kodi matenda a chifuwa chachikulu amafala bwanji?
  - a. Kuyetsemula
  - b. Kulankhula
  - c. Kubwelekana ziwiya
  - d. Kugona chipinda chimodzi
  - e. Kukumbatilana kapena kupyompyonana
  - f. Kugwilitsa ntchito bafa kapena chimbuzi chimodzi ndi odwala
  - g. Pogonana
  - h. Ngati pali zina, tiuzeni.....
  
6. Kodi nthenda ya chifuwa chachikulu imayamba bwanji?
  - a. Pali tizilombo timene timayambisa matendawo
  - b. Kukhala malo omwe palibe ukhondo
  - c. Kupasilidwa ndi makolo pobadwa
  - d. Ngati pali zina, tiuzeni.....
  
7. Ndi gulu liti la anthu lomwe lili pa chiophyezo kwambiri chotenga matenda a chifuwa chachikulu?
  - a. Ana
  - b. Anthu osuta fodya
  - c. Anthu amene akudwala matenda a HIV AIDS
  - d. Anthu amene ali ndi vuto lakusowa zakudya nthupi
  - e. Zina ngati zilipo, tiuzeni.
  
8. Kodi nthenda ya chifuwa chachikulu, ingachizike bwanji?
  - a. Mankhwala akuchipatala ochiza nthendayi.
  - b. Mankhwala azisamba opezekera kwa asing'anga
  - c. Singachizike
  - d. Zina zoonjezera, tiuzeni.

**Appendix H: Data Collection tool 2 chichewa version (health workers)**

13. Zaka

14. Sex

Male

Female

15. Sukulu munalekeza pati?

- a. Postgraduate education
- b. College degree
- c. Diploma
- d. Secondary school
- e. Primary school

16. Ndi zaka zingati zomwe mwakhala mukugwila ntchito zokhuzana ndi anthu odwala matenda a chifuwa chachikulu

- a. Nthawi yosakwanila chaka chimodzi
- b. Pakati pa chaka chimodzi ndi zisanu
- c. Pakati pa zaka zisanu ndi khumi.
- d. Zaka zopitilira khumi

17. Kodi munamvapo kapena kupangapo maphunziro okhuzana ndi kulondoloza za achibale omwe amakhala pafupi ndi omwe akudwala matenda a chifuwa chachikulu?

- a. Eya
- b. Ayi

18. Ngati munamvapo kapena kupangapo maphunzilo amenewa, odwala matenda a chifuwa chachikulu munawauzapo?

- a. Eya
- b. Ayi

19. Ngati simunawauzapo, nchifukwa chani?

- a. Kusowa nthawi
- b. Kuchuluka kwa odwala
- c. Sitiona kufunikila kowauza
- d. Odwalawo samabwera kuti azauzidwe

20. Kodi makina owunikila nthupi a X-ray akugwila ntchito pa chipatala pano?

- a. Nthawi zonse
- b. Miyezi itatu yapachaka
- c. Miyezi isanu ndi umodzi yapachaka
- d. Samagwila ntchito

21. Mukuziwapo za mankhwala aliwonse amene munthu amayenera kumwa kuti asatenge matenda a chifuwa chachikulu?
- Eya
  - Ayi
22. Ngati mukuwaziwa, ndi gulu liti la odwala lomwe limayenera kulandila ntundu wa mankhwala amenewa?
- Ana osakwana zaka zisanu komanso omwe akudwala matenda a HIV ndi edzi
  - Azimayi oyembekezera
  - Zina zoonjezera
23. Ndi mankhwala anji amene munthu amayenera kumwa kuti asadwale matenda a chifuwa chachikulu?
- Isoniazid
  - Rifampicin
  - Pyrazinamide
  - Ethambutol
  - Streptomycin
  - others
24. Kodi mankhwala amenewa amapezeka nthawi zonse pa chipatala pano?
- Eya
  - Ayi

