FACTORS AFFECTING EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS AMONG ADULT PATIENTS IN BUNDIBUGYO HOSPITAL, WESTERN UGANDA

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DECLARATION

I Opima Geoffrey declare that this research report is my own piece of work and has never been submitted to any other university or institution of higher learning for degree award or other academic award of any kind.

Signature ……..

Date …….

APPROVAL

I certify that this research report has been written under my supervision as the student's University Supervisor.

Signature……

Mr. Afayo Robert

Supervisor

Date…….....

DEDICATION

I dedicate this research report to my family; wife Anne and children; Elvis, Tony and Trinity

ACKNOWLEDGMENT

I would like to thank the Almighty God who helped me to complete this course successfully.

I thank my supervisor, Mr. Afayo Robert who dedicated his time in guiding me to complete this report.

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OPERATIONAL DEFINITIONS

Diagnostic delay: Time interval between the first consultation with a healthcare provider and diagnosis.

Haemoptysis: Presence of blood in the sputum

Patient delay: Time interval between onset of symptoms and the patient's first contact with a healthcare provider.

Pulmonary tuberculosis: Lung disease caused by mycobacterium tuberculosis

Total delay: Time interval between onset of symptoms, the patient's first contact with a healthcare provider and diagnosis of the patient with pulmonary tuberculosis. For this research, the delay refers to total delays and this is simply defined as delays.

Tuberculosis: A bacterial disease caused by mycobacterium tuberculosis and primarily affect the lungs but can affect any part of the body.

LIST OF ABBREVIATIONS

AIDS:	Acquired Immune Deficiency Syndrome
AOR:	Adjusted Odds Ratio
ARVs:	Anti-Retroviral Drugs
CI:	Confidence Interval
HIV:	Human Immuno-deficiency Virus
MoH:	Ministry of Health Uganda
OR:	Odds Ratio
SD:	Standard Deviation
SPSS:	Statistical Software for Social Scientists
TB:	Tuberculosis
PTB:	Pulmonary Tuberculosis
WHO:	World Health Organization

ABSTRACT

Background: Tuberculosis(TB) remains a public health problem worldwide (WHO, 2017a). World Health Organization's End TB Strategy advocates for early diagnosis of tuberculosis with a target of being able to detect over 90% of all new cases of TB by 2035 for ending TB disease (WHO, 2015). The Uganda's Ministry of Health has put a lot of emphasis on early diagnosis and early initiation of treatment as well as ensuring that treatment for tuberculosis is available free of charge. Despite the ministry's efforts, informal review of cases of pulmonary tuberculosis managed at Bundibugyo hospital in 2015 showed that about 2 in 5 cases were diagnosed late with the disease (Bundibugyo Hospital, 2016). Hence this study sought to assess factors affecting early diagnosis of pulmonary tuberculosis among adult patients who were undergoing treatment at Bundibugyo hospital from July to September 2017.

Objectives: The study aimed to assess factors affecting early diagnosis of pulmonary tuberculosis(PTB) among adult patients who were on treatment at Bundibugyo hospital.

Methods: This study adopted a cross sectional analytical study design. The study was carried out at Bundibugyo hospital. Consecutive sampling was used to select 152 patients with PTB who participated in this study. Only primary data were collected using questionnaire. The questionnaires had both open and closed ended questions. The questionnaires were pre-tested and adjusted before data collections. Data analyses were done using SPSS software.

Results: Only 3 (2%) of the 152 patients managed at Bundibugyo hospital for pulmonary tuberculosis were diagnosed with the disease early. Most patients (98%) had delayed diagnosis of pulmonary tuberculosis. Age of patients (X^2= 17.723, P= 0.001) and their marital status (X^2= 13.365, P= 0.010) were the only socio-demographic factors associated with diagnosis of pulmonary tuberculosis. Visiting a private clinic (X^2= 5.101, P= 0.024) before treatment was the only personal factor associated with early diagnosis of pulmonary tuberculosis.

Conclusions: The proportion of patients who were diagnosed early with pulmonary tuberculosis in Bundibugyo hospital was found to be very low. Age of patients and their marital status were the only socio-demographic factors associated with diagnosis of pulmonary tuberculosis. A patient visiting a private clinic for first consultations was the only personal factor associated with early diagnosis of pulmonary tuberculosis.

Recommendations: The unit should intensify health education about early diagnosis of tuberculosis in all out-patients points of care within the hospital. The hospital should ensure that all its care providers are actively involved in sensitizing patients under their care about need for early diagnosis and treatment in case of infection with pulmonary tuberculosis. The Ministry of Health should also strengthen the public private partnership for health to improve early diagnosis of pulmonary tuberculosis since this study has shown that visiting private clinics first is associated with delayed diagnosis of pulmonary tuberculosis.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The study is on Factors Affecting Early Diagnosis of Pulmonary Tuberculosis among Adult Patients in Bundibugyo District, Western Uganda. This chapter covers the background of the study, statement of the problem, study objectives, research questions, justification of the study, and conceptual framework.

1.2 Background of the study

According to World health Organization (WHO), Tuberculosis (TB) is a bacterial disease caused by mycobacterium tuberculosis which mostly affect the lungs (WHO, 2017a). Worldwide, almost a third of the global population has latent TB which is an inactive form of the TB disease (WHO, 2017a). Further, active TB disease may have mild symptoms for many months and this may lead to delays in seeking care and thus delayed diagnosis (WHO, 2017a). Delay in diagnosis of active TB disease in an individual can lead to further spread of the bacteria to other people (WHO, 2017a). Worse still, an individual with active TB disease has the potential to infect 10–15 people within close contact in a year's period (WHO, 2017a). This therefore means, early diagnosis of the disease is essential for initiation of care early enough given that on average 45% of people with active TB disease will die without proper treatment (WHO, 2017a). The figure is even worse for person infected with HIV where almost all those who get TB end up dying from the disease without proper treatment (WHO, 2017a).

Tuberculosis remains a public health problem worldwide (WHO, 2017a). In 2015, over a million children aged between 0 and 14 years got ill with TB. In addition, 170,000 children (minus children infected with HIV) died from tuberculosis in the same year (WHO, 2017a).
Developing countries are the worst hit with more than 95% of the global TB cases and deaths in these countries (WHO, 2017a). Furthermore, Africa is one of the two most affected continents with 26% of the new TB cases in 2015 occurring in Africa (WHO, 2017a). Tuberculosis disease affects countries disproportionately with 87% of the new TB cases occurring in only 30 countries described as high TB burdened countries (WHO, 2017a). In addition, 60% of the global new cases of tuberculosis occurred in only six countries in 2015 (WHO, 2017a).

Globally, health systems miss 3.6 million people with TB yearly and these people may not only fail to get treatment they need but also continue to spread the disease to other non-infected people (WHO, 2015). Tuberculosis can be diagnosed in a number of ways including clinical examinations, sputum smear microscopy, rapid test Xpert MTB/RIF®, culture, and imaging among other tests of which sputum smear microscopy is the most commonly used (WHO, 2017a). Unfortunately, microscopy has been reported to detect only half of TB cases (WHO, 2017a).

In Uganda, tuberculosis remains among the greatest public health challenges. Although the country is no longer among the TB high burden countries, it's still among the 20 most burdened countries with TB/ HIV epidemics (WHO, 2017b). In 2015 alone over 6000 Ugandans lost their lives to tuberculosis with over 79,000 contracting tuberculosis (Storla et al., 2008, WHO, 2015). Early diagnosis of pulmonary tuberculosis of tuberculosis is vital in the control of the disease. In addition, there is inadequate information regarding early diagnoses of tuberculosis in Uganda hence this study seeks to assess factors affecting early diagnosis of pulmonary tuberculosis among adults in Bundibugyo hospital.

1.3 Statement of the Problem

Tuberculosis still remains among the leading cause of morbidity and mortality in Uganda. World Health Organization (2015) recommends early diagnosis of pulmonary tuberculosis for effective control of the disease through early and effective treatment to reduce transmission of the bacteria to other people and better treatment outcome. World Health Organization's End TB Strategy advocates for early diagnosis of tuberculosis with a target of being able to detect over 90% of all new cases of TB by 2035 for ending TB disease (WHO, 2015). The Uganda's Ministry of Health through the National TB and Leprosy Control Programme has ensured that TB treatment is accessible to the population free of charge. In addition, the ministry has put a lot of emphasis on early diagnosis, early initiation of treatment and reducing the transmission of the mycobacterium tuberculosis through mass sensitizations using different channels of communication and in different languages to ensure that large numbers of Uganda's population are sensitized about TB. Despite the ministry's efforts, informal review of cases of pulmonary

tuberculosis managed at Bundibugyo hospital in 2015 show that about 2 in 5 cases are diagnosed late with the disease (Bundibugyo Hospital, 2016). On the contrary, delayed diagnosis leads to delayed treatment with a higher chance of developing complications resulting from the TB disease, poor treatment outcome, increased transmission of tuberculosis and higher cost of treatment to the family and country (WHO, 2015).

1.4 Study objectives

1.4.1 General objective

Assess factors affecting early diagnosis of pulmonary tuberculosis among adult patients who are currently on treatment at Bundibugyo hospital.

1.4.2 Specific objectives of the study were:

- To determine the proportion of adult patients with early diagnosis of pulmonary tuberculosis among patients currently getting treatment at Bundibugyo hospital in the last 12 months.
- To establish socio-demographic factors affecting early diagnosis of PTB among patients diagnosed with pulmonary tuberculosis who are currently getting treatment at Bundibugyo hospital in the last 12 months.
- To determine personal factors affecting early diagnosis of PTB among patients with pulmonary tuberculosis who are currently getting treatment at Bundibugyo hospital in the last 12 months.

1.5 Research questions were:

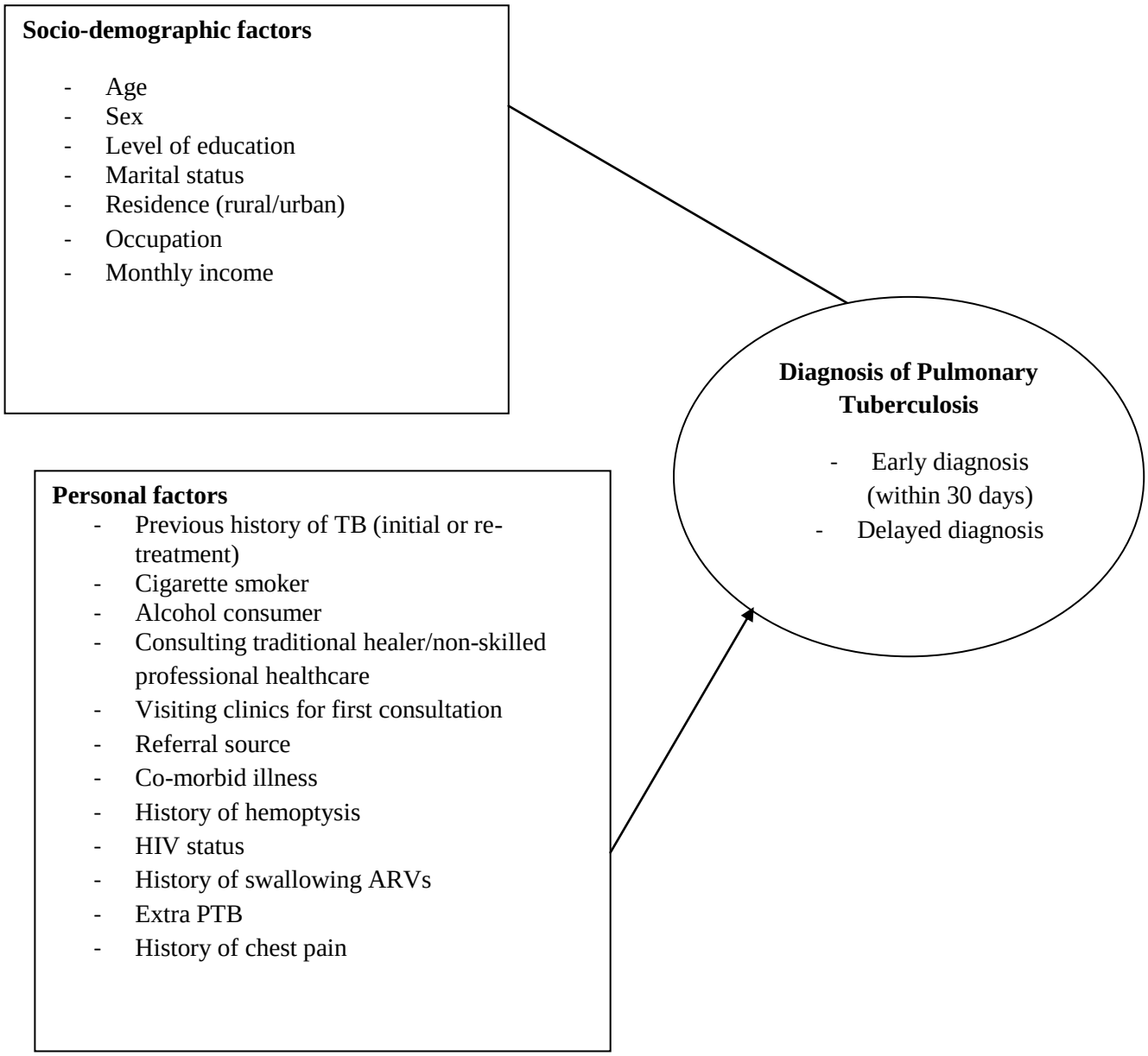
- What is the proportion of adult patients with early diagnosis of pulmonary Tuberculosis in Bundibugyo hospital in the last 12 months?
- What are socio-demographic factors affecting early diagnosis of PTB among patients treated with pulmonary tuberculosis in Bundibugyo hospital over the past of 12 months?
- What are personal factors affecting early diagnosis of PTB among patients treated for pulmonary tuberculosis in Bundibugyo hospital over the past 12 months?

1.6 Significance of the Study

The aim of this research was to investigate factors affecting early diagnosis of pulmonary tuberculosis among patients who are currently undergoing treatment for PTB at Bundibugyo hospital. This has been warranted by lack of information regarding early diagnosis of pulmonary tuberculosis among patients getting treatment for PTB at Bundibugyo hospital despite informal review which show that late diagnosis of PTB is high at the hospital. The primary beneficiaries of the findings of this study were Bundibugyo hospital management. The findings of this study provided information regarding factors affecting early diagnosis of pulmonary tuberculosis among patients getting care at Bundibugyo hospital. This information can be used by the management of Bundibugyo hospital to put in place specific measures to address identified factors responsible for delay in diagnosis of pulmonary tuberculosis at the hospital. Consequently, this would help to improve diagnosis of PTB at the hospital which in turn should improve the overall care for person diagnosed with pulmonary tuberculosis since early diagnosis is vital for effective control of the PTB disease. Further, the District Health Office of Bundibugyo could also use the evidence generated from this study to develop effective health education messages to sensitize the community as well as improve surveillance of the PTB in the district. In addition, findings of the study could also be used by the Ministry of Health (MOH) to develop strategies and fill policy gaps in the diagnosis of PTB that can be implemented to improve diagnosis of pulmonary tuberculosis and the overall management of tuberculosis burden in the Uganda.

1.7 Conceptual framework: Envisaged relationship between independent and dependent variables

Independent variables **Dependent variable**



Narrative

It was envisaged that socio-demographic factors of age, sex, level of education, marital status, place of residence (rural/urban), occupation and monthly income among others affect early diagnosis of PTB.

Likewise it was thought that personal factors of cigarette smoking, consuming alcohol, previous history of TB, consulting traditional healer/ non-skilled professional healthcare, visiting clinics for first consultation, referral source, co-morbid illness, history of hemoptysis, HIV status, history of swallowing ARVs, Extra PTB and history of chest pain can affect early diagnosis of pulmonary tuberculosis. These in turn affect treatment and the overall management and control of the disease.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This study aimed at assessing factors affecting early diagnosis of pulmonary tuberculosis among adult patients who are currently on treatment at Bundibugyo hospital. This section presents the summary of related studies reviewed regarding diagnosis of pulmonary tuberculosis at global, regional and local levels. It is presented according to the specific objectives.

2.2 Proportion of patients diagnosed early with pulmonary tuberculosis

A five-year study period in Taiwan among 78,118 patients newly diagnosed with PTB found that the mean diagnosis time was only 12days with only 24.9% of the patients having late diagnosis (Lin et al., 2009). Furthermore, a systematic review of 52 studies on pulmonary tuberculosis in both low and high income countries reported a mean delay of 31.7 and 28.5 days in low and high income countries respectively (Sreeramareddy et al., 2009). Further, a study of 924 patients aged at least 15 years diagnosed with pulmonary tuberculosis among government health facilities in 10 districts of Ethiopia found that the mean delays in diagnosing PTB was 60 days (Mesfin et al., 2009). Similarly, a cross sectional study among 639 patients with PTB at a hospital in Dar es Salaam, Republic of Tanzania found that about fifty three percent of the patients had delay in diagnosis of PTB (Mfinanga et al., 2008). Similarly, a cross sectional study conducted in Pwani region, Tanzania about delays in detection of TB cases found that the mean total delay in diagnosing a patient with tuberculosis was 125.5 days with 121 (58.7%) of the 206 patients having had delayed diagnosis (Ngadaya et al., 2009).

In Uganda, a cross-sectional health facility based study in Mukono and Wakiso districts among 158 adult patients with confirmed diagnosis for pulmonary tuberculosis found that majority of the patients (90%) had delays of over one month in diagnosing pulmonary tuberculosis (Buregyeya et al., 2014). Contrary to the above, a cross-sectional study conducted among 253 patients at government primary healthcare facilities in Kampala city found that only 24.1% of the patients had a long total delay (Sendagire et al., 2010). Additionally, the study reported a median total delay of 60 days with others spending up to 90 days to be diagnosed with the disease (Sendagire et al., 2010).

2.3 Socio-demographic factors and early diagnosis of PTB among patients diagnosed with pulmonary tuberculosis

A systematic review of over 40 studies on delays in diagnosing pulmonary tuberculosis in 17 Asian countries found that shorter patient delays was associated with male patients [odds ratio (OR) (95% confidence intervals, CI) = 0.85 (0.78, 0.92); 1.39 (1.08, 1.78)] (Cai et al., 2015). Furthermore, the study reported that travelling long distance to the first healthcare provider was also associated with shorter provider delays [OR (95%CI) = 0.96 (0.93, 1.00); 1.68 (1.12, 2.51)] (Cai et al., 2015). Additionally, the study also reported that being unemployed and having low income were all associated with delays in diagnosing pulmonary tuberculosis among the patients (Cai et al., 2015).

Similarly, a systematic review and Meta-Analyses of 29 studies from 17 provinces in China with a total of 38,947 patients following the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews found that socio-demographic and economic factors like rural residence, having lower level of education and low household income were determinants of delayed diagnosis among patients with pulmonary tuberculosis (Li et al., 2013). Additionally, the study found that the risk of delays was greater among female patients (Li et al., 2013). Further, a study of 139 patients with smear positive results for pulmonary tuberculosis (PTB) and average age of 39 years in India found that being female (OR (95% CI): 2.9, 1.03-8.23, P = 0.02) was associated with longer delay in diagnosing pulmonary tuberculosis (Alavi et al., 2015).

In addition, the study in the capital Addis Ababa found a statistically significant association between distance from the patient's residence to health facility and delays in diagnosing PTB with those coming farther away from the health facilities having longer delays (Demissie et al., 2002). Contrary to the above, a study of delays in PTB diagnosis in Gondar town, Ethiopia found that residing in rural areas was associated with longer delay in diagnosis of PTB while higher household income was positively associated with a shorter diagnosis delays (Bogale et al., 2017). Similarly, a five-year study in Taiwan among 78,118 patients newly diagnosed with PTB found that older age (Lin et al., 2009).

In Africa, a study of 286 patients newly diagnosed with tuberculosis in public hospitals in Ndjamena and Moundou, Chad found that delays in diagnosis of patients with PTB was associated with low level of education and low economic status (Ngangro et al., 2012). Contrary to the above, a study of 924 patients diagnosed with pulmonary tuberculosis in government health facilities in Ethiopia found no statistically significant gender difference in delays in diagnosis of PTB (Mesfin et al., 2009). However, the study found that the delay was associated with residing in rural areas and low level of education (Mesfin et al., 2009).

Contrary to the above, a cross-sectional study at a hospital in the Tanzanian port city of Dar es Salaam found a statistically significant difference between female and male patients in the experience of delays in diagnosing PTB with a higher proportion of females having a longer diagnosis delays than their male counterparts (62.1% vs 47.0%; $p<0.05$) (Mfinanga et al., 2008). In addition, the study found that patients who were residing in a distance more than 5 Km from the health facility, those who had no primary education, no employment and living far from a health facility had longer diagnosis delays (Mfinanga et al., 2008).

In Uganda, a cross-sectional study involving 158 adult patients with pulmonary tuberculosis conducted within health facilities in the districts of Mukono and Wakiso found that being male was an independent predictor for patients delay (Buregyeya et al., 2014). Furthermore, another cross-sectional study in Kampala city conducted among 253 patients with pulmonary tuberculosis managed at public primary health facilities found that being female and living at current place of residence for more than 5 years was associated with patient delay in diagnosing PTB (Sendagire et al., 2010). No similar studies were found regarding diagnostic delays in Bundibugyo district hence this study will seek to determine factors associated with early diagnosis of pulmonary tuberculosis among patients getting treatment for PTB at Bundibugyo hospital.

2.4 Personal factors and early diagnosis of PTB among patients diagnosed with pulmonary tuberculosis

A systematic review of over 40 studies on delays in diagnosing pulmonary tuberculosis in 17 Asian countries found that shorter patient delays was associated with getting positive sputum

smears were all associated with delays in diagnosing pulmonary tuberculosis among the patients (Cai et al., 2015). Sadly, the study reported association between going for consultation at a public health facility and delay in diagnosis of pulmonary tuberculosis (Cai et al., 2015). Further, a study of 139 patients with smear positive results for pulmonary tuberculosis (PTB) an average age of 39 years in India found that the average time for diagnosis of pulmonary tuberculosis was 73 days with some patients taking more than 1 year to be diagnosed (Alavi et al., 2015). About two third (65.5%) of these patients had late diagnosis of pulmonary tuberculosis (Alavi et al., 2015). Furthermore, the study reported that patients who were on immunosuppressive drugs also experienced longer delays in diagnosis of the disease (OR (95% CI): 8.18, 1.09-75.31, $P < 0.05$) (Alavi et al., 2015). Similarly, cigarette smoking was found to be significantly associated with delay in PTB diagnosis (Alavi et al., 2015).

Further, a cross-sectional study of consecutively selected two hundred sixteen patients diagnosed with PTB and getting care from two health facilities in Afar Region, Ethiopia found that there was a total delay of 70.5 days in diagnosing the patients with PTB (Belay et al., 2012). Furthermore, using multivariate logistic regression analysis, the researchers established that self-treatment (aOR. 3.99, CI 1.50-10.59) and patient first visiting non-formal health workers (aOR. 6.18, CI 1.84-20.76) were independent predictors of delays in early diagnosis of PTB (Belay et al., 2012). Similarly, patients visiting a lower health public health facility and private health facilities (aOR. 2.49, CI 1.07-5.84) first were also found to be predictors of delay in the early diagnosis of PTB among the patients (Belay et al., 2012). This finding was in line with an earlier cross sectional study which was conducted in all public health facilities in the Ethiopian capital Addis Ababa in 1998 among 700 patients with pulmonary TB which found a mean delay 78.2 days to diagnose PTB (Demissie et al., 2002).

Contrary to the above, a study of delays in PTB diagnosis in Gondar town, Ethiopia found a mean total delay of only 41.6 days (SD = 16.6) (Bogale et al., 2017). Further, the study found that patients who were seeking healthcare from multiple healthcare providers had longer delays in diagnosis of PTB compared with those who sought care from one provider (Bogale et al., 2017). However, like the study in Afar region, the study in Gondar town also found that patients

who sought care from primary level healthcare facilities also had longer delays in diagnosis of PTB (Bogale et al., 2017).

Further, a systematic review and Meta-Analyses of 29 studies from 17 provinces in China with a total of 38,947 patients following the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews found that health facility factors like inaccessibility due to geographical barriers, inadequate resources required for prompt diagnosis and lack of qualified healthcare providers were found to be associated with delay in diagnosis of pulmonary tuberculosis (Li et al., 2013). Additionally, the study found that patients who first sought care from Traditional Chinese Medicine (TMC) providers had longer delays in PTB diagnosis than those who went straight to the formal health care facilities (Li et al., 2013). Similarly, a five-year study in Taiwan among 78,118 patients newly diagnosed with PTB found that having a positive sputum culture and consultation at a non-medical center were associated with delayed diagnosis of PTB (Lin et al., 2009). Contrary to the above, a systematic review of 23 studies on pulmonary tuberculosis in India found that first-contact healthcare providers were the most important risk factors for delays in diagnosing pulmonary tuberculosis as opposed to personal factors (Sreeramareddy et al., 2014).

In Africa, a study of 924 patients diagnosed with pulmonary tuberculosis in government health facilities in Ethiopia found that the delay in diagnosing tuberculosis was associated with seeking care from private practitioners, drug vendors, religious leaders and misperceptions about causes of pulmonary TB (Mesfin et al., 2009). Contrary to the above, a cross-sectional study at a hospital in the Tanzanian port city of Dar es Salaam found that patients who were not able to recognize symptoms of TB and had a belief that TB is always associated with HIV infection had longer diagnosis delays (Mfinanga et al., 2008). Similarly, another cross sectional study among 206 patients diagnosed with tuberculosis in Pwani region, Tanzania reported that delayed diagnosis was associated with patient's belief that infection with pulmonary tuberculosis is synonymous with HIV/AIDS and patients' lack of knowledge that chest pain may be a symptom of tuberculosis disease (Ngadaya et al., 2009). Conversely, patients who presented with chest pain and those who first went to a public health facility had low delays in diagnosis of pulmonary tuberculosis (Ngadaya et al., 2009).

A retrospective study of 193 patients diagnosed with pulmonary tuberculosis in a high resource area in Taiwan found that underlying malignancy was one of the independent predictors of delayed diagnosis among these patients (Lin et al., 2010). Furthermore, a systematic review of 40 studies on delays in diagnosing tuberculosis in 17 Asian countries reported that patients with hemoptysis had delayed diagnosis (Cai et al., 2015). Further, a study in India involving 139 patients with smear positive results for pulmonary tuberculosis found that patients who were on immunosuppressive drugs like ARVs had longer delays in diagnosis of pulmonary tuberculosis compared to their counterparts who were not taking any immunosuppressive drugs (Alavi et al., 2015).

Further, a study in Taiwan found that patients who were admitted with other conditions rather than infectious diseases had a longer delay in diagnosis of PTB compared to those admitted with chest conditions (Lin et al., 2010). Similarly, a cross-sectional study in Afar region of Ethiopia among 216 patients diagnosed with TB using consecutive sampling method found that having extra-pulmonary tuberculosis was associated with delays in diagnosis of pulmonary tuberculosis (Belay et al., 2012). in addition, the odds of delayed diagnosis among patients with extra-pulmonary tuberculosis was more than twice the odds of delays among patients without extra-pulmonary (Belay et al., 2012).

Contrary to the above, another study in Gondar town, Ethiopia found that patients living with HIV/AIDS had shorter delays in diagnosis of pulmonary tuberculosis compared to those who were HIV negative (Bogale et al., 2017). This could be attributed to the high level care given to patients who are living with HIV/ AIDS. Similarly, a cross-sectional study in Dar es Salaam, Republic of Tanzania 639 patients with tuberculosis found that having chest pain was associated with shorter delay in diagnosing pulmonary tuberculosis (Mfinanga et al., 2008). In line with the above finding, a cross sectional study in Pwani region, Tanzania reported that patients who presented with chest pain had a shorter delay in diagnosis of pulmonary tuberculosis compared to those who did not present with chest (Ngadaya et al., 2009).

In Uganda, a cross-sectional study involving 158 adult patients with pulmonary tuberculosis conducted within health facilities in the districts of Mukono and Wakiso found that delayed

diagnosis was due to patients visiting a non-government health facility for first consultations (Buregyeya et al., 2014). Furthermore, another cross-sectional study in Kampala city conducted among 253 patients with pulmonary tuberculosis managed at public primary health facilities found that knowledge of tuberculosis as a curable disease was associated with early diagnosis of pulmonary tuberculosis among the study participants (Sendagire et al., 2010). Similarly, the researchers found that delays in diagnosing pulmonary tuberculosis had a positive association with having had HIV test before (Sendagire et al., 2010). Sadly, most of the delays were attributed to the health facility delays with more than ninety percent of the patients in this study having made an average of 4 visits before they were diagnosed with tuberculosis from onset of the TB symptoms (Sendagire et al., 2010). No similar studies were found regarding diagnostic delays in Bundibugyo district hence this study will seek to determine factors associated with early diagnosis of pulmonary tuberculosis among patients getting treatment for PTB at Bundibugyo hospital.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This study aimed at assessing factors affecting early diagnosis of pulmonary tuberculosis among adult patients who are currently on treatment at Bundibugyo hospital. This chapter describes methods that the researcher used in the study. Specifically, it describes study design, data sources, study population, how sample size was calculated, procedures that were used to sample study participants, study variables, techniques that were applied in collecting data, tools for data collections, plan for data analysis, quality control measures, ethical considerations, study limitations, inclusion and exclusion criteria and plan for disseminating the study findings.

3.2 Study Design

This study adopted a cross sectional analytical study design. This design was chosen because the researcher intended to conduct a one off study to get the current picture of delays in PTB diagnosis with no follow up plans. As such the researcher collected the data only once during the study. Additionally, no interventions were undertaken during the study making the cross sectional design the most appropriate. The study was only quantitative in nature.

3.3 Study area

The study was carried out at Bundibugyo hospital. The hospital is located in Bundibugyo district, western Uganda. It is surrounded by Ntoroko district in the north, Kabarole district in the east, Kasese district in the south and Democratic Republic of Congo (DRC) in the west. The district is mainly inhabited by the Bamba/Babwisi and Bakonzo ethnic groups. The main economic activity in the district is subsistence agriculture with cocoa being the main cash crop in the district. The district is mainly mountainous with Ruwenzori Mountain covering most parts of the district and Semiliki plains lying on the western border with DRC. The district is also home to the famous Sempaya hot springs and Semiliki national park. Bundibugyo hospital is a general district hospital which serves the population of Bundibugyo and eastern DRC. The district has two health sub-districts (HSD) namely Bwamba and Bughendera health sub-districts.

3.4 Source of Data

This study used primary data. Primary data were collected from patients diagnosed with pulmonary tuberculosis, who were getting treatment at Bundibugyo hospital TB clinic between July, 2017 and September, 2017.

3.5 Study Population

3.5.1 Target population

This study targeted all patients with pulmonary tuberculosis in Bundibugyo District, western Uganda.

3.5.2 Accessible population

The accessible population included all the patients diagnosed with pulmonary tuberculosis at Bundibugyo Hospital.

3.5.3 Study population

The study population were patients diagnosed with pulmonary tuberculosis and were getting treatment at Bundibugyo hospital TB clinic from July to September, 2017.

3.6 Sample size calculation

The sample size was calculated using Kish and Leslie (1965) formula for calculating sample size of a cross-sectional study given by:

$$n = \frac{(Z_{1-a})^2 p[1-p]}{d^2}$$

Where;

n is the required sample size

$\mathbf{Z_{1-a}}$ is the value of z from the probability tables of a normally distributed population and equals to 1.96 for 95% level of confidence.

p is the estimated proportion of patients with delayed diagnosis of pulmonary tuberculosis in Uganda. For this study, prevalence of 90% (0.9) which was got from a similar study in Mukono and Wakiso districts of Uganda (Buregyeya et al., 2014) will be used.

d is the estimated precision for the study and is 5% (0.05).

Substituting the above values in this formula;

$$n = \frac{(Z_{1-a})^2 p[1-p]}{d^2}$$

$$n = \frac{(1.96)^2 x\ 0.9[1-0.9]}{(0.05)^2}$$

$$n = \frac{0.345744}{0.0025} = 138 \text{ patients}$$

Adding 10% of 138 patients (14 patients) to the calculated sample size (**n)** for non-response, we got a total of 152 patients.

Therefore, the minimum sample size for this study was 152 patients.

3.7 Sampling procedures

The study used consecutive sampling to select patients with PTB that participated in the study. This allowed the researcher to select patients who were still undergoing treatment at the hospital and were therefore able to give first hand information through interviews as opposed to reviewing randomly selected files without opportunity to clarify missing data. Furthermore, consecutive sampling also facilitated collection of data within the time constraints in which this study had to be conducted.

3.8 Inclusion and exclusion criteria

3.8.1 Inclusion criteria

This study included:

- Patients who were 18 years and older being managed for pulmonary tuberculosis at Bundibugyo hospital
- Patients who consented to participate in the study.

3.8.2 Exclusion Criteria

- Very sick tuberculosis patients
- Deaf tuberculosis patients
- Mentally sick patients with tuberculosis

3.9 Study variables

In this study, the dependent variable was early diagnosis of pulmonary tuberculosis.

The independent variables were:

- **Socio-demographic factors:** Age, sex, level of education, marital status, residence (rural/urban), occupation and monthly income of patients.
- **Personal factors:** Previous history of TB (initial or re-treatment), cigarette smoking, alcohol consumer, consulting traditional healer/non-skilled professional healthcare, self-treatment, visiting clinics for first consultation, referral source, co-morbid illness, history of hemoptysis, HIV status, history of swallowing ARVs, Extra PTB and history of chest pain.

3.10 Data collection techniques, tools and procedures

3.10.1 Data collection techniques

The researcher used questionnaires for data collections. Semi- structured questionnaires were used to collect data. The questionnaire was selected because it is quicker and facilities collection of data in a more objective way since it is structured. The questionnaires was designed in English and translated in two major local languages spoken in Bundibugyo district namely Lukhonzo and Lubwisi since most of the patients were well conversant with these languages.

3.10.2 Data collection tools

The researcher used researcher-administered questionnaires to collect data from the patients. The questionnaires had both open and closed ended questions. The questionnaires had two different sections. The first section had questions on socio-demographic factors of patients and the other section comprised of questions on personal factors affecting early diagnosis of pulmonary tuberculosis among patients being treated at Bundibugyo hospital.

Selection and training of research assistants: The researcher used 3 Research Assistants. The research assistants were nursing officers working in the TB clinic. This was because the researcher wanted health professionals who had experience in the management of tuberculosis. The researcher conducted a one day training to orient the 3 research assistants on the data collection tool prior to sending them to the field for data collection. This was to ensure that they were well conversant with the tool and therefore improved the overall quality of the data that were collected.

Pre-testing of the tool: The questionnaires were pre-tested among patients with pulmonary tuberculosis getting care from Nyahuka HC IV. The researcher printed 10 copies of the questionnaire and used it for interviewing patients on treatment for pulmonary TB at Nyahuka HC IV. Their responses were used to assess the clarity of the data collection tool. Any question which was not clear was clarified to improve the accuracy of the questions in the tool.

3.10.3 Data collection procedures

The researcher and the research assistants consecutively recruited patients diagnosed with PTB at Bundibugyo Hospital TB clinic. The researcher and the research assistants would go to the TB clinic at Bundibugyo hospital on the designated clinic days. They would then approach patients at the clinic and clarify their diagnoses basing on their medical forms on exit. Those who were found to be having PTB were screened for eligibility and those eligible were asked for consent to participate in the study. Every patient who consented was then recruited in the study and interviewed. This process was repeated until the sample size of 152 was attained.

3.11 Data management

The researcher offered adequate support supervision to the research assistants to ensure that they collected data according to the set study protocol. The researcher/research assistants ensured that all the applicable questions in the questionnaires were filled before leaving a respondent. This was to ensure the completeness of the questionnaires. The data collected were kept under key and lock for safety of the data. Data collected was entered into Microsoft excel. The data were then cleaned, coded and exported to Statistical Package for Social Scientists (SPSS) version 19 for analysis.

3.12 Plan for data analysis

The researcher processed responses from the participants into meaningful information with aid of SPSS statistical software version 19. The researcher then summarised data using frequency tables, percentages, chart and graphs. Further, the researcher also coded categorical variables into meaningful categories for ease of analysis. Three different levels of data analysis were carried out namely univariate, bivariate and multivariate levels. The univariate analysis focused on

exploration of individual variable using descriptive statistics including frequency counts and proportions for interpreting individual variables.

At bi-variate analysis, the researcher measured association between individual independent variables and dependent variable (early diagnosis of pulmonary tuberculosis). In this case, the researcher used chi-square test statistic for measuring association between each independent variable and dependent variable. For interpretation of statistical measures, the level of significance was set at 0.05 with a p-value <0.05 demonstrating that an independent variable has statistically significant association with the dependent variable.

At multivariate level of analysis, all statistically significant independent variables at bivariate level of analysis were analysed further to determine factors affecting the dependent variable. At this level, the researcher used Odds ratio (OR), P-values and 95% Confidence Interval to measure the effect of independent variables on the dependent variable. For interpretation, an Odds ratio of less than or greater than 1 will be considered statistically significant provided the p-value <0.05.

3.13 Quality control

The researcher used 3 Research Assistants. The researcher trained the 3 research assistants prior to sending them to the field for data collection. This was to ensure that the data collected were of high quality. The researcher numbered all questionnaires with serial numbers to ease cross-checking for any questionnaire that may go amiss. Further, the researcher and research assistants clarified all questions during data collections while still with the respondents. This was to ensure that all questionnaires were complete. To ensure that correct analysis was done, assistance of health data analyst was sought so that the correct statistical tests were used. This was to ensure that the quality of the research findings was acceptable.

3.14 Ethical considerations

Ethical approval was sought by the researcher from Research and Ethics Committee of International Health Sciences University. In addition, the researcher also sought administrative clearance from District Health Officer (DHO), Bundibugyo and Bundibugyo hospital management. Further, the researcher got an introductory letter from the International Health

Sciences University- School of Nursing. During data collections, the researcher and research assistants carried copies of the approval and introductory letters. Further, the researcher and research assistants sought a written informed consent from each respondent before enrolment into the study. The researcher also emphasized voluntary participation to the study respondents with opportunity to withdraw their participation at any point during the study. The researcher observed confidentiality and privacy of the study respondents at all time and this was emphasized during the enrolment process. Additionally, no personal identifying information was collected from the respondents. The researcher took all necessary precautions to ensure that no physical or psychological harm was inflicted on any respondent in the process of data collections and the collected data were used only for academic purpose and nothing outside the informed consent agreed upon by the respondents.

3.15 Limitations of the study

Sampling bias: The consecutive convenient sampling is a non-probability sampling method that does not give equal chance of participating in the study and this means only patients who were available during data collections period had the chance of participating in the study. Consequently, it was difficult to generalise the findings that was got from this study to other cases of pulmonary tuberculosis in other parts of the country.

Selection bias: This study enrolled only patients who were getting treatment for pulmonary tuberculosis at the hospital during the study. Those who completed their course of treatment for tuberculosis at the hospital did not get opportunity to participate in this study thereby creating selection bias.

3.16 Validity and Reliability

Validity: The researcher reviewed related studies conducted in other parts of the world and adapted some questions in some of the data collection tools used in order to improve validity of the data collection tool that was used in this study. Further, researcher made consultations with people with expertise in tuberculosis control and management and researchers seeking their views on the questionnaire developed and their recommendations were incorporated in the tool development to improve validity. The researcher also pre-tested the questionnaires among patients being treated for pulmonary tuberculosis at Nyahuka HC IV within Bwamba HSD,

Bundibugyo district. Nyahuka HC IV was chosen because its located within the same HSD as Bundibugyo hospital. The responses that were got from the pretest analysis were used to further refine questions in the questionnaire to improve the tool validity. Lastly, the researcher also aligned the questions in the questionnaire to the specific study objectives.

Reliability: Cronbach's alpha was used to measure reliability coefficient of the questionnaire. During the pre-test, the researcher used the questionnaire to collect data from 25 patients with PTB at Nyahuka HC IV and analyzed it using SPSS to determine the reliability coefficient. The instrument was considered reliable since an alpha value of 0.75 was got during the pretest analysis.

3.17 Plan for dissemination

The researcher will submit the findings of this study to IHSU School of Nursing. Further, the researcher also plans to share study findings with management and staff of Bundibugyo Hospital as well as Bundibugyo district health team. Lastly, the researcher plans to present study findings at national and international conferences for wider disseminations.

CHAPTER FOUR: RESULTS

4.1 Introduction

This study aimed at assessing factors affecting early diagnosis of pulmonary tuberculosis among adult patients who are currently on treatment at Bundibugyo hospital. This chapter presents the results of the data analysis. Data analysis were done at only two levels namely univariate and bivariate analysis levels. Multivariate analysis could not be done due to insufficient sample size. Percentages were used to interpret findings at univariate level while chi-square and p-values were used to interpret bivariate data. The findings are summarized using frequency tables and charts. In addition, the study findings are presented in line with the specific objectives.

4.2 Socio-demographic characteristics TB patients in Bundibugyo hospital

Table 1: Descriptive analysis of socio-demographic characteristics of TB patients in Bundibugyo hospital(N=152)

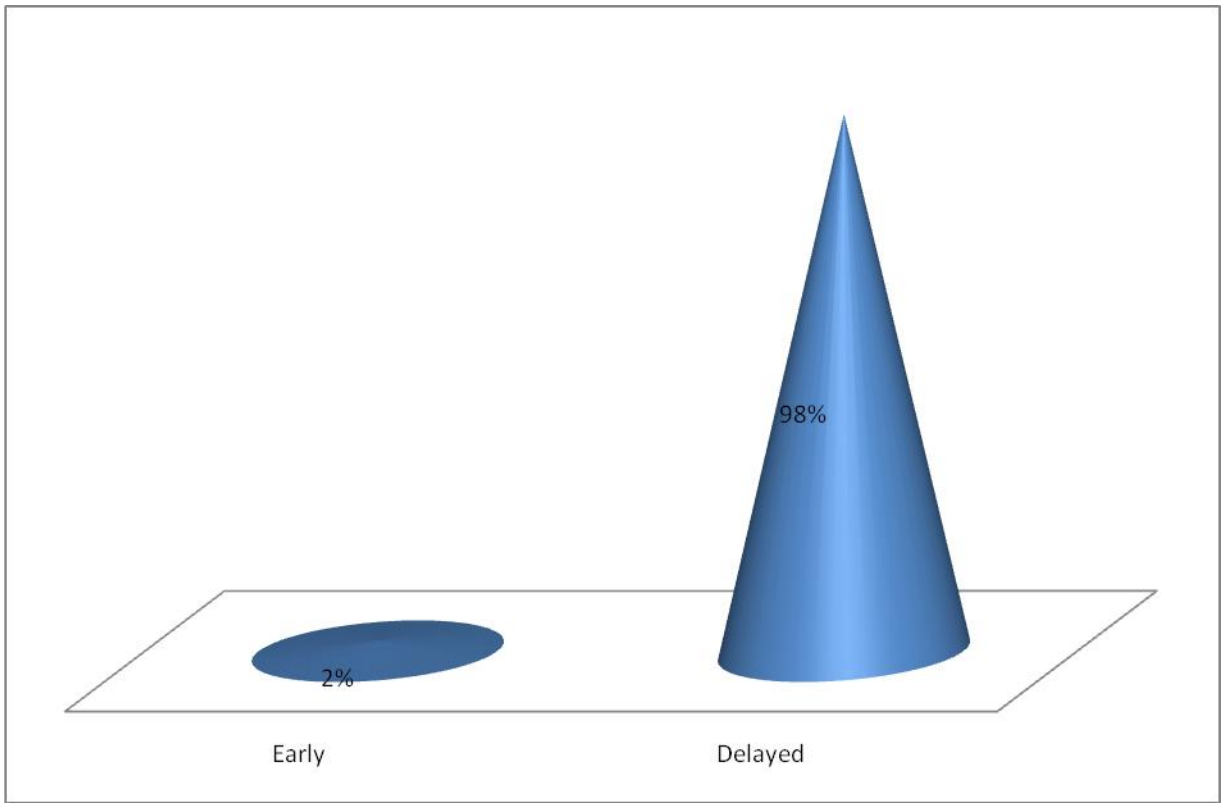
Variable	Category	N	Percent
Age	19-28	26	17.1
	29-38	53	**34.9**
	39-48	38	25.0
	49-58	24	15.8
	>59 or more	11	7.2
Sex			
	Male	103	**67.8**
	Female	49	32.2
Marital status			
	Married	59	38.8
	Single	21	13.8
	Separated	67	**44.1**
	Divorced	4	2.6
	Cohabiting	1	0.7
Level of education			
	None	48	31.6
	Primary	78	**51.3**
	Secondary	23	15.1
	Tertiary	3	2.0
Employment			
	Employed	10	6.6
	Unemployed	142	**93.4**
Monthly income			
	135,000/= or less	131	**86.2**
	>135,000/=	21	13.8
Occupation			
	Business person	7	4.6
	Civil servant	4	2.6
	Farmer	132	**86.8**
	Others	9	5.9
Location			
	Urban	15	9.9
	Rural	137	**90.1**

Source: primary data

Table 1 shows that 53 (34.9%) of 152 patients diagnosed with pulmonary tuberculosis at Bundibugyo hospital were aged 29-38 years with 103 (67.8%) being male patients. Further, more than two fifths 67 (44.1%) of the patients were separated from their spouses, and more than half (51.3%) had primary education as their highest academic qualifications. The majority 142 (93.4%) of the patients were unemployed with 131 (86.2%) earning 135,000= (US$37) or less. In addition, the majority 132 (86.8%) of the patients were peasant farmers and more than 9 out of every 10 (90.1%) patients were rural dwellers.

4.3 Proportion of patients diagnosed Early with Pulmonary Tuberculosis (PTB)

Figure 1: Distribution of patients according to delay in diagnosis of PTB in Bundibugyo hospital



Source: primary data

Figure 1 shows that only 3 (2%) of the 152 patients managed at Bundibugyo hospital for pulmonary tuberculosis were diagnosed with the disease early. Most patients (98%) had delayed diagnosis of pulmonary tuberculosis.

4.4 Socio-demographic factors associated with early diagnosis of PTB among patients in Bundibugyo hospital

Table 2:Results showing Socio-demographic factors associated with early diagnosis of PTB among patients in Bundibugyo hospital

Variable		Early diagnosis	Delayed diagnosis	χ^2	p-value
Age					
	19-28	1(33.3)	25(16.8)	17.723	**0.001**
	29-38	0	53(35.6)		
	39-48	0	38(25.5)		
	49-58	0	24(16.1)		
	>59 or more	2(66.7)	9(6.0)		
Sex					
	Male	2(66.7)	101(67.8)	0.002	0.967
	Female	1(33.3)	48(32.2)		
Marital status					
	Married	2(50.0)	57(38.3)	13.365	**0.010**
	Single	0	21(14.1)		
	Separated	0	67(45.0)		
	Divorced	1(25.0)	3(2.0)		
	Cohabiting	1(25.0)	1(0.7)		
Level of education					
	None	1(33.3)	47(31.5)	0.667	0.881
	Primary	2(66.7)	76(51.0)		
	Secondary	0	23(15.4)		
	Tertiary	0	3(2.0)		
Employment					
	Employed	0	10(6.7)	0.216	0.642
	Unemployed	3(100)	139(93.3)		
Monthly income					
	135,000/= or less	3(100)	128(85.9)	0.491	0.484
	>135,000/=	0	21(14.1)		
Occupation					
	Business person	0	7(4.7)	0.464	0.927
	Civil servant	0	4(2.7)		
	Farmer	3(100)	129(86.6)		
	Others	0	9(6.0)		
Location					
	Urban	0	15(10.1)	0.335	0.563
	Rural	3(100)	134(89.9)		

Source: primary data

Table 2 shows that age of patients (X^2= 17.723, P= 0.001) and their marital status (X^2= 13.365, P= 0.010) were the only socio-demographic factors associated with diagnosis of pulmonary tuberculosis. All other socio-demographic factors had no statistically significant association with diagnosis of pulmonary tuberculosis (P> 0.05).

4.5 Personal factors associated with early diagnosis of PTB among patients in Bundibugyo hospital

Table 3: Personal factors associated with early diagnosis of PTB among patients in Bundibugyo hospital

Variable	Early diagnosis	Delayed diagnosis	χ^2	p-value
Smoke				
Yes	3(100)	105(70.5)	1.247	0.264
No	0	44(29.5)		
Alcohol consumption				
Yes	0	38(25.5)	1.020	0.312
No	3(100)	111(74.5)		
Ever suffered TB				
Yes	1(33.3)	27(18.1)	0.453	0.501
No	2(66.7)	122(81.9)		
Sought treatment from traditional healer				
Yes	0	32(21.5)	0.816	0.366
No	3(100)	149(78.5)		
Visited private clinic before treatment				
Yes	0	95(63.8)	5.101	**0.024**
No	3(100)	54(36.2)		
Ever suffered from other conditions				
Yes	0	7(4.7)	0.148	0.701
No	3(100)	142(95.3)		
Type tuberculosis				
PTB	3(100)	148(99.3)	0.020	0.887
Extra TB	0	1(0.7)		
HIV status				
Negative	3(100)	132(88.6)	0.385	0.535
Positive	0	17(11.4)		
Swallowing ARV				
Yes	0	18(12.1)	0.411	0.521
No	3(100)	131(87.9)		
Chest pain one of symptoms				
Yes	3(100)	123(82.6)	0.632	0.427
No	0	26(17.4)		
Cough bloody sputum				
Yes	0	65(43.6)	2.287	0.131
No	3(100)	84(56.4)		
Referral				
Self-referred	2(66.7)	83(55.7)	0.206	0.902
Health worker	0	5(3.4)		
Relative/friends	1(33.3)	61(40.9)		

Source: primary data

From table 4, visiting a private clinic (X^2= 5.101, P= 0.024) before treatment was the only personal factor associated with diagnosis of pulmonary tuberculosis. All other personal factors did not have statistically significant association with diagnosis of pulmonary tuberculosis (P>0.05).

CHAPTER FIVE: DISCUSSIONS

5.1 Introduction

This study aimed at assessing factors affecting eaG at Bundibugyo hospital. This chapter discusses the study findings in line with other relevant studies reviewed in chapter two. The discussions are presented in line with the specific objectives.

5.2 Proportion of patients diagnosed early with pulmonary tuberculosis (PTB)

Only about one in fifty patients who were managed at Bundibugyo hospital for pulmonary tuberculosis and participated in this study were diagnosed with the disease early. This finding could mean that majority of the patients delay to come to the facility leading to the overall delay in diagnosing them with pulmonary tuberculosis. Further, the finding could indicate inadequate health promotion effort to create awareness by health workers in Bundibugyo as a district especially in very remote villages. Additionally, the findings could also be attributed to long distances patients have to cover to the nearest health facilities to seek professional care. Finally, Bundibugyo being a mountainous district, this could also act as a geographical barrier to quick movement of patients to the nearest health facilities.

The implication of this finding is that most of the patients with pulmonary tuberculosis treated at Bundibugyo hospital experience delays in being diagnosed with the disease and therefore remain in the active phase of tuberculosis without appropriate treatment for tuberculosis over a long period of time. Consequently, these patients present a great risk of transmitting the disease to members of their households, communities and the health workers that they routinely see during consultations. Therefore, there is very urgent need to institute appropriate mitigation measures to reduce delay in diagnosis of the disease so that the risk of PTB transmission in the active state of the disease is curbed.

The finding of this study is similar to the findings of a cross-sectional study in Mukono and Wakiso districts in Uganda among 158 adult patients with confirmed diagnosis for pulmonary tuberculosis which found that majority of the patients (90%) had delays in diagnosing pulmonary tuberculosis (Buregyeya et al., 2014). The similarities in the findings of these studies could be attributed to similar study settings, and sample sizes. Both studies were carried out in health facilities and had comparable sample sizes. The sample size of the study in Mukono and

Wakiso was 158 adult patients with confirmed pulmonary tuberculosis. This was comparable to 152 patients in this study.

Contrary to the findings of this study, a five-year study in Taiwan among 78,118 patients newly diagnosed patients with PTB found that only 24.9% of the patients had late diagnosis (Lin et al., 2009). The differences in the findings of these studies could be attributed to the differences in the study designs and sample sizes used in the two studies. Whereas the study in Taiwan was prospective in nature and had a sample size of over seventy thousand patients diagnosed with PTB, this study was cross sectional in nature and had a sample size of only one hundred and fifty two patients with PTB. Therefore, these differences could have resulted in the observed differences in findings. Furthermore, the findings of this study was not comparable to the findings of a cross sectional study among 639 patients with PTB at a hospital in Dar es Salaam, Republic of Tanzania which found that only about fifty three percent of the patients had delay in diagnosis of PTB (Mfinanga et al., 2008). The difference in the findings of the two studies could be attributed to the differences in study settings and sample sizes. Whereas as the study in Tanzania was carried out in a health facility within the Metropolitan city of Dar es Salaam, this study was carried out in a hospital located in a remote town in western Uganda. Therefore, the differences in the study settings could have influenced the findings of the two studies due to different socio-economic status of the study participants. Additionally, the sample size used in the study in Tanzania was more than four times the sample size used in this study. The differences in the sample sizes used in the two studies could have resulted in the observed differences in the findings of the two studies.

5.3 Socio-demographic factors associated with early diagnosis of PTB among patients diagnosed with pulmonary tuberculosis in Bundibugyo hospital

This study found that age of a patient was associated with early diagnosis of pulmonary tuberculosis. This means that a patient's age affects his/ her health seeking behaviour in one way or another and health seeking behaviour may in turn determines whether or not a patient visits a health facility timely. Visiting a health facility as soon as the first symptoms are noticed increases a patient's chance of being diagnosed with PTB early enough. However, the sample size was not large enough to carry out multivariate analysis and therefore the magnitude of the

association between age and early diagnosis of PTB could not be determined. The implication of this study is that more efforts need to be put in identifying the age group most affected with delays in diagnosis of pulmonary tuberculosis among patients managed for tuberculosis in Bundibugyo hospital and other hospitals within the country where tuberculosis is managed so that the specific interventions can be instituted to improve diagnosis of PTB among such age groups.

The finding of this study is similar to the finding of a five-year study in Taiwan among 78,118 patients newly diagnosed with PTB which found that older age was associated with delays in the diagnosis of pulmonary tuberculosis (Lin et al., 2009).

Marital status was another socio-demographic factor which was found to be associated with diagnosis of PTB. This means that marital status of an individual patient has effects on the timeliness of the patient being diagnosed with the pulmonary tuberculosis. This could mean that a patient who is married may be forced to seek care early enough due to the support received from the partner. Consequently, such a patient may be diagnosed with PTB early enough compared to the unmarried patient who may not be having a social support. The implication of this finding is that married and unmarried patients with pulmonary tuberculosis require different health interventions which suit their needs since this study has shown that marital status affects a patient's chance of being diagnosed early with pulmonary tuberculosis. It was however not clear how marital status affects a patient's chance of being diagnosed with the disease early since multivariate analysis could not be performed due to small sample size.

However, this study did not find any statistical associations between other socio-demographic factors such as a patient's sex, level of education, employment status, occupation and place of residence contrary to other findings. For instance, a systematic review of over 40 studies on delays in diagnosing pulmonary tuberculosis in 17 Asian countries found that shorter patient delays was associated with male patients (Cai et al., 2015). The difference in the findings could be attributed to the differences in the study designs and sample sizes used in the two studies. Whereas as the study in Asian countries used systematic reviews of over 40 studies which constituted a much larger sample size, this study used a cross section study with a sample size of

only 152 patients. This therefore could have resulted in the observed differences in the study findings.

Similarly, in comparison to this study, a systematic review and Meta-Analyses of 29 studies in China with a total of 38,947 patients following the Cochrane Collaboration and the Preferred Reporting Items for Systematic Reviews found that socio-demographic and economic factors like rural residence, having lower level of education and low household income were determinants of delayed diagnosis among patients with pulmonary tuberculosis (Li et al., 2013). This is contrary to the findings of this study. The differences in the findings of these studies could be attributed to the differences in the sample sizes used in the two studies. The sample size used in the study in China was over 256 times the sample size used in this study. The large difference in the sample sizes used in the two studies could have contributed to the observed differences in the findings of the studies.

5.4 Personal factors associated with early diagnosis of PTB among patients in Bundibugyo hospital

This study found that none of the patients who first visited a private clinic before starting treatment for pulmonary tuberculosis had early diagnosis of PTB. This means that visiting a private clinic delays the process of the patient getting the right diagnosis for pulmonary tuberculosis. This finding could mean that private clinics use providers who lack the basic understanding of recognizing clinical features of pulmonary tuberculosis and therefore are not able to order for the required investigations necessary for diagnosing pulmonary tuberculosis.

Furthermore, the finding could also mean that the private clinics lack the required diagnostic equipment for investigating and diagnosing pulmonary tuberculosis.

Additionally, the delay in diagnosis of pulmonary tuberculosis in private clinics could also be attributed to the commercialization of health care in Uganda where private clinics compete for retention of patients at all cost even to the disadvantage of the patients. This means that a healthcare provider in a private clinic would try all sorts of treatments on the patients as long as the patient still has the capacity to pay for such treatments. For instance, a patient who visits a private clinic with complaints of cough could be treated with a range of antibiotics of different classes and strengths. This could take several weeks or even months especially where there is no

sign of improvement in the patient's condition. Consequently, a patient would spend a large amount of time in one private clinic even without a significant improvement in his/ her health condition thereby leading to delays in going to the appropriate health facility where the right diagnosis can be made. Hence delays in diagnosing pulmonary tuberculosis among patients who visit a private clinic first.

Delays in diagnosis of pulmonary tuberculosis is likely to continue unless adequate intervention is put in place to address the observed delays from private clinics since many people prefer to consult private clinics first for conveniences and also due to inefficiencies in the public health facilities. Delayed diagnosis of pulmonary tuberculosis ultimately has effects on the commencement of treatment. This in turn increases chances of PTB transmission among those who come into contact with a patient who is not yet on appropriate anti-TB drugs since pulmonary tuberculosis is an airborne disease.

This is consistent with the finding of a cross-sectional study of consecutively selected two hundred sixteen patients diagnosed with PTB and getting care from two health facilities in Afar Region, Ethiopia which found that delays in early diagnosis of patients with PTB was associated with patients visiting private health facilities first (Belay et al., 2012). The similarities in the findings of these two studies could be attributed to similar study settings, study designs and comparable sample sizes. Both studies were conducted in developing countries with poor public health facilities and a high number of private health facilities which provide good conditions for poor quality of care. Similarly, both studies used cross-sectional study design which assesses the situation as it is without any intervention to influence outcome variable.

Similarly, this finding is comparable to the findings of a five-year study in Taiwan among 78,118 patients newly diagnosed with PTB which found that consultation at a non-medical center were associated with delayed diagnosis of PTB (Lin et al., 2009). Furthermore, the finding of this study is in line with the finding of a study of 924 patients diagnosed with pulmonary tuberculosis in government health facilities in Ethiopia which reported that the delay in diagnosing tuberculosis was associated with seeking care from private health practitioners (Mesfin et al., 2009). Both studies recruited patients diagnosed with PTB only and these patients are likely to have similar experiences given that both studies were carried out in developing African countries.

Furthermore , the finding of this study is in line with that of a cross-sectional study involving 158 adult patients with pulmonary tuberculosis conducted within health facilities in the districts of Mukono and Wakiso which found that delayed diagnosis was due to patients visiting a non-government health facility for first consultations (Buregyeya et al., 2014). The similarities in the findings of these studies could be attributed to the comparable sample sizes and similar study settings. Both studies had almost identical sample sizes. The sample size for the study carried out in Mukono and Wakiso districts was 158 patients. This was almost the same as the 152 patients who participated in this study. Similar sample sizes used could have resulted into similar study findings. In addition, both studies were carried out in Uganda and therefore have similar study settings. This could have led to similarities in the observed findings of the two studies.

Contrary to the findings of this study, a systematic review of over 40 studies on delays in diagnosing pulmonary tuberculosis in 17 Asian countries reported association between going for consultation at a public health facility and delay in diagnosis of pulmonary tuberculosis (Cai et al., 2015). The differences in the findings of these studies could be attributed to the differences in the study designs and sample sizes used in conducting the studies. Whereas as the Asian study was a systematic review from multiple studies in 17 different countries in Asia, this study was a cross sectional study carried out among only 152 patients in one public health hospital in an upcountry district in Uganda. The differences in the designs used in the two studies could have resulted in the observed differences in the findings of the studies.

5.5 Study limitations (methodological issues)

The researcher expresses cautions about the findings of this study. This is due to the following methodological limitations:

1. **Selection bias:** The researcher selected the study area on the basis of his personal observations. Therefore, this could have created a selection bias which in turn could have influenced the findings of this study.
2. **Prevalence bias:** This study did not get the views of patients who had already completed their treatment for pulmonary tuberculosis at the hospital, those who started the treatment but defaulted, those who were diagnosed with pulmonary tuberculosis but died before

completing their treatment, those whose review dates did not fall within the period in which data for this study were collected or those who missed their clinic appointments during the data collections period. Consequently, the proportion of patients who had early diagnosis in this study is only a reflection of the patients who were available during the data collection time. Therefore, the factors found to be associated with diagnosis of pulmonary tuberculosis are also based on only the views of the patients who were present during the data collection period thereby creating a prevalence bias.

3. **Information bias:** The principal investigator in this study is a nurse in Bundibugyo hospital. Therefore, there is a chance that he could have interacted with some of the patients who participated in this study in one way or another during the course of providing nursing care within the hospital. Therefore, this could have influenced the patients' responses in one way or the other. Patients tend to provide information which the health care provider wants to hear leading to information bias.

4. **Analysis and interpretation bias:** Only univariate and bivariate analyses were carried out. Multivariate analysis could not be carried out due to small sample size used. Therefore, the effects size of all factors that were found to be associated with diagnosis of pulmonary tuberculosis could not be determined. This in turn affected interpretation of the results since the magnitude and direction of the associations could not be determined.
5. **External validity:** The sample size used in this study was very small and not representative of all patients diagnosed with pulmonary tuberculosis in all health facilities in Uganda. Therefore, the findings of this study cannot be generalized to patients diagnosed with pulmonary tuberculosis in other health facilities in the country.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter comprises of conclusions drawn from findings of the study and relevant recommendations made in line with the conclusions and discussions of findings in the previous chapter.

6.2 Conclusions

The conclusions made in this study are based on the study methods, findings and the discussions made in the preceding chapters.

The proportion of patients who were diagnosed early with pulmonary tuberculosis was found to be very low.

Age of patients and their marital status were the only socio-demographic factors associated with diagnosis of pulmonary tuberculosis.

A patient visiting a private clinic for first consultations was the only personal factor associated with delay in diagnosis of pulmonary tuberculosis.

6.3 Recommendations

Unit level

The unit should intensify health education about early diagnosis of tuberculosis in all out-patients points of services within the hospital.

Hospital level

The hospital should ensure that health education materials are provided at all points of care within the hospital. In addition, the hospital should also ensure that all its care providers are actively involved in sensitizing patients under their care about need for early diagnosis and treatment in case of infection with pulmonary tuberculosis.

The hospital should integrate health education on management of tuberculosis in other routine activities such as immunization, ANC care among others.

Ministry of Health level

The Ministry of Health should strengthen the capacity of private health providers so that they are able to make appropriate clinical diagnosis for cases of pulmonary tuberculosis and make appropriate referral for further investigation and confirmation of the disease.

In addition, the Ministry of Health should also strengthen the public private partnership for health to improve early diagnosis of pulmonary tuberculosis since this study has shown that visiting private clinics first is associated with delayed diagnosis of pulmonary tuberculosis.

Further research

There is need for further studies on early diagnosis of pulmonary tuberculosis and health system factors in both public and private health facilities within the country to understand the extent to which these factors contribute to the observed high delays in diagnosis of pulmonary tuberculosis.

REFERENCES

Alavi, S. M., Bakhtiyariniya, P. & Albagi, A. (2015). Factors Associated With Delay in Diagnosis and Treatment of Pulmonary Tuberculosis. *Jundishapur Journal of Microbiology,* 8**,** e19238.

Belay, M., Bjune, G., Ameni, G. & Abebe, F. (2012). Diagnostic and treatment delay among Tuberculosis patients in Afar Region, Ethiopia: A cross-sectional study. *BMC Public Health,* 12**,** 369-369.

Bogale, S., Diro, E., Shiferaw, A. M. & Yenit, M. K. (2017). Factors associated with the length of delay with tuberculosis diagnosis and treatment among adult tuberculosis patients attending at public health facilities in Gondar town, Northwest, Ethiopia. *BMC Infectious Diseases,* 17**,** 145.

Buregyeya, E., Criel, B., Nuwaha, F. & Colebunders, R. (2014). Delays in diagnosis and treatment of pulmonary tuberculosis in Wakiso and Mukono districts, Uganda. *BMC Public Health,* 14**,** 586-586.

Cai, J., Wang, X., Ma, A., Wang, Q., Han, X. & Li, Y. (2015). Factors Associated with Patient and Provider Delays for Tuberculosis Diagnosis and Treatment in Asia: A Systematic Review and Meta-Analysis. *PLoS ONE,* 10**,** e0120088.

Demissie, M., Lindtjorn, B. & Berhane, Y. (2002). Patient and health service delay in the diagnosis of pulmonary tuberculosis in Ethiopia. *BMC Public Health,* 2**,** 23-23.

Li, Y., Ehiri, J., Tang, S., Li, D., Bian, Y., Lin, H., Marshall, C. & Cao, J. (2013). Factors associated with patient, and diagnostic delays in Chinese TB patients: a systematic review and meta-analysis. *BMC Medicine,* 11**,** 156-156.

Lin, C.-Y., Lin, W.-R., Chen, T.-C., Lu, P.-L., Huang, P.-M., Tsai, Z.-R., Huang, M.-S., Tsai, W.-C. & Chen, Y.-H. (2010). Why is In-hospital Diagnosis of Pulmonary Tuberculosis Delayed in Southern Taiwan? *J Formos Med Assoc,* 109**,** 269–277.

Lin, H.-P., Deng, C.-Y. & Chou, P. (2009). Diagnosis and treatment delay among pulmonary tuberculosis patients identified using the Taiwan reporting enquiry system, 2002–2006. *BMC Public Health,* 9**,** 55-55.

Mesfin, M. M., Newell, J. N., Walley, J. D., Gessessew, A. & Madeley, R. J. (2009). Delayed consultation among pulmonary tuberculosis patients: a cross sectional study of 10 DOTS districts of Ethiopia. *BMC Public Health,* 9**,** 53-53.

Mfinanga, S. G., Mutayoba, B. K., Kahwa, A., Kimaro, G., Mtandu, R., Ngadaya, E., Egwaga, S. & Kitua, A. Y. (2008). The magnitude and factors associated with delays in management of smear positive tuberculosis in Dar es Salaam, Tanzania. *BMC Health Services Research,* 8**,** 158-158.

Ngadaya, E. S., Mfinanga, G. S., Wandwalo, E. R. & Morkve, O. (2009). Delay in Tuberculosis case detection in Pwani region, Tanzania. a cross sectional study. *BMC Health Services Research,* 9**,** 196-196.

Ngangro, N. N., Ngarhounoum, D., Ngangro, M. N., Rangar, N., Siriwardana, M. G., Des Fontaines, V. H. & Chauvin, P. (2012). Pulmonary tuberculosis diagnostic delays in Chad: a multicenter, hospital-based survey in Ndjamena and Moundou. *BMC Public Health,* 12**,** 513-513.

Sendagire, I., Loeff, M. S. V. D., Mubiru, M., Konde-Lule, J. & Cobelens, F. (2010). Long Delays and Missed Opportunities in Diagnosing Smear-Positive Pulmonary Tuberculosis in Kampala, Uganda: A Cross-Sectional Study. *PLoS ONE* 5.

Sreeramareddy, C. T., Panduru, K. V., Menten, J. & Van Den Ende, J. (2009). Time delays in diagnosis of pulmonary tuberculosis: a systematic review of literature. *BMC Infectious Diseases,* 9**,** 91-91.

Sreeramareddy, C. T., Qin, Z. Z., Satyanarayana, S., Subbaraman, R. & Pai, M. (2014). Delays in diagnosis and treatment of pulmonary tuberculosis in India: a systematic review. *The international journal of tuberculosis and lung disease : the official journal of the International Union against Tuberculosis and Lung Disease,* 18**,** 255-266.

Storla, D. G., Yimer, S. & Bjune, G. A. (2008). A systematic review of delay in the diagnosis and treatment of tuberculosis. *BMC Public Health,* 8**,** 15-15.

WHO. (2015). The End TB Strategy. Geneva: World Health Organization.

WHO. (2017a). *Tuberculosis: Fact sheet* [Online]. World Health Organization. Available from: http://www.who.int/mediacentre/factsheets/fs104/en/ [Accessed 19/04/2017].

WHO. (2017b). *Uganda Tuberculosis profile* [Online]. Available: www.who.int/tb/data [Accessed 20/04/2017].

APPENDICES

Appendix I: Consent form and Data collection tools

Consent Form

Introduction

I am Opima Geoffrey, a final year student at International Health Sciences University, pursuing a Bachelor's Degree in Nursing Science. I am carrying out a study titled, "**Factors Affecting early diagnosis of pulmonary tuberculosis among adult patients in Bundibugyo hospital, western Uganda."** You have been chosen to participate in this study on the basis of being a patient who is receiving treatment for pulmonary tuberculosis at Bundibugyo hospital.

Background to the study

Worldwide, almost a third of the global population has latent TB which is an inactive form of the disease. Further, active TB disease may have mild symptoms for many months and this may lead to delays in seeking care and thus delayed diagnosis.

Delay in diagnosis of active TB disease in an individual can lead to further spread of the bacteria to other people. Worse still, an individual with active TB disease has the potential to infect 10-15 people within close contact in a year's period. This therefore, means early diagnosis of the disease is essential for initiation of care early enough given that on average 45% of people with active TB disease will die without proper treatment.

In addition, there is inadequate information regarding early diagnosis of TB in Uganda hence this study seeks to asses factors affecting early diagnosis of pulmonary tuberculosis among adults in Bundibugyo hospital.

Procedure

You are requested to fill the questionnaire attached to this consent form. Filling this questionnaire will take at most 45 minutes of your time.

Benefits of the study

There are no monetary benefits or other direct benefits for participating in this study. However, the study will provide information which can be used to develop appropriate measures for improving care given to patients with pulmonary TB in Bundibugyo hospital. Subsequently this will improve diagnosis of patients with TB disease resulting into improved treatment outcomes for patients with PTB getting care at the hospital. In addition, this will contribute to the reduction

in deaths due to TB disease at the hospital. Furthermore, lessons learnt from this study can be used to improve diagnosis of TB disease in other health facilities elsewhere within the country.

Potential risks and discomforts

There are no known risks for participating in this study since it does not involve any experimental procedure. The study will however require your time to fill the questionnaire and this may be an inconvenience to you.

Confidentiality of participant's information

All the information that you will provide to the researcher will be kept confidential. No personal identifying data will be collected. This is to protect your identity during and after the study. The data will be kept in a secure place under lock and key with no unauthorized access to it. Once entered into a computer, the data will be protected using a password. The information you provide will be used for academic purpose only and not any other purpose that can endanger you as a participant.

Voluntary nature of your participation

Your participation in this study is purely voluntary. Your decision whether or not to participate will have no effect on your work at the hospital. If you decide to participate, you are still free to withdraw at any time during the interview with no consequences.

Ethical approval

This study is approved by the IHSU Research and Ethics committee (IHSU-REC). Besides, the researcher has also got administrative clearance from Bundibugyo Hospital management and the District Health Office, Bundibugyo district to carry out this study at the Hospital.

Contact information

You are free to ask any question about your participation in this study. In case you want to get any other clarifications, you can contact any of the following:

Opima Geoffrey (Researcher) on mobile phone: 0772367315, or opimageoffrey@gmail.com

Chairperson, IHSU Research and Ethics Committee (REC): Dr. Samuel Kabwigu on 0779610100

Uganda National Council for Science and Technology (UNCST): Dr. Julius Ecuru 0772595233.

Respondent's consent

I acknowledge that I have read/ the content of this consent has been read to me. I also agree that I have understood the content of this consent form; and I have got relevant clarifications on areas that needed explanations. I know that all information that I provide will be kept confidential and used only for the purpose of the study stated above.

I therefore voluntarily consent to take part in this study.

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

Signature of interviewer:……. Date.....

APPENDIX II: QUESTIONNAIRE

Title of the study: Factors Affecting early diagnosis of pulmonary tuberculosis among adult patients in Bundibugyo hospital, western Uganda.

Serial No.....

Instructions

The questionnaire is divided into 2 parts. Part I: Socio-demographic factors and part II: co-morbidity factors. Tick or write as appropriate.

Part I: Socio-demographic factors

Qn1. Age (years).....

Qn2. Sex

1. Male ☐
2. Female ☐

Qn3. Marital status

1. Married ☐
2. Single ☐
3. Separated ☐
4. Divorced ☐
5. Co-habiting ☐

Qn4. Level of education

1. None ☐
2. Primary ☐
3. Secondary ☐
4. Tertiary ☐

Qn5. Employment status

1. Employed ☐
2. Unemployed ☐

Qn6. Monthly income

1. ≤135,000= ☐
2. >135,000= ☐

Qn7. What is your current occupation?.....

Qn8. Where do you live?

1. Urban ☐
2. Rural ☐

Part II: Personal Factors

Qn9. Do you smoke cigarettes?

1. No ☐
2. Yes ☐

Qn10. Do you drink alcohol?

1. Yes ☐
2. No ☐

Qn11. Have you ever suffered from TB disease before this current episode?

1. Yes ☐
2. No ☐

Qn12. Did you seek treatment from a traditional healer for your TB disease?

1. Yes ☐
2. No ☐

Qn13. Did you first visit any private clinic before seeking treatment at Bundibugyo hospital?

1. Yes ☐
2. No ☐

Qn14. Apart from TB disease, have/are you suffered/ suffering from any other chronic health condition such as diabetes, hypertension or cancer?

1. Yes ☐
2. No ☐

Qn15. Type of tuberculosis

1. Pulmonary TB ☐
2. Extra-pulmonary TB ☐

Qn17. HIV status

1. Negative ☐
2. Positive ☐

Qn18. Are you swallowing ARVs?

1. Yes ☐
2. No ☐

Qn19. Was/is chest pain one of the symptoms of your conditions?

1. Yes ☐
2. No ☐

Qn20. Did you cough bloody sputum before starting TB treatment?

1. Yes ☐
2. No ☐

Qn21. How were you referred to this health facility?

1. Self-referred ☐
2. Health workers ☐
3. Relatives/ friends ☐

Diagnosis of Tuberculosis

Qn22. From onset of the first symptoms, approximately how long did you take to seek assistance at a health facility?

1. ≤4 weeks ☐
2. >4 weeks ☐

Thank you for your time

APPENDIX III: STUDY WORK PLAN

Activity	September 2016	March 2017	May 2017	September 2017
Concept development				
Writing proposal and submission				
Data collection and analysis				
Writing the first draft report				
Writing and submitting final report				

APPENDIX IV: STUDY BUDGET

Item	Cost/Unit	Total Cost (Ug.Shs)
Stationeries	100,000	100,000
Printing and photocopy of Questionnaires	-	150,000
Training research assistants	300,000	300,000
Facilitation for 3 Research Assistants	300,000	900,000
Transport during the research period	850,000	850,000
Consultation for Data Analysis	1,500,000	1,500,000
Printing and photocopying of 3 research reports (spiral bound copies)	300,000	300,000
Printing and binding of 3 hard cover research reports	55,000	165,000
Grand Total		**4,265,000**

APPENDIX V: INTRODUCTORY LETTER

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
sanitas per scientiam

making a difference in health care

Office of the Dean, School of Nursing

Kampala, 8th August 2017

The medical Superintendent,
Bundibugyo Hospital
P.O Box 1148, Bundibugyo.

Received
for reference
25/09/17

Dear Sir/Madam,
RE: ASSISTANCE FOR RESEARCH

Greetings from International Health Sciences University.

This is to introduce to you **Opima Geoffrey,** Reg. No. **2015-BNS-TU-JAN-029** who is a student of our University. As part of the requirements for the award of a Bachelors degree in Nursing of our University, the student is required to carry out research in partial fulfillment of the award.

The topic of research is: **Factors Affecting Early Diagnosis of Pulmonary Tuberculosis Among Adults Patients in Bundibugyo Hospital, Western Uganda.**

This therefore is to kindly request you to render the student assistance as may be necessary for the research.

I, and indeed the entire University are grateful in advance for all assistance that will be accorded to our student.

Sincerely Yours,

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
08 AUG 2017
SCHOOL OF NURSING
P. O. Box 7782, Kampala - Uganda

Ms. Agwang Agnes
Dean, School of Nursing

The International Health Sciences University
P.O. Box 7782 Kampala – Uganda
(+256) 0312 307400 email: aagwang@ihsu.ac.ug
web: www.ihsu.ac.ug

APPENDIX VI: CORRESPONDENCE LETTER

Medical Superintendent: 0772-453868
E-mail: amonbwamba@gmail.com
Administrator: 0772-358508
E-mail: francisndahura@gmail.com
Nursing Officer in-charge: 078296213
Senior Clinical Officer: 0782962135
Supplies Officer: 0787837371
Medical Social Worker:0782-487003

Bundibugyo General Hospital
Office of The Sen. Hosp Admnistator

P.O Box 1148, Bundibugyo
Date: 26/09/2017
Our Ref:

THE DEAN,
SCHOOL OF NURSING,
INTERNATIONAL HEALTH SCIENCES UNIVERSITY
P.O BOX 7782 KAMPALA-UGANDA.

Dear Sir/ Madam,

RE: **OPIMA GEOFFREY.**

Greetings to you from Bundibugyo District Hospital, Western Uganda.

Iam writing to you in response to your letter addressed to us dated 08th Aug, 2017, requesting us to accord assistance to the above referred person who happens to be your student.

Mr. Opima was indeed granted permission to collect data for his research proposal titled "Factors affecting early diagnosis of pulmonary Tuberculosis among adult patients in Bundibugyo Hospital, Western Uganda".

As he was here, he behaved well and we wish him success in his studies.

Yours Sincerely,

Ndahura Francis
SENIOR HOSPITAL ADMINISTRATOR.