2023

MASTER'S THESIS

Hadijah MBONDE

T.R.

ANKARA YILDIRIM BEYAZIT UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

INVESTIGATING THE FACTORS AFFECTING THE AVAILABLE TUBERCULOSIS PREVENTION AND CONTROL PROGRAMS IN KAMPALA, UGANDA

MASTER'S THESIS

Hadijah MBONDE

PUBLIC HEALTH PROGRAM

Ankara, 2023

T.R.
ANKARA YILDIRIM BEYAZIT UNIVERSITY
INSTITUTE OF HEALTH SCIENCES

INVESTIGATING THE FACTORS AFFECTING THE AVAILABLE TUBERCULOSIS PREVENTION AND CONTROL PROGRAMS IN KAMPALA, UGANDA

MASTER'S THESIS

Hadijah MBONDE

PUBLIC HEALTH PROGRAM

Ankara, 2023

T.R.
ANKARA YILDIRIM BEYAZIT UNIVERSITY
INSTITUTE OF HEALTH SCIENCES

Investigating the Factors Affecting the Available Tuberculosis Prevention and Control Programs in Kampala, Uganda

Hadijah MBONDE

Master's Thesis

10/04/2023

Thesis Advisor
Assoc. Dr. Dilek ÖZTAŞ

Examining Committee Members
Assoc. Dr. Dilek ÖZTAŞ
Assoc. Dr. Egemen ÜNAL
Assoc. Dr. Serdar DENİZ

We declare that this thesis, which we have read and listened to, has met all the scope and quality requirement for a Master's Degree

Prof. Dr. Sena KAPLAN

Institute Director

I certify that this thesis meets all the requirements for Master's Degree

DECLARATION

I declare that this thesis and the work presented therein are mine. It was generated by me as a result of my original research. All previously published materials in this thesis are acknowledged according to standard referencing guidelines. It has not been presented before for any degree or non-degree program (04/10/2023).

Hadijah MBONDE

ACKNOWLEDGMENT

Allah deserves all the praise and gratitude I can muster for granting me the opportunity to work on my dissertation.

I would like to convey my sincere gratitude to my supervisor, Assoc. Dr. Dilek ÖZTAŞ, for her endless mentoring, direction, and support throughout my graduate studies. I also want to express my gratitude to Prof. Dr. Salih MOLLAHALLOLU, Assoc. Dr. Egemen ÜNAL, and Dr. Nimetcan MEHMET, without whose help patience and guidance, I could not have progressed this far.

I want to express my gratitude to Ms. Elizabeth Egesa, the sister in charge at Kisenyi Health Center IV, as well as the members of the Kisenyi TB unit, for their invaluable work in helping me make this study a reality. I also want to express my gratitude to my friends Mr. Uzoma Beneth Uzosike, Ms. Sebahat Aslan Tek, and Ms. Asl Ece Acar Filizci for their unwavering assistance and hard work during my studies.

I want to convey my sincere gratitude to my supportive parents, Mr. Mbonde Ramadhan and my devoted mother, Ms. Namubiru Miisah, for always believing in me and supporting me wholeheartedly. I also want to appreciate my siblings for their unending support and affection.

Finally, and most significantly, I want to express my gratitude to Dr. Mohammed Hashiru for being my loving and devoted spouse. I'm really appreciative of his love, care, guidance, and unending support because they have been priceless for me personally and academically.

TABLE OF CONTENTS

ABSTRACT

Investigating the Factors Affecting the Available Tuberculosis Prevention Programs and Control in Kampala, Uganda

This study's main aim is to pinpoint the variables influencing tuberculosis preventive and control initiatives now in effect in Kampala, Uganda. The theoretical foundation for this cross-sectional study design was Wilber's integral theory. Data was put together using a structured questionnaire filled out by health workers at five Tuberculosis dispensaries in Kampala City Council Authority hospitals around Kampala district. A total of 413 respondents—151 women and 262 men—were questioned. Each respondent provided informed consent before the data was collected.

Data analysis was done using SPSS. In order to understand how dependent and independent variables are related, the chi-square association test was used at a significance level of 0.05. 74.33% of the respondents had a treatment supporter while taking their TB medicine, yet 63.44% never disclosed their TB illness to anyone with whom they shared a home. Whereas 59.6% of the patients were HIV positive, 53.8% had low literacy about tuberculosis therapy. As 64.3% of people were taking other medications besides TB medicines, 64.2% were more likely to cease their tuberculosis treatment due to feeling better in less than two months. These and other factors were pinpointed to be affecting the available tuberculosis control and prevention programs in Kampala.

In conclusion, the functioning of the existing TB prevention and control programs in the Kampala district of Uganda was figured to be aided by patients having a treatment supporter (DOT), TB dispensaries being close by or less than $3 in transportation costs away, the supply of TB drugs at the tuberculosis dispensaries, staff attitudes, convenient working hours, and short waiting times at the tuberculosis facilities.

Keywords: Control, Factors, Prevention, Program, Tuberculosis.

ÖZET

Uganda, Kampala'da Mevcut Tüberküloz Önleme Programlarını ve Kontrolünü Etkileyen Faktörlerin Araştırılması

Bu çalışmanın temel amacı, Uganda, Kampala'da hali hazırda uygulanmakta olan Tüberküloz önleme ve kontrol programlarını etkileyen faktörleri belirlemektir. Bu kesitsel çalışma tasarımının teorik temeli, Wilber'in integral teorisidir. Veriler, sağlık çalışanları tarafından uygulanan yapılandırılmış bir anket kullanılarak toplanmıştır. Kampala bölgesindeki Kampala City Council Authority hastanelerindeki beş Tüberküloz dispanserine ulaşılmıştır. Bu çalışmaya 151 kadın ve 262 erkek olmak üzere toplam 413 kişi katılım sağlamıştır. Her katılımcıdan, veriler toplanmadan önce bilgilendirilmiş onay alınmıştır.

Veri analizi SPSS kullanılarak yapılmıştır. Bağımlı ve bağımsız değişkenler arasındaki ilişki için 0,05 anlamlılık düzeyinde ki-kare birliktelik testi kullanılmıştır. Bu çalışma sonuçlara göre katılanların %74,33'ü verem ilaçlarını alırken tedavi destekçisi vardı, %63,44'ü verem hastalıklarını aynı evi paylaştığı hiç kimseye açıklamamıştır. Hastaların %59,6'sı HIV pozitifken, %53,8'i tüberküloz tedavisi bilgi düzeyi düşük çıkmıştır. Kişilerin %64,3'ü verem ilaçlarının yanı sıra başka ilaçlar da alıyordu ve %64,2'si iki aydan daha kısa bir süre içinde kendini daha iyi hissettiği için verem tedavisini bırakma olasılığı daha yüksek çıktı. Bunlar ve diğer faktörlerin, Kampala'daki mevcut Tüberküloz kontrol ve önleme programlarını etkilediği belirlenmiştir.

Tedavi destekçisi olan hastalar, verem dispanserlerinin yürünebilir mesafelerde olması veya nakliye maliyetinin 3 dolardan daha az olması, verem ilaçlarının verem dispanserlerinde bulunması, personel tutumu, rahat çalışma süreleri ve Verem tesislerinde kısa bekleme süreleri Uganda'nın Kampala ilçesinde mevcut TB önleme ve kontrol programlarının işleyişini kolaylaştırdığı anlaşılmıştır.

Anahtar kelimeleri: Kontrol, Faktörler, Önleme, Program, Tüberküloz.

LIST OF ABBREVIATIONS

ACF	: Active Case-Finding
AIC	: AIDS Information Centre
AIDS	: Acquired Immunodeficiency Syndrome
ART	: Antiretroviral therapy
BCG	: Bacille Calmette-Guerin
CAFU	: Children's AIDS Fund Uganda
CDC	: Center for Disease Control
CHCs	: Community Health Campaigns
CHEWs	: Community Health Extension Workers
CM	: Community Member
CI	: Confidence Interval
COVID-19	: Coronavirus disease 2019
CXR	: Chest X-rays
DOTS	: Directly Observed Therapy Short-Course
EPTB	: Extra Pulmonary Tuberculosis
FM	: Family Member
GoU	: Government of Uganda
IGRAs	: Interferon-Gamma Release Assays
INH	: Isonicotinic Acid Hydrazide
IPC	: Infection Prevention and Control
IPT	: Isoniazid Preventative Therapy
KCCA	: Kampala City Council Authority
KPMG	: Klynveld Peat Marwick Goerdeler
LTBI	: Latent Tuberculosis Infection
HC	: Health Center
HIV	: Human Immunodeficiency Virus
HSSIP	: Health Sector Strategic and Investment Plan
HW	: Health Worker
MDR	: Multi-Drug Resistance
mHealth	: Mobile health
MOH	: Ministry of Health
MoES	: Ministry of Education and Sports

NTDs : Neglected Tropical Diseases

NCDs : Non-Communicable Diseases

NCC : National Coordination Committee

NHA : National Health Accounts

NSP : National Strategic Plan

NTPL : National Tuberculosis Program and Leprosy

PTB-SM : Pulmonary Tuberculosis Smear

PLHIV : People Living with HIV

PHC : Primary Health Care

PPP : Purchasing Power Parity

RR : Rifampicin Resistance

TASO : The AIDS Support Organization

TB : Tuberculosis

THE : Total Health Expenditure

TPT : Tuberculosis Preventive Therapy

TRT : Turkish Radio and Television Corporation

TST : Tuberculin skin tests

USAID : United States Agency for International Development

UBOS : Uganda Bureau of Statistics

UNHRO : Uganda National Health Research Organization

UHC : Universal Health Coverage

UV : Ultra-Violet

VDOT : Video Directly Observed Therapy

VHTs : Village Health Teams

WHO : World Health Organization

XDR : Extensive drug resistance

ZTLS : Zonal TB Leprosy Supervision

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1. Background

Tuberculosis (TB) is an airborne disease caused by bacteria known as most frequently, Mycobacterium TB that infects the lungs. When those suffering from lung TB spits, cough, sneeze, or coughs, TB spreads via the air. In order for someone to fall sick, a tiny fraction of germs have to be inhaled (1). 1.6 million individuals worldwide lost their lives due to TB in 2021 (this includes 187 000 HIV infected people). In the world today, the next most communicable killer disease after COVID-19 (above HIV/AIDS). It is also the world's 13th leading cause of mortality. Globally, 10.6 million people are anticipated to contract TB in 2021; including a total of 3.4 million women, 6 million men, and a total of 1.2 million children. TB, unfortunately, happens in all countries and individuals of all ages. Furthermore, drug-resistant variants of TB undermine control efforts in numerous regions of the globe (2). People with weak immune systems, such as those with HIV, dietary deficiencies, diabetes, or smokers, are more likely to contract an illness (3).

Although TB is found all over the world, the majority of its patients live in nations with low or middle incomes. For instance, approximately fifty percent of the earth's patients with TB live in the nation of Indonesia, South Africa, Pakistan, Nigeria, Bangladesh, the Philippines, India and China (1). Global TB Report by World Health Organization (WHO), 2021, the disease can be prevented and even cured in that 6-month course of medication can effectively treat close to 85% of TB patients (4). However, medication non-compliance which is common among TB patients has made improved contagiousness for longer, increased their risk of relapsing or dying from TB, caused treatment to fail, and accelerated the emergence of drug-resistant TB (5).

TB drug resistance occurs in various types; mono resistance, which is against just one first-line anti-TB treatment, and poly resistance, which is against multiple

first-line anti-tuberculosis drugs of first-line. Multidrug resistance (MDR) exists at the very least against isoniazid and rifampicin. In addition to multi-drug resistance, is extensive drug resistance (XDR), which is against any fluoroquinolone. Lastly there exists rifampicin resistance (RR), which is resisting rifampicin determined through genotypic or phenotypic approaches, with or without susceptibility to other anti-Tuberculosis drugs. It covers all types of rifampicin resistance, including mono-, poly-, MDR-, and XDR resistance (1).

WHO aims to put an end to the worldwide tuberculosis crisis by 2035. However, to ensure that everyone who is unwell or infected may access these medical treatment, broad medical care is necessary (4). Furthermore, efforts must be stepped up and gains must be sustained via adequate funding as well as having access to reliable data to determine what works and which additional solutions are required (6).

1.2. Background to the Problem

WHO has an aim to eliminate the worldwide TB epidemic by 2035. Despite some major advancements, much more funding is required to guarantee that everyone has access to the best TB preventive and treatment options and to fund the kind of research required to create cutting-edge diagnostics, vaccinations, and treatment regimens (7).

The Quality of Tuberculosis Services Assessment Report-Uganda, 2020, states that both accessibility to lab services and the availability of core Tuberculosis-related interventions at most types of medical centers were generally high, with virtually all centers providing diagnosis, screening, and treatments (8). However, despite the above successes, Uganda is unfortunately still one of the thirty nations with the largest Tuberculosis burden (9).

For the anticipated 86,000 new cases of tuberculosis in 2019, treatment coverage was only 65 percent, and treatment effectiveness was just 72 percent, both severely below the 85 percent government goal for 2019. In response to the aforementioned statistics, the government of Uganda established the National Tuberculosis and Leprosy Program (NTLP), which has been tasked by the government with the task

of bringing the infection under control by providing high-quality services for afflicted (8) however, TB still poses a threat to personal and public health in Uganda today.

Thus understanding the factors affecting the available TB prevention and control programs in Kampala district of Uganda, and answering questions such as how and to what extent do these factors influence could help address issues to boost the TB treatment success and improve health outcomes.

1.3. Problem Statement

The three most significant TB strategies for prevention and control include detecting and providing treatment for people with current TB; to Figure out and screening persons that come in touch with TB patients to establish if they have contracted TB or have active infections and giving the necessary medication; and to screen communities at greater risk of tuberculosis disease and infection growth in order to find and treat affected patients. He goes on to emphasize that the main focus of TB prevention and management is on state and municipal health departments (10).

Despite the enactment of the WHO-recommended Directly Observed Treatment, Short-Course (DOTS) approach as the highly cost-efficient way as well as the best curative method to stop spreading tuberculosis in communities, TB continues to be the primary death factor in the low resource settings, particularly in sub-Saharan Africa. The DOTS strategy is based on latent case detection by sputum smear microscopy (11,12).

Suspected individuals are therefore anticipated to be capable of recognizing signs of tuberculosis and to possess favorable attitude toward TB treatment by professional health facilities. However, several research has discovered tuberculosis case identification lags because health-care services are seen negatively (13,14) being afraid of stigmatization (8), minimal degrees of TB awareness and customary convictions (15) for example in one of the studies, TB is perceived as a punishment for breaking sexually restrictive traditions following the passing away of a relative (16).

The delays in the detection of TB incidences lead to infected individuals lingering in the surrounding area for prolonged periods of time, deteriorating personal results and prolonging the course of airborne, interpersonal transfer of TB (17,18).

The WHO publicly advised in 2012 that domestic contacts in countries with large burdens such as Uganda, frequent checks should be conducted (19), and a handful of nations have executed this measure in a systematic manner (20).

From literature review, most of the studies carried out on TB disease and its factors, use models that tackle a single problem such as behavioral model, socio-demographic models and so on (13,15,16,21) whereas some other factors aren't even covered in the previous studies in Uganda. Besides, none of the studies addresses the variables that influence the readily accessible TB prevention and control approaches in Kampala nor Uganda as a whole and without this knowledge, it will be difficult to address this condition.

Furthermore, this study will be guided by Wilber's model which provides a wide platform to examine more than one factors at ago hence contributing towards the available literature and improving both personal and public health, prevention of TB disease and empowerment of the current and future TB patients to better manage the disease.

1.4. Objectives

1.4.1. General Objective

The aim of this study is to investigate the factors affecting the prevention and control of TB in Kampala, Uganda. Furthermore, to provide recommendations especially to those factors that affect the programs negatively and also to address the information deficit and add to the current literature.

1.4.2. Specific Objectives

- ❖ To identify the available TB control and prevention services in Kampala.
- ❖ It is to determine the factors that are thought to be affecting the prevention and control of Tuberculosis.
- ❖ To determine what extent each factor affects the available TB control and prevention programs in the capital city of Uganda.

1.5. Significance of the Study

The causes of the high TB cases and consequently low treatment success rates can be understood by determining the variables influencing the TB control and prevention programs currently in place in Kampala district of Uganda. This will not only add to the corpus of knowledge on the general variables that hamper Global End TB efforts, but it will also add new information particular to Kampala.

Customized methods to address the variables can then be developed once they have been identified. Both TB patients and those who work with them will benefit from the study because the results could be used to develop plans to increase the standard of treatment. The study's results can serve as the foundation for other generalizable studies, which will be advantageous to Uganda's Health Ministry and Social Service. The National Leprosy and TB Control Program might then get advice on how to enhance Kampala's TB treatment and prevention, which would ultimately enhance TB control in this district.

2. GENERAL INFORMATION

2.1. Uganda and the Health System

2.1.1. Uganda's Geography

Uganda, a landlocked nation, shares borders with Kenya to the east, Sudan to the north, the Democratic Republic of the Congo to the west, Rwanda to the southwest, and Tanzania to the south. 241,559 square kilometer make up all of Uganda's land. The open water takes up around 37,000 square kilo meter of this region, with the remaining land. The country's southern region has a sizable chunk of Lake Victoria, which it shares with Kenya and Tanzania (22).

Uganda is located on an eastern African plateau at an average elevation of 1,100 meters above the level of the sea. The plateau often dips southward into Sudan, which explains why the majority of the country's rivers tend to flow north. Despite being equatorial in general, the climate varies because altitude affects it. The height, varieties of soil, and primarily warm and wet climate of Uganda give the nation a tremendous amount of agricultural potential. They also give explanations for the vast array of woods, grasslands, and animal reserves throughout the nation (23).

2.1.2. Population

With an annual surge in population of 3.1% as per 2014 census Uganda has an estimated population of 43.7 million by mid-year 2022 (24). According to the world bank, Uganda's age dependency ratio in 2021 was as follows; young (percentage of population of working age), was reported to be 85%, old (percentage of population of working age) at 3% making a total of 88% (25).

According to world meters 2020, 5 children per woman is the total fertility rate of the nation and urban population was 25.2 % of the population (11,135,655 people in 2019). Uganda's life expectancy is 64.4 at both sexes with 66.7 years for females and 62.0 years for male life expectancy at birth.

Infant mortality was 39.2 in 2020 decreasing from 150.34 infant deaths per 1,000 live births in 1950. There has been a reduction in the under 5 deaths from 270.54 in 1950 to 53.3 per 1000 live births in 2020 (26).

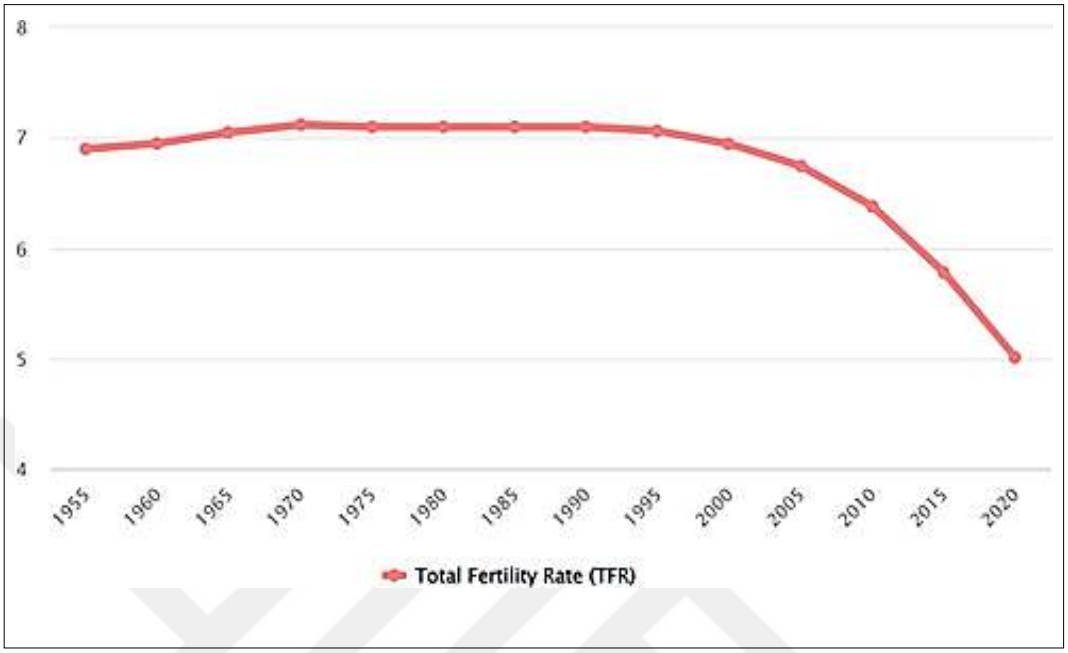

Figure 2.1. Total fertility rate in Uganda from 1950 -2020

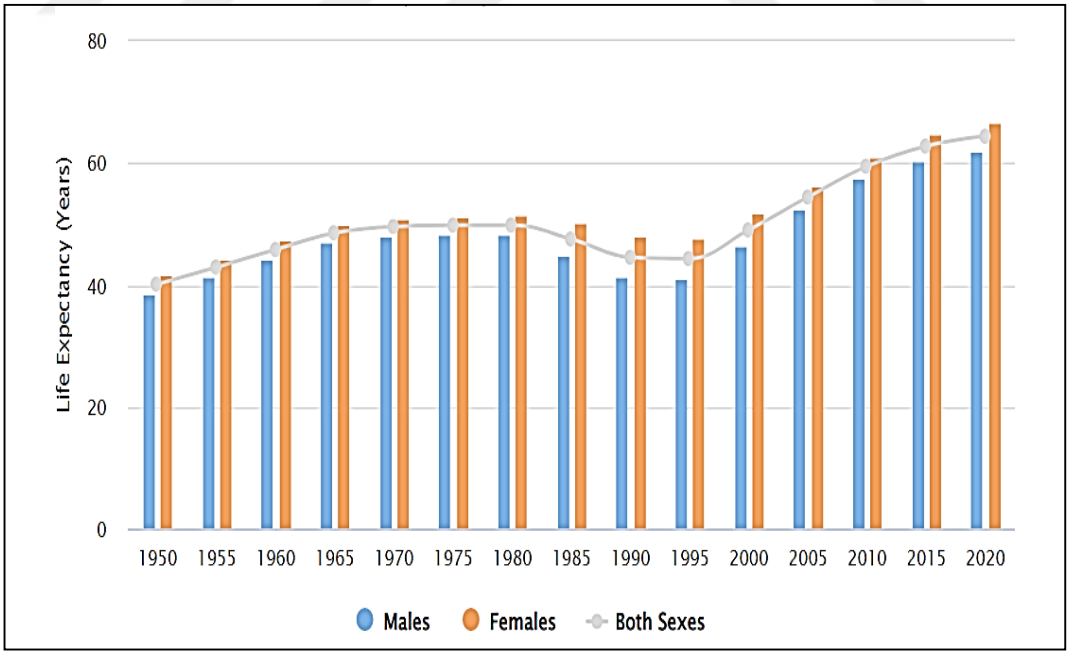

Figure 2.2. Life Expectancy in Uganda from 1950-2020

2.1.3. Economy

According to the wage indicator, Uganda's current minimum wage is 130,000Ugx (35.37USD) (27). Besides, according to the World Bank's prediction in the Global Economic Prospects, Uganda's economic growth will be less than that of the majority of its East African Community counterparts. However, the GDP per capita rose from US$ 889 in FY 2018/19 to US$ 1,046 in FY 2021/22, surpassing the yearly National Development Plan III objective of 1,006 US dollars and formally certifying Uganda's move to lower middle-income status (28).

Agriculture makes up 24.2% of Uganda's economy, followed by industry at 25.5% and services at 50.3%. Dairy, crop, Fisheries, dairy, and animal husbandry subsectors are all included in the agricultural sector. Manufacturing, construction, and electricity supply sub-sectors are part of the industrial sector, whereas the retail trade and wholesale, telecommunications, restaurants and hotels, communications and transport, and tourism sub-sectors are all part of the services sector. Uganda's economy has grown steadily, on average, about 7% annually (23).

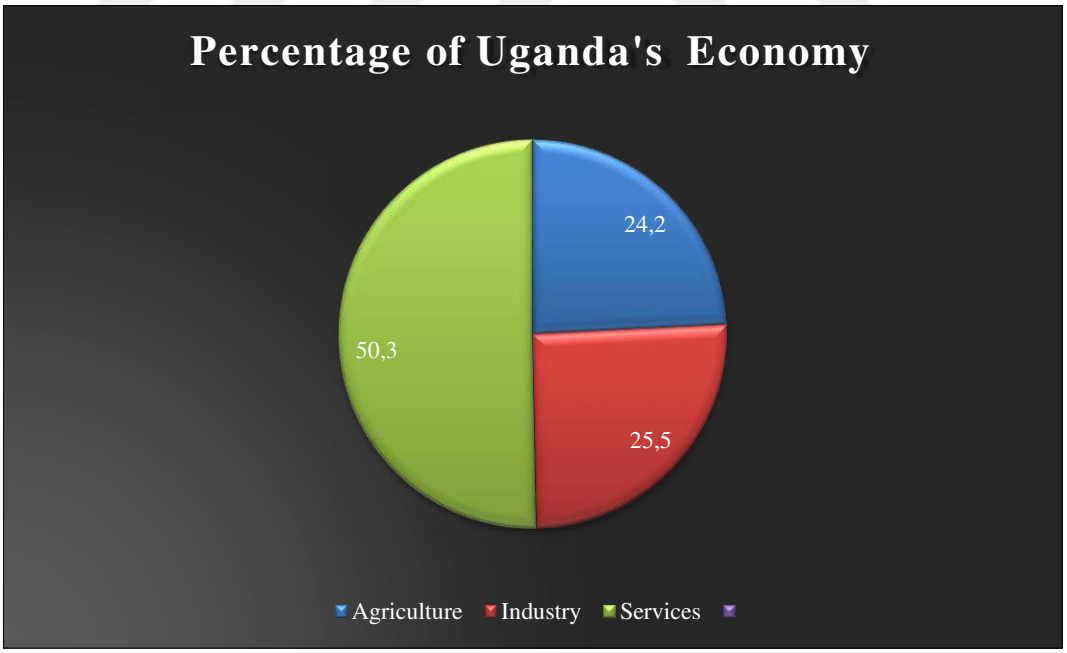

Figure 2.3. Percentage of Uganda's Economy

2.1.4. Education

The development of a country absolutely depends on education. The Sports and Education Ministry (MoES) is in-charge of ensuring that all Ugandans have access to high-quality education at a price that is both affordable and reasonable. Additionally, the current educational system is set up to provide all Ugandans with the fundamental knowledge, values, and skills they need to take use of their environment for personal and national growth in areas like politics, religion, politics, nutrition, and other areas (22).

Most literate Ugandans complete the country's two fundamental educational levels—primary and secondary schools—and only a small minority continue their education at universities and other higher institutions. Some Ugandans have the opportunity to enroll in the 893 pre-primary schools for their pre-school education (MoES, 2019). However, pre-primary enrollment dropped from 18% in 2016 to 8% in 2017 as a result of fewer students enrolling. There were 8.8 million children enrolled in primary schools and 1,370,583 students attending secondary schools in 2017 (22).

2.2. The Healthcare System

Delivering the required minimal level of healthcare is the goal the health system of Uganda. There are both the nationwide and district-level in Uganda's decentralized healthcare system. On a national scale, there are state referrals, district referrals, and largely independent entities including Uganda national health research organization, Uganda blood transfusion services, public health laboratories and national medical stores (29).

The non-profit organizations are administered on a local and national level, and 78% of them have a religious foundation. The three principal operators are Uganda's Muslim medical bureau, Catholic medical bureau, and Protestant medical bureau (30). Additionally, non-governmental organizations have become the leading non-profit providers of HIV/AIDS counselling and care (31). Clinics and unofficial drug stores are among the for-profit service providers.

In 2021, Uganda had 6,937 health institutions, including public, privatized, as well as privatized non-profit ones. Government-owned medical facilities occupy

45.16% the Privatized for Non Profit (PFNP) take up 40.29%, 14.44% for Private for Profit (PFP) and 0.11% for the local community (29). Government-run and PFNP have superior medical services than PFP, which are typically lesser tiered.

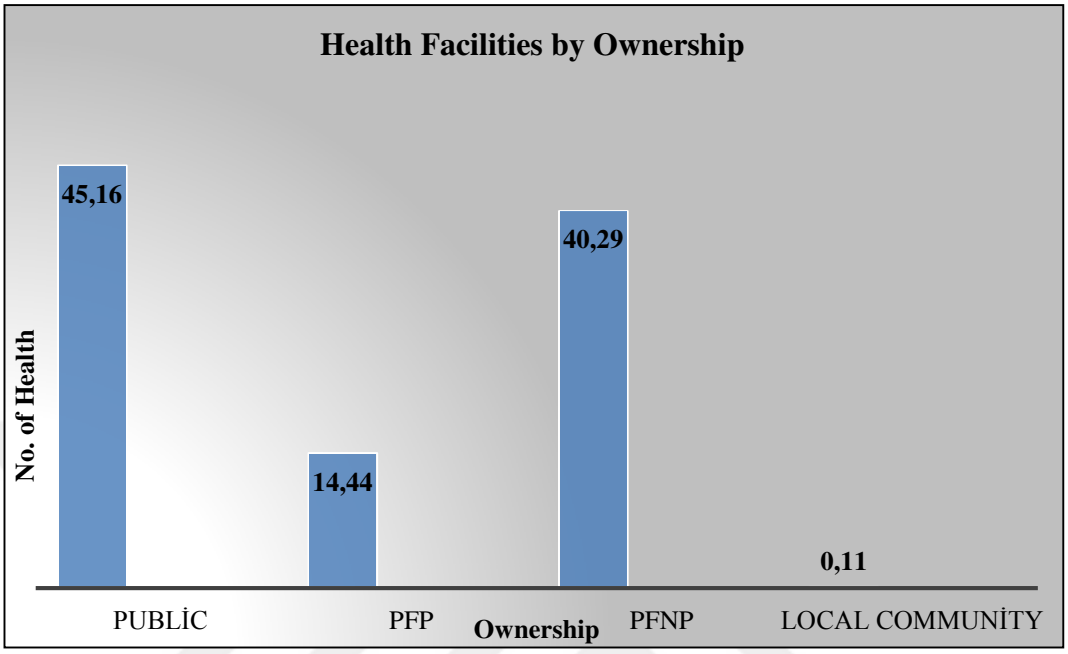

Figure 2.4. Health facilities in Uganda by ownership

Doctors, dentists, nurses, midwives, pharmacists, and allied health specialists (31) constitute formal providers, whereas herbalists, spiritual healers, conventional birth attendants, hydro-therapists, and other traditional caregivers constitute the informal providers (30).

2.2.1. Organization and Provision of Services

In governance, the health ministry is now executing the remastered edition of health sector plans, the strategic and investment plan for the health sector. The MOH is in responsibility of organizing stakeholders as well as planning, allocating funds, developing policy, and executing rules. Village Health Teams make up the lowest level of the healthcare system which is district-based (VHTs). They are unpaid community healthcare givers that primarily provide preventative care, simple curative care, and health education in local areas. They are considered first-level health services. Health Centre II, an outpatient facility managed by a nurse, is the stage that follows. This is designed to accommodate 5000 patients and health workers (29).

The step up that follows is Health Centre III (HCIII), which provides HC II services in addition to inpatient, straightforward diagnostic, and maternal health care and serves 10,000 people. A clinical officer monitors its operation. The Health Centre IV is located above HC III and is administered by a physician. On top of the treatments offered at healthcare center III, it as well offers surgical procedures. Comprehensive emergency obstetric care and blood transfusion services are also anticipated to be offered by HC IV. There are 163 general hospitals, 222 health center IVs, 1,574 health center IIIs, 3,365 health center IIs, 1572 clinics, and 24 special clinics from TASO, AIDS information center, and children's AIDS Fund Uganda. There are also 13 regional referral hospitals, 3 referral hospitals, 2 national referral hospitals, 2 national referral hospitals (29).

There are many different types of healthcare services offered in Uganda, including preventive, promotional, general and emergency surgery, outpatient services therapeutic, maternity, inpatient treatment, transfusion of blood and laboratory services, training, and research. The main primary healthcare (PHC) referral institutions, general hospitals have 100 to 250 beds and 185 employees, respectively, according to service delivery requirements. They serve as a conduit between lower level healthcare facilities and regional and national referral hospitals (32).

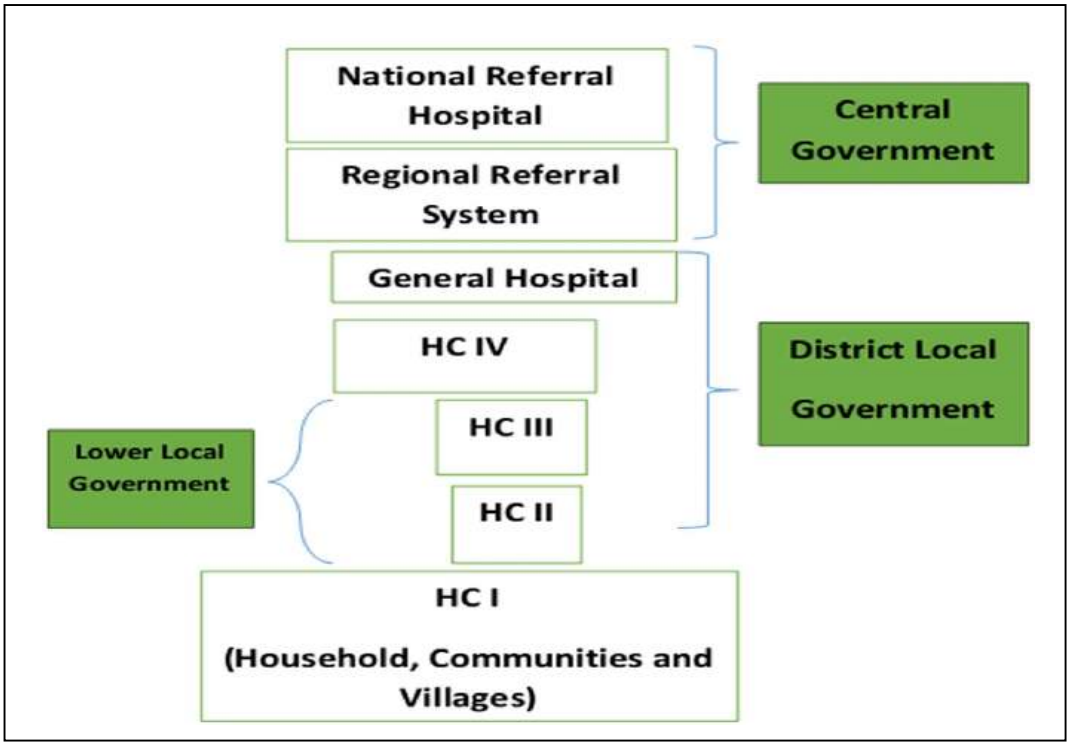

Figure 2.5. Organogram of the Ministry of Health of Uganda

2.2.2. Physical and Human Resource

The fundamental driver of population health improvement and the backbone of every nation's health system in terms of providing vital services and saving lives is human resource development in the health sector (33). However, Uganda suffers from a severe scarcity of health professionals. According to the conclusions of the WHO African Region report on the status of the health workforce released in 2022, Uganda has 17,007 general practitioners, 179 specialists, 23,644 nurses and midwives, 26 dentists, 324 pharmacists and technicians, 3874 lab personnel, and 4646 other health workers (34).

The Government of Uganda through Community Health Extension Workers (CHEWs) National Strategy (2018- 2022), aims to build and strengthen the community health system as a component of the wider national health system so as to add more community accessibility to services as well as guarantee the equitable distribution of household- and community-centered health care services. The main goal is to properly and adequately train a cadre of CHEWs and launch them to provide high-quality, preventative, promotional, and chosen basic curative health services at the community level (29).

2.2.3. Financing Healthcare System

Since the early 2000s, Uganda has conducted the National Health Accounts (NHA) survey, and the recent report spans the fiscal years 2016–17 to 2018–19 (the eighth cycle of NHA for this nation). The system of health accounts' 2011 version is used to monitor health spending in Uganda. The current results of the NHA survey showed that Uganda's total health expenditure (THE) for the fiscal years 2016–17, 2017–18, and 2018–19 was, respectively, UGX 4.749 billion, UGX 5.241 billion, and UGX 5.492 billion (35). However, expenditures on health per capita in US dollars which estimates the health expenditures such as healthcare goods and services consumed during each year in 2019 was $32, a 1.1% increase from 2018 (25,36).

Healthcare in Uganda is financed by both public funds (24%) and private trust (76%). Private sources include payments made by households, private firms, and for non-profit organizations. Out-of-pocket expenditures correspond to approximately

55% of all private health expenditures and 41% of total expenditures. Funds for the delivery of primary health care services come from two sources; The first is the central government contribution, mainly from taxes, and the second is the donors or financings channeled through project support, direct regional support and various global health initiatives (37).

Although public resources in Uganda are cross-subsidized to some extent, risk and pooling of funds are insufficient due to the lack of initiatives to integrate various finance channels and significant out-of-pocket spending. Community-oriented medical insurance, voluntary privatized prepayment plans, and healthcare organizations are examples of small, dispersed risk pools (37). Medical care providers in public institutions are provided with a budget from the central government in which they operate. In the privatized sector, primary health care givers are reimbursed based on a charge-for-service basis on behalf of the government (38).

2.2.4. Health Service Utilization

Due to urban bias, socioeconomic determinants of health, and challenges associated with transportation, access to healthcare in rural areas of Uganda and the other African countries in the Sub-Sahara remains problem. The most vulnerable citizens in Sub-Saharan Africa have disproportionately limited access to health centers due to the inequitable nature of their health systems. Concern over the lack of healthcare parity in Sub-Saharan Africa has grown as those nations experience a period of high prevalence of non-infectious as well as infectious illnesses, the latter of which require a robust primary care network due to a time-consuming care system (39).

2.2.5. Turkey and Uganda

Turkey covers an area of 785,350 square-kilometer (40) which is way bigger than Uganda; 241,559 square kilometer make up all of Uganda's land and has a greater population of 85,278,553 people in 2022 (41) which is almost double the estimated Uganda’s mid- year 2022 population (43.7 million) (24).

While the Ugandan state is defined as a low-income state, Turkey on the other hand is termed as a middle-low-income state with a fertility rate of 1.76 child per

woman, infant mortality of 8.7, under 5-year mortality of 10.6 per 1000 birth and a life expectancy of 78.6 at both sexes. Whereas Uganda had an elderly proportion of 2.4 %, Turkey had 9.5% in 2020 (41).

The ratio of doctors to patients and nurses to patients in Uganda is at 1:25 000 and 1:11 000, respectively much lower than the WHO suggested doctor-patient ratio of 1:1000. Furthermore, despite the fact that the WHO does not officially suggest a nurse-to-patient ratio, 1:11 000 is still unsuitable given that the majority of well-established healthcare systems have a doctor-to-nurse ratio of 1:2–5 (42). The GDP per capital in Turkey is 10, 655 US Dollars in 2022 (41) higher than Uganda's 1,046 in FY 2021/22 (28). According to the World Bank economic classification, Uganda falls into lower middle income as Turkey is to the upper middle income countries (43).

In 2021, the average TB incidence was 134 per 100,000population globally, Uganda on the other hand, had an incidence of 199 per 100,000population which was lower than the Sub-Saharan African incidence (212 per 100,000 population) though higher than low income countries at an incidence of 185 per 100,000population (46). Turkey, however, had an incidence of 11 per 100.000 population which was way under the the global, upper middle income countries and WHO European region incidences (47). This is shown in figure 2.6 and 2.7 below.

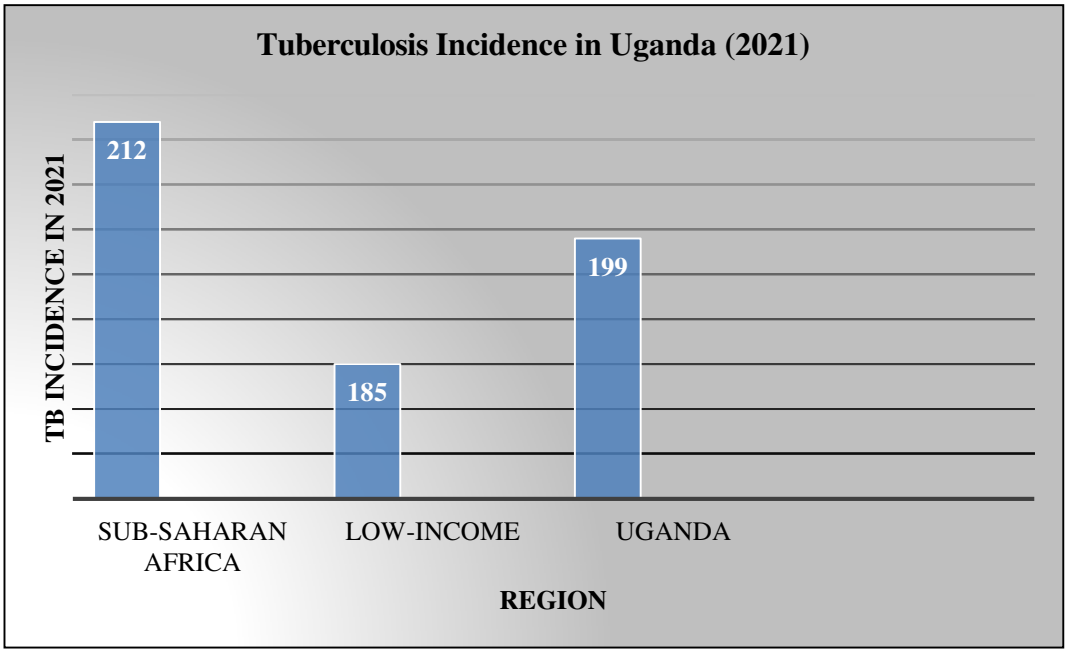

Figure 2.6. Comparison of Tuberculosis incidence in 2021 (per 100,000 population)

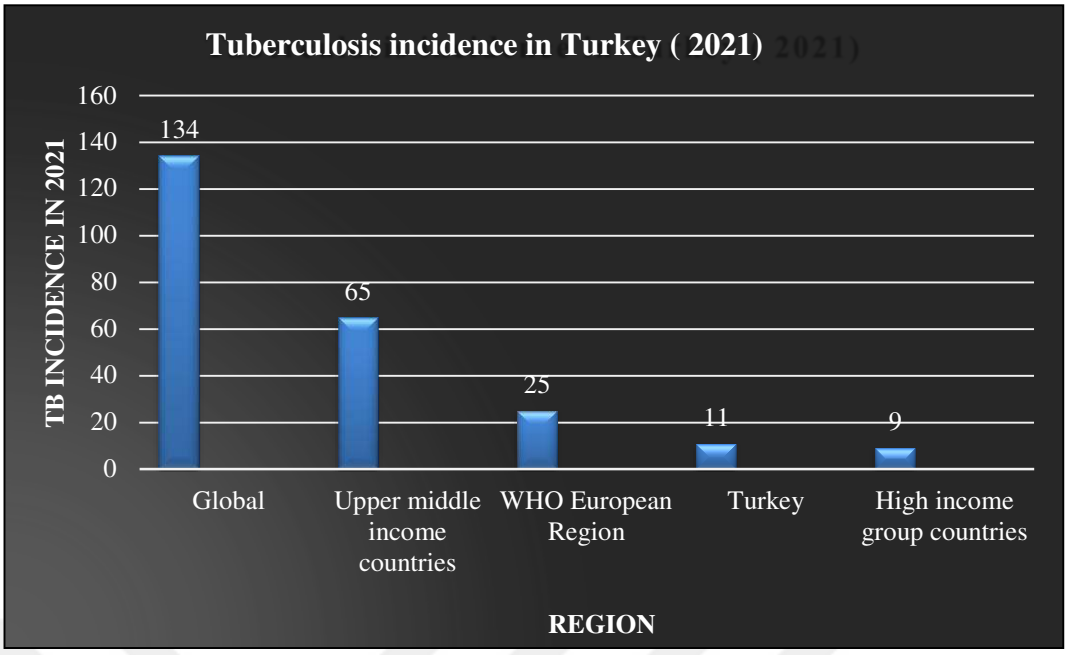

Figure 2.7. International Comparison of Tuberculosis Incidence in 2021 (per 100.000 population)

2.3. Literature Review

2.3.1. Introduction

HIV/AIDS, tuberculosis, and malaria are three well-known but poorly controlled diseases that continue to account for more than half of the global burden of infectious disease mortality. This is true despite the consistent emergence of new pathogens with significant public health, economic, and geopolitical impact (44) for example according to Mel Spigelman, president of the non-profit TB Alliance, "TB has recovered the dubious distinction" while global COVID-19 deaths have been progressively dropping (45). In addition, The World Health Organization's 2022 Global TB report estimates that 10.6 million people had TB in 2021, an increase of 4.5% from 2020, and that 1.6 million people died from TB (including 187 000 HIV positive individuals) (46).

Many of the world's poorest countries are hampered in their ability to grow economically and develop because of these diseases. They nevertheless have an impact on developed nations as well, and are frequently linked to issues like immigration, international travel, and poverty. For thousands of years, Mycobacterium TB has existed. Nevertheless, one third of the world's population is currently afflicted,

demonstrating its continuing effects. Those who get active TB infect roughly 10 to 15 more people each year, even though not all of these people become ill. In 2002, 8–9 million people were had TB, many of whom had strains of M. tuberculosis that were resistant to anti–tuberculosis medications, and about 2 million people died from the disease, the majority (98%) of whom were from developing nations. The incidence of TB has generally been rising by 0.4% to 3% yearly. Southeast Asia has the highest number of cases, although regions like Eastern Europe and sub-Saharan Africa have recorded far faster rates of rise. Following a decade or more of declining rates associated to the use of directly observed therapy (44).

2.3.2. Major Infections in Uganda

The majority of morbidity and mortality in Uganda are caused by communicable diseases, accounting for more than fifty percent of the disease burden. As far as illnesses and fatalities go, TB, malaria, and HIV/AIDS, diarrheal, epidemic-prone, and diseases that can be prevented by vaccine are the main culprits. Moreover, non-infectious diseases, which include mental health problems, are raising up. The increased mortality is also a result of maternal and perinatal illnesses. Neglected tropical diseases continue to be a major issue in the nation, primarily impacting rural, underprivileged areas (47). The 10 most prevalent causes of deaths, per Global Burden of Diseases 2019 report include, malaria, congenital birth defects, ischemic heart disease, lower respiratory infections, sexually transmitted infections excluding HIV, neonatal disorders, HIV/AIDS, Tuberculosis, Stroke, diarrheal diseases (52).

2.3.3. History of TB in Uganda

Throughout a large portion of recorded human history, TB has claimed a lot of its victims' lives. In the eighteenth and nineteenth centuries, TB spread like bush fires in North America and Europe, earning itself a title "Captain Among these Men of Death" (48). However, In the 1940s, new medications made it feasible to conquer the illness; as a result, the incidence of cases fell sharply (49).

According to Gutierrez and colleagues, an early progenitor of M. tuberculosis existed in East Africa as long ago as 3 million years ago, and they speculate that it may have infected early hominids at that time (50). According to the earliest Mengo

hospital records, TB existed in central East Africa at the time of the first European incursions into that region (51).

The work of Theophile Laennec at the start of the 19th century marked the beginning of knowledge of the pathophysiology of TB. The transmission of Mycobacterium TB infection was proven by Jean-Antoine Villemin in 1865, and Robert Koch identified the tubercle bacillus as the causative agent in 1882. Clemens von Pirquet invented the tuberculin skin test in 1907, and three years later he exploited it to demonstrate latent TB infection in asymptomatic children. Sanatoria were established in the latter part of the nineteenth and early twentieth centuries to cure TB patients. Public health initiatives to avert the propagation of TB were established after the bacterial origin of the disease was discovered. BCG vaccinations were widely utilized after World War 1, but the current age of TB therapy and eradication didn't begin until the discovery of streptomycin and isoniazid in 1944 and 1952, respectively (48).

It is now clearer than ever that nationwide initiatives on combating TB should be solidified and prioritized on boosting the quality of early detection, treatment, and care services; bolstering the administration of programs, deployment, and monitoring (49). In Uganda, TB is a public health issue. There were reportedly 15,600 fatalities and 88,000 new cases of TB in 2019. While 56% of all cases were men, children turned out to be 13% of those cases. Seventy-five percent of TB cases in 2019 (65,897) were diagnosed and reported to the National Tuberculosis and Leprosy Program (NTLP); another 25,000 cases were either not diagnosed or confirmed but not reported. Furthermore, only 559 of the predicted 1,500 cases of Drug-Resistant Tuberculosis (DR-TB) in 2019 were identified and reported to the NTLP (52).

Halving TB prevalence and the number of TB-related deaths via the WHO-Directly Observed Therapy-Short course strategy (DOTS) and other breakthroughs is one of the Millennium Development Goals' fundamental objectives (53). However, limited resources are the reason why DOTS coverage is poor. Particularly in rural locations, there are no resources to facilitate health workers to visit the TB patients down there. In order to support DOTS, the national TB program has to receive funding from the Ministry of Health. The primary health care monies that the districts receive are insufficient to support DOTS (54).

2.3.4. Definition of Key Concepts

Affecting: having an influencing on someone or something, or to cause a change in someone or something (55).

Tuberculosis: a bacterial infection called Mycobacterium tuberculosis, it causes a respiratory condition that most frequently affects the lungs (1).

Control: to order, limit, or rule something, or someone's actions or behaviour (55).

Prevention: the act of stopping something from happening or of stopping someone from doing something (55).

Program: a plan or system under which action may be taken toward a goal (56).

2.3.5. TB and Related Conditions

With a yearly average of 330 cases of all types and 136 fresh smears results positive per 100,000 people, tuberculosis appears to be a major threat to health in Uganda (57).

Through multi-sectoral, it is also feasible to reduce the number of people who contract the disease by addressing TB factors such undernourishment, HIV infection, smoking, and diabetes. In some countries, the prevalence of TB has already been diminished to fewer than 10 cases and fewer than 1 fatality per 100,000 people annually. Scientific advancements (such as a new vaccine) are needed in order to dramatically reduce the annual number of TB incidences globally to the levels already obtained in these low-burden countries (4).

2.3.5.1. TB and HIV

In comparison to those who are HIV negative, those with HIV had an 18 (CI: 15–21)-fold higher risk of developing active TB illness. HIV and TB are a deadly combo since they both hasten the progression of each other. About 187, 000 deaths occurred from HIV-associated TB in 2021. Only 76% of TB patients had been notified and had a recorded HIV test result in 2021, up from 73% in 2020. HIV-associated TB

is most prevalent in the WHO African Region. Only 46% of identified HIV-positive TB patients were using ART overall in 2021 (1).

Uganda is one of the 30 nations that the WHO has identified as having a high TB/HIV burden. The estimated incidence rate for TB in 2019 was 200 per 100,000 people, while the estimated fatality rate was 35 per 100,000 people (58). TB was the primary cause of death in HIV patients, according to a number of Ugandan studies, and many of these patients passed away before their TB could be confirmed by laboratory tests (54).

Uganda, like the majority of Sub-Saharan Africa, is struggling with the HIV/AIDS and TB epidemics. Approximately 60% of TB patients are thought to also have HIV/AIDS. The number of TB cases reported in the area has increased four-fold as a result of this simultaneous catastrophe. Consequently, TB is the leading cause of death for those with HIV/AIDS. The clinical presentation of TB in people who had both infections changed, which has an impact on clinical management and the creation of public health strategies to address the twin epidemic (57).

2.3.5.2. Multi-Drug Resistance TB (MDR-TB)

MDR-TB is a type of TB brought on by bacteria that are Resistant to Rifampicin (RR) and isoniazid, the two most potent first-line TB medications. Second-line medications can be used to treat and even eradicate MDR-TB. However, second-line treatment choices are few and call for lengthy chemotherapy (lasting at least 9 months and possibly 20 months) using expensive and hazardous drugs (1). Out of the 65,897 TB cases in Uganda that were reported in 2019. The WHO predicted that 1% of new cases and 12% of those that had already been treated in that year were MDR/RR-TB infections. Treatment for 384 individuals with MDR/RR-TB began in 2017, and 74% of them were effectively treated (58)

Patients with MDR/RR-TB experienced a 60% global treatment success rate in 2019. WHO recommended a new, shorter (9–11 months), completely oral regimen for MDB-TB patients in 2020. According to research, patients find the shorter regimens simpler to follow than the longer ones, which last up to 20 months (1). However, between 2019 and 2020, there was a decrease in the number of patients receiving

treatment for RR-TB and MDR-TB. Only about one in three of those in need (161, 746) were reported to have begun RR-TB therapy in 2021 (46).

2.3.5.3. Catastrophic Costs

A catastrophic expenditure is one that exceeds 20% of the average yearly household income prior to TB (59). The main source of funding in low and middle income countries is the Global Fund to Fight AIDS, TB, and Malaria. Overall, it accounts for close to 50% of the funding for TB provided by foreign donors. The largest bilateral donor and financial supporter of the Global Fund is the United States government (46,60).

Despite all the above funding, the percentage of TB patients and their households that experienced catastrophic costs ranged from 13% to 92%, and the pooled average, adjusted for the number of cases reported in each country, was 48%, according to the findings of 27 national surveys. However, this is contrary to the 2015 End TB Strategy, which advocates for "No TB patients and their households facing catastrophic costs as a result of TB sickness" (1).

2.3.6. Strategies Used to Control Tuberculosis

By terminating the chain of transmission, TB control programs seek to reduce TB morbidity and mortality (61). The three priority strategies for TB prevention and control, according to Satcher,1995, are as follows:

a) Detecting and treating people with active TB;

b) Figuring and screening people who have had contact with TB patients to determine whether they are infected with Mycobacterium TB or have active TB and providing appropriate treatment; and

c) Screening populations at high risk for TB. He goes on to emphasize that the main focus of TB prevention and management is on state and municipal health departments (10). In another report that recapitulates the significance of several established priority strategies for TB prevention and control, includes identifying and treating people with active TB disease, locating and screening people who have had

contact with TB patients, and screening, testing, and treating other chosen individuals and populations at high risk for latent TB infection (LTBI) and subsequent active TB disease (62).

Policies and procedures for TB control should be developed, reviewed periodically, and evaluated for effectiveness in all healthcare settings, especially those where patients are most likely to be exposed to TB. This will help determine the steps that need to be taken to reduce the risk of TB transmission (63).

2.3.6.1. Management of High-Risk Groups

The management of high-risk groups entails identifying particular populations that are more likely to contract TB (or become infected with TB), putting strategies in place to find active TB cases and latent TB infections, ensuring the availability of supervised and supported treatment, and keeping track of treatment results. The policy for high-risk group management should clearly state how risk groups are defined in the nation or region, for example, by epidemiological characteristics such as a defined threshold of TB incidence or high prevalence of risk factors for TB (recent immigration from high TB incidence countries, poverty, alcohol and substance abuse, malnourishment, destitution) and/or by cost-effectiveness considerations (10,62,63).

2.3.6.2. Early TB Detection

The two main approaches for early TB detection are systematic screening and optimizing patient-initiated route interventions. According to the DOTS strategy, the patient-initiated pathway, also known as the passive case-finding strategy, is essentially adopted in most nations (64,65).

Individuals in high-risk categories should be routinely screened for active TB, and all cases should receive sufficient treatment, including monitoring the effectiveness of the medication. Due to other factors like chaotic lifestyles, psychological problems, destitution, immigration/legal status, and high mobility, many people in high TB risk categories also have an elevated risk of treatment default. These people require close monitoring and intense medication (including DOT). To satisfy the needs of these specific high-risk groups, there should be sufficient staff and

resources (such as time, transportation options, and facilitators). Evaluation of the screening yield and the overall impact of the intervention depends on tracking the outcomes of the treatment. The proposed goals for high-risk groups include achieving 95% population screening and 95% treatment success rates. In addition, screenings for infectious TB patients should be conducted on all close contacts (66).

Due to their difficulty in being accessed by the healthcare system, screening of some high-risk groups, such as illegal immigrants, may provide additional challenges. To shorten diagnostic and treatment delays as much as feasible, access to services should be facilitated and incentive programs should be offered (65,66). Systematic screening pathway is comprised of LTBI additionally, known as active case-finding (ACF) (67). High risk groups should routinely screen for LTBI using interferon gamma release assays and/or tuberculin skin tests (TST) (66,68). Chest X-rays (CXR) are frequently used for ACF, including in-contact investigations and in conjunction with yearly health screening programs. For those who have TST/IGRA positive results and/or abnormal CXR values, a bacterial examination will be offered and positive patients offered preventive therapy, including treatment support, and treatment outcomes tracked (64).

2.3.6.3. Measures to Control Infection

To stop the spread of M. tuberculosis in communal areas like hospitals, jails, and homeless shelters, infection control measures are required. Simple isolation facilities with enough ventilation and UV light as well as negative pressure rooms are all examples of effective infection control (64,66). Avoiding overcrowding lowers the danger of transmission for the general populace (69). Based on a three-tier approach, the US Centre for Disease Control (CDC) guidelines stressed the use of personal respiratory protection, avoidance of nosocomial dissemination, and preventing the exposure of uninfected people to active TB patients (64).

2.3.6.4. Appropriate Medical Care

Without appropriate measures to stop TB advancement from LTBI, new transmission, and unsatisfactory treatment outcomes in TB patients, early LTBI/TB identification may become ineffective. The recommended medication is isoniazid

preventative therapy (IPT), with a regimen ranging from 6 months to 9 months, and 12 months being advocated for HIV-infected patient (68,70). However, other trials found that regardless of HIV status, the 9-month regimen was preferable to the 6- or 12-month ones for improving treatment outcomes in TB patients (65).

The main drawback of IPT is the elevated risk of hepatotoxicity that gets worse as one grows older. Recent recommendations suggested that just treating LTBI in people under the age of 35 should be discontinued. However, treatment of LTBI should not have an age restriction and shouldn't be used reluctantly especially if it's benefit outweighs the risk of side effects and will contribute to the global eradication of TB (61). Further research is required to determine the tolerance, toxicity, and effectiveness of the 4-6month Rifampicin preventive treatment as well as other alternative medicines for treating LTBI (71–73). More so, generally older patients, due to jeopardized frailty, co-occurring diseases, and negative drug reactions, may need therapy for longer than the norm, typically 9 months as opposed to 6 months (73). Receiving adequate follow-up care, which is a core part of the DOTS method is also crucial for TB patients (62).

TB Treatment Process in Uganda

The National Tuberculosis and Leprosy Program (NTLP) in Uganda suggests a regimen of isoniazid (H), rifampicin (R), ethambutol (E), pyrazinamide (Z), and streptomycin (S) for two months, followed by H, R, E, and Z for one month, and H, R, and E for five months, in accordance with WHO recommendations (74,75). Although this regimen has a 60–70% overall success rate, there is considerable worry about the amplification of resistance and low cure rates, especially in areas like Uganda where drug-resistant TB is common (76).

The two most frequently suggested medications are levofloxacin and moxifloxacin, and the WHO has advised using these medicines to treat MDR-TB. For both levofloxacin and moxifloxacin, the recommended dose is 400 mg once on a daily basis (77). In Uganda, according to the recommendations, a standardized regimen should consist of an intense 6-month phase with kanamycin (or capreomycin), levofloxacin (Lfx), ethionamide (Eto), cycloserine (Cs), and pyrazinamide (Z), followed by an 18-month continuity phase without the aminoglycoside. When drug

susceptibility tests and tolerance data were available, tailored regimens were advised (78).

2.3.6.5. Management by Program

The strategic plan is intended to be effectively implemented through the use of programmatic management. All TB patients, infected residents, and personnel in healthcare facilities and communities should be recognized and quickly reported under a unified national surveillance system using either active or passive case-finding techniques (62). Healthcare professionals, patients, families, visitors, and employees should all get education on tailored TB knowledge so that they may all comprehend and participate in TB control programs. The main healthcare provider's and the department of health's responsibilities should be strengthened. The health authorities should provide epidemiological and managerial assistance, consulting, program training, and assessment in addition to helping design and update policies, procedures, and record-keeping systems. primary healthcare practitioners are crucial in informing the patient, promoting follow-up, and referring them to a care team (62,79). With the aid of public health or the TB program, close monitoring of TB patients, as well as education and contact investigation, must be maintained (68).

2.3.7. Available TB Control and Prevention Programs in Uganda

2.3.7.1. National Coordination Committee (NCC) for TB

At 253 TB cases per 100,000 people, Uganda is one of the states with a high TB prevalence that still requires leadership and coordination to put an end to the TB pandemic by 2035 (3). Between 1999 and 2009, the first global recommendations for implementing Infection Prevention and Control (IPC) for TB were declared. The need for these recommendations was spawned by the TB resurgence and the various factors that contributed to the epidemic, such as the rise in HIV infections, which occurred at the same time as the healthcare systems in low- and middle-income countries were disrupted, the rising prevalence of non-communicable diseases, and the emergence of drug-resistant TB forms. IPC procedures are rarely frequently or systematically

adopted, despite their potential value and impact, especially in areas with limited resources, even if they can minimize the risk of TB transmission (80).

On 16th September 2016, the NCC for TB was established by the Minister of Health (MoH), Dr. Jane Ruth Aceng, at the MoH headquarters in Kampala. The MoH, health development partners, laboratory technicians, civil society organizations, religious organizations, the armed forces, and pharmacists are just a few of the stakeholders in the health sector represented on the NCC. The NCC has been given the responsibility of providing the leadership for the coordination and expansion of preventive, treatment, and care efforts in Uganda. The NCC was established in accordance with the End-TB Strategy's guiding principles, which call for strong coalitions with communities and civic society in the fight against TB (3).

2.3.7.2. Tuberculosis Preventive Treatment

Tuberculosis Preventive Treatment (TPT) was introduced by the MoH on July 4th, 2019 with a target population of over 300,000 People Living with HIV and AIDS (PLHIV) in Uganda. The Government would also offer TPT to all children living with HIV who are 12 months of age or older, as well as to HIV-negative newborns and kids who are 5 years of age or younger and household contacts of people who have pulmonary TB. In accordance with the scale-up strategy, the Government would offer TPT at 1,947 Antiretroviral therapy (ART) venues around the nation. Those who are at risk of contracting TB disease are also given access to TPT. Despite not displaying any clinical TB symptoms or signs, these people are infected with the bacteria that causes TB (3).

Uganda has only been able to reach 16% of the PLHIV with this life-saving intervention, despite the acceptance of global TPT recommendations. After the nation reaffirmed its dedication to prioritizing TB diagnosis, treatment, and prevention during the UN High-Level Meeting held in New York in September 2018, two-thirds of the population had been reached. Despite the first TB/HIV joint strategy being formed 13 years ago, Uganda is still dealing with a twin epidemic of TB and HIV, with 40% of TB patients testing HIV positive and 35 per 100 000 individuals dying from TB and HIV. Similar to this, in Uganda, there were an estimated 14, 000 TB-related fatalities

among HIV-positive people in 2017. As a result, increasing TPT was necessary to lower TB-related fatalities among PLHIV (3).

2.3.7.3. National Tuberculosis Leprosy Program

The National TB and Leprosy Program (NTLP), a section of the Ministry of Health's National Disease Management, was founded with the multi-item goal of creating high-quality TB and leprosy diagnosis and treatment facilities throughout the country and supervising the control of these illnesses (81).

A further effort by the NTLP to address Uganda's chronic TB difficulties is the new National Strategic Plan 2020/2021-2024/2025, which intends to reduce TB incidence by 20%. The NTLP intends to fortify public systems with an emphasis on reaching the maximum number of people and scaling Programs, as well as to improve diagnosis and treatment services, including the integration of cutting-edge technologies and pharmaceuticals (52).

The NTLP administrative structure is divided into three levels: central, zonal, and district. The Central Unit is directed by the program manager in collaboration with the Zonal TB Leprosy Supervisors. The ZTLSs are placed far away to facilitate oversight of TB control initiatives in all districts within their respective zones. The management of TB and leprosy control initiatives at the district level is the responsibility of the District TB Leprosy Supervisors. The primary duties of the Central Unit of the NTLP are to; establish policies, standards, and technical and operational guideline, overseeing technical support, partner coordination and national coordination of TB control initiatives, plan and execute out training guaranteeing the purchase and timely delivery of medications and supplies outreach interaction and social mobilization, tracking and assessing progress, and establishing medical and therapeutic standards (81).

2.3.7.4. DOTS-WHO

The most economical and efficacious preventive method to stop the spread of TB in communities is Directly Observed Therapy, Short-Course. Supervision of patient while swallowing their medicines, boosting treatment loyalt, and preventing

MDR-tb patients are its main objective (11,12). It is a therapy technique where the patient takes each and every dose of medication while a professional is watching. And yet numerous studies have shown that TB case identification delays are associated with a poor opinion of medical care (13,14,82), stigmatization, (8), low levels of TB knowledge and traditional beliefs (15).

According to one study, those who disregard cultural traditions that prohibit sexual intercourse in the pass on of a death in the family are penalized with TB (16). Due to the aforementioned and other TB case diagnostic delays, infected individuals continue to live in the community, which degrades personal outcomes and maintains the TB cycle of airborne transmission (17,18). The precepts of DOTS are: sustained funding and political commitment; standard treatment with inspection and treatment assistance; case surveillance through dependable bacteriology; consistent supply of drugs and management services; and tracking, assessment (66).

High percentages of treatment completion and cure have been observed in nations that have implemented all five DOTS elements (83). One of the key objectives of the Millennium Development Goals is to halve TB prevalence and the number of TB-related fatalities through the WHO-DOTS strategy (53). Until now, low DOTS coverage is caused by a lack of resources. There are no resources, especially in remote areas, to enable health personnel to visit the TB patients there. The Ministry of Health must provide financing for the national TB program in order for DOTS to be supported. DOTS cannot be supported by the primary health care funding that the districts get (54).

2.3.7.5. Community Health Campaigns

Societal health campaigns and public sensitization efforts in regards with TB have shown an outstanding benefit in the early detection and treatment of this disease. This is realized through implementing society-based screening initiatives for main illnesses like HIV, malaria cancer, and TB with the support of local in-charges and the government of Uganda (84). TB screenings and mobile HIV testing programs in impoverished Uganda serve to increase the diagnosis of TB patients (85–87). Early illness detection is essential to maximizing the value of suitable therapy for both

individual health and transmission prevention, and on-site testing techniques are acknowledged as an effective method for detecting infected patients (88).

2.3.7.6. Mobile Health

To treat active TB, various medications are combined. Antibiotics are given out on the orders of doctors or other healthcare experts based on the requirements of the country or the municipality. Since it maintains the TB patient under close surveillance, it is a beneficial program that improves the efficacy of the medication (89). However, using DOT in places with little resources, like Uganda, can be challenging. Some obstacles to DOTS's success include TB stigma, patients who forget to make appointments with TB doctors, the difficulties of common face-to-face interactions, high travel costs, a shortage of public health personnel, and protracted patient wait times at hospitals (90,91).

As an alternative to face-to-face DOT programs, mobile health (m Health) solutions have, however, demonstrated potential (92). In Uganda, authentic tracking and SMS text messages have been utilized to increase adherence to antiretroviral therapy (93). The use of a smartphone app to record drug swallowing films as part of video directly observed therapy (VDOT) is an innovative technique to track conformity and get past patient treatment restrictions (94–99). Hence, VDOT enables patients to submit records of their daily medicine intake for evaluation by TB care specialists without having to physically meet. Yet, it has been discovered that in Uganda, stigmatizing TB patients is the main barrier to the VDOT (96).

2.3.8. Wilber's Integrative Model

The authors of the book ‘’Mind, Body, and Health: Toward an Integral Medicine’’, James Gordon, Dennis Jaffe, and David Bresler, made one of the earliest attempts in contemporary times to use a holistic approach to healthcare. Numerous research has contributed to the development of this paradigm from the earliest contemporary attempts to the present; one of these studies is an approach advanced by the philosopher Ken Wilber that is based on psychology. By modifying this holistic approach to healthcare, Wilber eventually created a quadrilateral system, which has

since established the broad contours of the holistic framework, incorporating internal and external components as well as individual and social domains (100).

The word integral means necessary and important as a part of a whole or contained within it (55). The integrative approach is a strategy for bringing together linked themes and incorporating as many approaches and views into a subject as is practical (101). Wilber asserts that this model offers an operating system that makes it possible to concentrate on all the fundamentals of any issue from daily life to business, medicine, health care, law, and environment (102). According to Duffy, the model reflects every facet of a problem where individual and social components may be identified. It also serves as a regulatory tool by making any scenario apparent from all angles and promoting the development of effective solutions. Duffy further emphasizes that the usage of the integrative model in the health sector, which is prevalent in many nations, makes it the most adaptable aspect of the model (103).

According to Schlitz, the integrative model aims to prevent, diagnose and treat disease or any physical and mental disorder, as well as to protect against potential death or disability; It is a model that prioritizes a system change for improvement and protection from a treatment-centered system. The model is an approach that enables inquiry by bringing together multiple perspectives to support recovery synergistically for healthcare providers, service users and health systems (100). Regardless of the discipline in which it is applied, Wilber claims that the model's goal is to touch on every dynamic associated with this field and to provide a comprehensive view of those dynamics (102). In addition to this, the model provides service providers with critical thinking and ethical reasoning skills and increases awareness (104).

On the other side, Al-Hachim claims that the model aims to get a clear image of why the issue develops and how it can be addressed and improved (105). According to Wilber, people exist both individually and as a part of the society they live in. For this reason, Wilber states that every situation or behavior examined in the integrative model he designed should be considered together with at least four quadrants (106).

These quadrants reveal four basic perspectives by considering the individual both in terms of individual characteristics and as a part of social integrity. Thus, an inclusive information is presented by considering individual and social factors, cultural

values, and systematic problems together. Irrespective of the domain in which it is applied, Wilber states that the model's goal is to touch on every dynamic associated with this field and to provide a comprehensive view of those dynamics (102). On the other side, Al-Hachim claims that the model aims to get a clear image of why the issue develops and how it can be addressed and remedied (105).

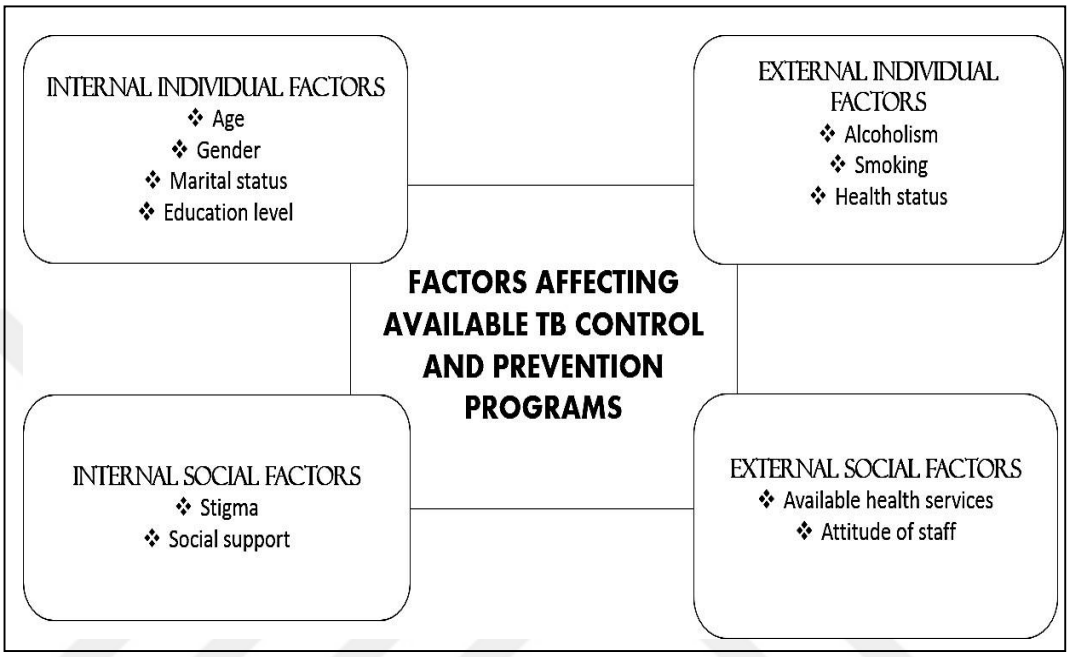

Figure 2.8. Conceptual framework adapted from Wilber's Model

The Integral Model's four-quadrant system is depicted in Figure 2.8. According to Wilber the four quadrants he developed are as follows: Individual aspects are expressed in the upper left and upper right quadrants, whilst social factors are expressed in the lower left and lower right quadrants. Internal factors are indicated by the left upper and lower quadrants, whereas external factors are shown by the right upper and lower quadrants (102).

The concept seeks to allow all factors to be taken into account and to bring a "I, it, and we" perspective to the investigated issue in order to arrive at an inclusive and effective approach. The "I" language is used to describe the upper left quadrant, while the "we" language is used to describe the bottom left quadrant. The "it" language is also used to describe the upper and lower right quadrants. Each of the dials presents a perspective in their own methodology, relatively independent of the others (107).

A change in one quadrant may affect the other three (106). Individuals and the activities they engage in as a result of those qualities will always be a part of social integrity. The behavior that is viewed as a technical and external component may therefore be affected by changes on the subjective side, and vice versa. Likewise, it is possible that changes in social factors affect individual factors (108).

2.3.8.1. Internal-Individual Factors (Upper Left Quadrant)

The subjective and internal experiences of the individual, as well as their unique and internal factors, are represented in the left upper quadrant. It concentrates on social, religious, and demographic aspects (102). This quadrant focuses on the prohibitive or facilitative effects of demographic and socioeconomic characteristics on the functioning of TB control and prevention strategies including age, gender, educational level, marital status, income, and employment status.

2.3.8.2. External-Individual Factors (Right Upper Quadrant)

The right upper quadrant is referred to as "behavioral" since it refers to the characteristics or behaviors of people that can be measured objectively (109). This quadrant includes the external behaviors and actions of the individual as part of the social cohesion, focusing specifically on physical and mental health as well as behavioral factors such as smoking and drinking and various actions that put health at risk. The right upper quadrant can be used to assess the positive or negative effects of behavioral factors such as smoking, eating well, drinking moderately, and health status on the effectiveness of TB preventive and control programs (108).

2.3.8.3. Internal-Social Factors (Left Lower Quadrant)

The attitudes of family and friends, which are crucial to a human interaction, are included in this quadrant along with cultural aspects such as how a particular illness is accepted culturally. Examining the effects of social support networks like family and friends, general cultural perceptions, and physician-patient communication abilities on behavior, decision-making, or illness is done in the left lower quadrant (102). For example in one of the studies, TB is perceived as a punishment for breaking cultural

rules that require one to stay away from sexual intercourse after the loss of a member of a family (16). This quadrant focuses on how cultural elements, like social support, affect the effectiveness of TB preventive and control efforts.

2.3.8.4. External-Social Factors (Right Lower Quadrant)

Topics including social, environmental, legal, and economic situations, as well as national and international governance systems, financial resources, and public policy are covered in the lower right quadrant (110). This quadrant is concerned with the compatibility of individual factors with systems. It covers all the material, economic and social factors that are not linked to the formation of the illness but cause it and its treatment, and deals with the social systems and social developments (109).

This quadrant evaluates aspects of the economics, insurance, distribution, and access to healthcare. In order to assess how system-related elements affect operation of TB prevention and control programs, the lower right quadrant concentrates on the prohibitive and facilitative function of the systems viewpoint in providing services. When examining the right upper quadrant, it is possible to see behavioral aspects associated with TB such as smoking, changes in an individual's immunological parameters, or worsening in organ functions. The Integrative Model is employed in several investigations, according to the literature evaluation (103,109–111).

2.3.9. Factors Affecting Available TB Control and Prevention Programs

The following elements have been identified by prior research as those affecting TB control and prevention program and will be discussed:

2.3.9.1. Internal Individual Factors

This quadrant focuses on the prohibitive or facilitative effects of demographic and socioeconomic characteristics on the functioning of TB control and prevention strategies including age, gender, educational level, marital status, income, and employment status.

i. Employment and Socio Economic Status

It will be essential to confirm whether socioeconomic status has any bearing on TB control and prevention initiatives. According to a large number of researchers, having a job is associated with a higher socioeconomic level, which makes it possible to pay for transportation and healthcare costs and, as a result, contributes to the effectiveness of the TB programs that are currently in place (94,112–114).

ii. Transportation Costs

As the primary cause of non-compliance and treatment default in rural China, financial hurdles to receiving TB treatment have been found (115). This has an impact on the programs for TB control and prevention that are currently in place by increasing the prevalence of drug-resistant TB. The transportation subsidy is crucial in lowering the cost of TB treatment for underprivileged patients (116). According to a Zambian study, the expense of transportation contributes to TB treatment non-compliance, particularly after the patient starts feeling better (82).

iii. Gender

Literature is divided on the subject of gender's impact on TB services. Males demonstrated greater favorable behavior in utilizing TB services than females in one study carried out in Bangladesh (117).

iv. Education

Less literate people were more likely to exhibit non-self-report adherence behaviors (118,119). However, in a different study the risk was lesser (120). According to numerous earlier studies, a determinant of adherence behaviors was an absence of adequate awareness regarding TB (112,121–123). High TB knowledge was linked to a lower risk of TB in a different study. Hence, a better TB prevention and control strategy ought to prioritize health literacy (120). The results of the Ugandan study showed that a significant number of livestock community members were knowledgeable about mycobacterial illnesses, notably TB, but that prejudice from society was a significant obstacle (124).

v. Age

Age has less of an adverse effect on the outcomes of therapy for TB. According to other studies, older adults have treatment resistance, mortality, and recurrent tuberculosis due to the increased age-associated immunosuppressive disorders such diabetic mellitus (125,126). Comparing patients aged 20 to 39 to those aged 60 and beyond, a mixed-method examination revealed that patients aged 20 to 39 had a higher likelihood of missing a dosage and a lower risk of unsuccessful treatment (120).

2.3.9.2. External Individual Factors

A barrier is described as something that prevents something else from happening or makes it more difficult (55). The following elements have been recognized by prior researchers as impediments to TB control and prevention initiatives.

i. TB Vaccination

One of the most crucial elements in stopping and containing the spread of tuberculosis is vaccination. Since 1921, the BCG vaccine has been used the most frequently to prevent tuberculosis. There is evidence that BCG can prevent some dangerous kinds of pediatric TB with a defensive efficacy of 75% (127). Currently, BCG is given to newborns in high-risk areas like Uganda (128). Although it is ineffective against adult pulmonary tuberculosis, it offers protection against pediatric tuberculosis. Numerous new vaccine candidates with the potential to replace or enhance the BCG vaccine are currently undergoing clinical trials as a result of substantial study into the manufacturing of the TB vaccine. On the other hand, a cohort investigation in Uganda discovered that children who received BCG between the ages of one month and five had a considerably lower death rate than those who did not (129).

ii. Smoking

Poor therapeutic outcomes, including therapeutic breakdowns and early fatalities, are associated with tobacco use. Tobacco smoking is associated with multi-drug resistance TB and increases the risk of pulmonary tuberculosis infection,

progression, and early mortality (112,130–132). It may be possible to significantly improve the performance of abstinence in TB patients by increasing knowledge of the health dangers of smoking among TB patients and healthcare professionals and routinely providing tobacco-dependence treatment in specified TB treatment systems in tobacco-free healthcare facilities (130). According to a statistical estimate, smoking will cause 18 million and 40 million cases and deaths from TB over the course of the next 40 years, respectively, assuming current smoking trends persist (133). In a Ugandan investigation, smoking cigarettes was associated with a decreased chance of successful therapy (134). Furthermore, a study done in Turkey indicated that smoking had substantial independent effects on TB patients' response to treatment (135).

iii. HIV/AIDS

Given that TB therapy is lengthy and involves a number of medications, side effects are common, and patients often feel better before finishing their medication, adherence to it is particularly challenging (136). Patients with TB must adhere to their treatment plan at least 90% of the time if they want to be treated (137). Patients' TB treatment outcomes could be harmed by the extra strain of using HIV-drugs as well as possible interactions between medicines with adverse effects (125). Stigma associated with TB and HIV diagnoses has also been linked to poor therapeutic rates (138). In multiple earlier investigations, HIV has been linked to unsuccessful attempts to treat TB (139–141). Despite a decline in HIV co-infected TB cases, the steady decline in Uganda's incidence rate is attributable to a rise of freshly acquired TB infections among HIV-uninfected individuals (142). Patients with TB and HIV have considerably different rates of successful therapy in different parts of the territory (143).

iv. Alcohol

Through cognitive and biologic processes, alcohol is linked to higher rates of HIV, TB, and pneumonia as well as less favorable treatment rates. Initial study evidence suggests that COVID-19 and serious diseases are more likely to affect individuals who drink heavily and those with alcoholic difficulties (144). Alcohol use was associated with failure to adhere in TB cases in Uganda (145). According to a

feasibility study in south Africa, patients with TB who use alcohol or cigarettes may experience poor treatment outcomes, and this risk increases if they also have HIV (146). In a study conducted in Kenya, alcohol was mentioned among the reasons why TB patients missed collecting their TB drugs (147).

One review study cites smoking and alcohol misuse among factors that weaken the host's defense against TB infection and disease; as a result, further interventions to lessen people's susceptibility to TB may be necessary to meet long-term epidemiological targets for worldwide TB control (148). While isoniazid preventative therapy reduces TB incidence and death among patients with HIV, frequent drinking during isoniazid is related with liver damage and poor adherence. Interventions are therefore urgently needed to reduce alcohol use and increase adherence to isoniazid in this population in countries like Uganda where HIV and TB are highly prevalent (149).

v. Health-Promoting Behaviors

NTLP can improve its administration by studying TB patients' patterns of obtaining medical attention, ensuring that patients receive effective treatment more quickly (117). Patients with TB are said to delay seeking treatment or forego it entirely, as evidenced by a Ugandan study. Additionally, it was common practice to combine treatments provided by herbal experts and pharmaceutical services (150).

vi. TB Disease and Its Treatments Awareness (Treatment Literacy)

It is critical to give patients accurate knowledge about the science underpinning the ailment and its treatment so that they can take more responsibility for their own care and be better prepared to defend their rights when the proper care is not given. This is referred to as "treatment literacy" (151). According to a study from Nigeria, local authority health officials must intensify their efforts to raise public awareness of the disease in order to enhance social perception and the early diagnosis of infection (152). Another Moroccan study that was conducted found that TB patients had poor knowledge. This outcome highlights the significance of patient education in ongoing TB case treatment (153).

vii. Getting Well

When treatment first begins, patients are typically exceedingly unwell and possibly lethargic. Yet, as therapy progresses and the patient's health improves and their symptoms begin to lessen, it could become challenging to continue the course of therapy due to the recovery. A patient may not feel the need to continue treatment after they feel better or are in excellent health (151,153,154). According to a study from Zambia, people who stopped using their anti-TB drugs were more likely to be symptom-free (155). Another study from India found that 33.3% of the 5,235 TB patients stopped their therapy because they thought they were seeing results quickly (156).

2.3.9.3. Internal Social Factors

This section also covers cultural considerations, such as how a particular sickness is viewed in a given culture, as well as the attitudes of family and friends, which are essential to human connection. Here, we examine how social support systems including family and friends, broader cultural beliefs, and the degree of communication between a doctor and patient affect behavior, decision-making, or sickness (102).

i. Societal Assistance

According to prior studies, patients who had financial and dietary assistance ranked among the variables particularly highlighted as being more motivated to take medications on an ongoing basis when they had assistance from relatives and close friends (123,157–159), and family support was a safeguard for DOTS (123). In Uganda, however, Video-DOT (VDOT) was aided by a lack of stigma from friends and family (96). In an additional investigation, the most crucial factor linked to self-identified compliance behaviors was discovered to be psychological backing (120). When clients had emotional assistance from their relatives, their behavioral patterns modified. Studies show that having psychological assistance from loved ones or friends can assist people to embrace the possibility of TB treatment (157,158).

ii. Stigmatization

The concept of discrimination, which defines how TB patients experience, predict, and/or perceive unfavorable communal judgment, has a substantial impact on health (160). A variety of sufferers who felt anxious about their prospects of TB experienced stigma and prejudice from others (161,162). Several individuals who felt anxious about whether or not TB was treatable encountered discrimination and prejudice from others. In numerous studies of related investigations, HIV has been associated with unsuccessful TB treatment (139,140). Stigma around TB and HIV diagnoses has also been attached, and this may have a negative impact on how well TB treatments work (138). Family members must therefore assist and motivate patients to diagnose themselves with TB and help them stay to their TB treatment.

2.3.9.4. External Social Factors

Factors affecting the health system include structural elements, personnel knowledge and attitudes, and the relationship between patient and program needs.

i. Relationship Between Patient and Program Needs

According to a Nigerian study, both patient- and health facility-related factors played a significant role in the high percentage of non-compliance to TB treatment among TB patients in Osun State health facilities (163). In-depth interviews conducted as to "evaluate the needs and perspectives of patients and providers in two chest clinics in Delhi" revealed that the causes of default are associated with a lack of alignment between patient and program priorities and specific disease- and treatment-related characteristics. Convenient clinic hours, plans for providing care in family situations, and assistance for complicated cases like alcoholics are some of the patient needs that health systems have yet to address (164).

ii. Institutional Issues

A systematic evaluation of qualitative studies on TB treatment found that poverty and gender bias are two social, service-related, individual, and institutional barriers to finishing TB treatment (165).

iii. Staff Attitudes

Several studies have shown how important patient-healthcare provider communication is to the success of TB control and prevention strategies (15,150,160,166–168).

iv. Health Protection Strategies

Enormous expenses for treatment and diagnosis are faced by MDR-TB patients in particular, although these costs might be reduced by a well-thought-out health insurance system (169). Additional consideration ought to be paid to innovative support for patient systems, which also involve, among other things, preventing catastrophic health costs associated with drug-resistant tuberculosis through insurance systems (170). Enhancing health insurance coverage and boosting payment rates for TB outpatient care appear to be major drivers in lowering total costs and financial burdens for patients (171) thus TB prevention and control are improved.

v. Social Security

It has been revealed that financial redistribution initiatives, insurance for the out of work, educational perks, and transportation bonuses all help to reduce the number of people with TB and encourage commitment to treatments, efficiency, and recuperation (172,173). Also those suffering from TB appreciate rewards in money over non-monetary ones since they are more effective and efficient (174,175). According to reports, experiments aimed at boosting TB results used conditioned financial incentives that vary from 193 to 858 US dollars (176). Although they are quite efficient in enhancing TB cure rates in those communities with the fewest resources, such as Uganda, without outside interference, these conditioned financial incentives are too pricy for nations with limited resources to incorporate into normal TB care programs. Incentives of one dollar, for example, have been associated with higher rates of TB treatment, and a study carried out in rural Uganda found that TB patients had less destruction (177).

vi. Healthcare System

Multiple research investigations have discovered that the health systems significantly impact TB prevention and control because it influences how TB patients feel about their treatment, how their cases are handled, and how content they are with the quality of their medical care (161,162,178,179). In countries classified as high – burdened, the period between diagnosis and beginning treatment for TB is still too long (14,180). Delays can occur in the individual, the medical system, or diagnostic processes (14,181,182). However, more than half of the lags are the fault of the health system (183). Slowdowns in detection screening may cause the infection to worsen, increase death rates overall, leading to communal TB (184). Early TB detection is therefore essential for TB control. Average diagnosis delays range from eight to thirteen weeks, according to research conducted in Tanzania and Uganda (185,186).

vii. Calamities of Nature

According to the Standard of TB tests Evaluation Report-Uganda, 2020, laboratory tests and essential TB-related treatments were widely accessible at most types of health facilities in Uganda, with almost all facilities offering testing, diagnosis, and therapeutic programs for the disease (8). However, COVID-19 has culminated in diminished utilization of healthcare facilities globally, which has slowed down TB diagnosis and treatment, leading to an increase in TB-related mortality (4).

3. METHODOLOGY

3.1. Study Design

This is a cross-sectional survey carried out to obtain a detailed understanding of the factors affecting the available TB control and prevention programs in Kampala District of Uganda. Cross-sectional study designs, according to Burns and Grove, assess participants at the same time, regardless of their developmental stage, with the goal of describing differences in phenomena across stages (187). Instead of gathering data at various times for the same participant, data is gathered at one point in time but with different study participants (188).

As a result, the study is carried out in the present to ascertain what is currently in place, and exposure and illness status are simultaneously evaluated (189). A standardized questionnaire was used to gather information from each TB patient at a specific time, continuing until no further attempts could be made to contact the sampled patients. Despite the fact that data collection took place at various times for the various patients, it only happened once for each of them.

3.2. Study Population

The target population consisted of current TB patients aged between 18 to 65years who were residents within the geographical boundaries of Kampala district for at least two years. Children were not included in the study due to worries regarding permission and the idea that they cannot make their own health decisions.

3.3. Study Location

The following study was performed in Kampala district, Central region of Uganda. Kampala district is the capital city of Uganda. It is the largest, busiest and the most crowded city in Uganda. The City is currently divided into five urban divisions namely: Central, Kawempe, Makindye, Rubaga, Nakawa, which cover a total of 189 square kilometers; with 169 square km of land and 19 square km of with a population of 1.75 million (190,191).

Figure 3.1. Map of Uganda showing the regions (189)

Figure 3.2. Map of Kampala district (188)

3.4. Sample Size Calculation

Using the standard sample size formula by Cochran's Formula (192);

For infinite population; Sample size $=Z^2(PQ)/e^2$

Z=standard error associated with chosen level of confidence (95%) is 1.96

P=variability/standard deviation (0.5)

Q=1-P, e=marginal error (5%), S= (1.96)

$S= (1.96)^2*(0.5*0.5)/ (0.05)^2$

S= 384.16

According to Kampala capital city Authority, Kampala has a population of 1.75 million people therefore, the adjusted formula had to be applied which is:

Adjusted sample size = S/1+[(S-1)/population].

=384.16/1[(384.16-1)/1,750,000]

Therefore, an adjusted sample size of 383 people from Kampala was the minimum sample size for the study. However, to increase the significance level of the data, a total sample size of 413 was collected.

3.5. Sample Selection

The subjects were selected using a simple random sampling technique from the TB dispensaries around Kampala district. Current patients as they came for treatment to these dispensaries were requested to take part in this survey and the aim of the study was explained to them thoroughly well. All participants were required to sign a consent form to prove that no force had been applied. With the permission from Kampala City Council Authority (KCCA), five TB dispensaries were accessed.

Table 3.1. Tuberculosis dispensaries accessed in Kampala district

TB Dispensary	Number of patients (%)
Kisenyi HC IV	130 (31.5)
Kawaala HC IV	104 (25.2)
Kitebi HC III	86 (20.8)
Kiswa HC III	50 (12.1)
Bukoto HC III	43 (10.4)

3.6. Data Collection Tool

A structured questionnaire of predetermined questions for which respondents were asked to make one choice among fixed range of responses with open question was used in this study. The questionnaire was also used in ‘’Factors affecting compliance to tuberculosis treatment in Andara Kavango region Namibia’’ study by Kudakwashe Chani (193). In order to seek permission to use this questionnaire, an email was sent to the writer. The questionnaire had 33 questions covering all the study’s areas of interest. It was pilot tested in one of the minor TB dispensaries in Kampala. Then changes where necessary were made before it was applied to our volunteering study population. Hard copies of questionnaire were used. The questionnaire was divided in to four sections namely; internal individual, external individual, internal social and external social questions.

Questionnaires were used to acquire data from individuals using face to face interviews by trained people who understood both English and Luganda. The data collectors received training for one week on questionnaire material and methods to ensure that the objectives were well understood and the data collection process done without difficulty in order to achieve valid and reliable data.

3.7. Data Collection Process

Data was gathered from the five KCCA-awarded TB dispensaries in the Kampala district from October 12 to 16, 2022, after receiving the relevant ethical permissions. The researcher and 15 other qualified nurses (10 females and 5 males) collected the data, with three nurses working at each dispensary.

Data was collected from five different TB dispensaries in three given KCCA hospitals; two TB dispensaries in Rubaga division (Kitebi HC III and Kawaala HC IV), two in Nakawa division (Bukoto HC III and Kiswa HC III) and one in Central division (Kisenyi HC IV).

To guarantee that the objectives were well understood, the data collection tools were used without complication, and the data were obtained with validity and reliability, the data collectors underwent a week of training on the questionnaire's content and techniques. Five days were spent gathering data from the patients who came to attend counselling sessions and collection of TB drugs.

Following the confirmation of written consent, the data collectors recorded the interview date and questionnaire serial number before moving on to the next question in a language that the participant could understand. By selecting the appropriate response number and typing the same number in the coding box, the data collector recorded responses provided by the participant. This was done to guarantee the accuracy of the data.

For questions 21 and 26,''Tick the symptoms of TB'' and ''If yes to the above question, which side effects did you experience?'' respectively, the participant was asked to choose only one main option amongst the many given.

Monthly Income was grouped as low, medium and high income. According to wage indicator, the Uganda's current minimum wage is 130,000Ugx (35.37USD) (27). The national poverty level for Uganda was established in 1990 and ranges from US$0.88 to US$1.04 per person per day (the variation depends on region). Compared to the World Bank's US$1.90 per person per day extreme poverty benchmark, it provides a far more optimistic picture of poverty trends (194).

However, according to another source, the average wages for low skilled employees in Uganda decreased to 412400 UGX/Month (110.534 USD/Month). The maximum level was 649900 UGX/Month and minimum was 389700 UGX/Month (195). Therefore, we considered 300,000Ugx (81.63USD) as the cut off income for low, 300,000-1000,000Ugx (81.63- 272.10USD) to be medium and 1000,000ugx (272.10USD) as high income (196).

In order to calculate the knowledge variable as a dependent variable, ‘’TB medicines should be taken until’’ was the considered question.

Inclusion Criteria

People aged between 18 and 65 years.

People currently under Tuberculosis treatment.

Permanent resident or who have been living in the selected areas at least for two years.

Exclusion Criteria

TB service providers.

People who didn’t give consent to take part in the study.

Study variables and definition

Dependent Variable

The major variables of the study, which tries to capture the likely factors facing the deployed TB control and prevention techniques, are whether an individual had a treatment supporter, notified anyone about their TB treatment, were taking other medications besides TB as well as treatment literacy. To ascertain if people were happy with the services provided, respondents were also asked about their preferred location for collecting of TB medicines.

Having a treatment Supporter meant a TB patient having someone to monitor them while taking the TB treatment drugs. This could be a health worker from the TB dispensary or a family member or a community member.

Notified anyone about their TB treatment. This aimed at finding out whether a TB patient had informed anyone of their family members or friends that they shared the same dwelling about their TB treatment at the point of their illness.

Taking other medications. Whether a TB patient was taking other medications such as ART besides TB drugs over the same period of time

Treatment literacy. This aimed to find out whether a particular TB patient had knowledge about TB infection especially the treatment period of TB.

Preferred drug collection point. This aimed at finding out the reason why certain dispensaries were preferred over the others such as working hours and waiting time at the facilities.

Independent Variable

Internal individual factors such as Age (18-65), gender (male & female), education (non-educated, primary level, secondary level, tertiary level)

External individual factors such as smoking, alcoholism and compromised immune system.

In this study smoking referred to an adult who has smoked at least 100 cigarettes throughout their life and does so today whereas alcoholism referred to continued excessive or compulsive use of alcoholic drinks.

Internal social factors such as social support and stigma

External social factors such as social protection and health system.

3.8. Data Analysis

In order to describe the data and identify any significant differences among the groups, statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) 25th version. Descriptive summary statistics and graphical summaries in charts (pie, bar, line, cross-tabulations) were presented. Chi-square tests of association was conducted to assess dependence relationships among potential factors.

3.9. Ethical Approval

Ethical approval to conduct this study was obtained on from the relevant committees at the academic (Ankara Yıldırım Beyazıt University) in Turkey as decision numbered 09.06.2022-10 and relevant approval was received from the

Kampala City Council Authority department of public health and environment referred as; DPHE/KCCA/1301. Both files can be found in the appendix.

3.10. Consent

Participants were asked to sign a questionnaire permission form outlining the study's goals and their options for participating or declining. The letter of consent is attached in appendix.

4. RESULTS

The demographic information of the research participants is included in the presentation of the research findings as data analysis and interpretation in this chapter.

The precise goals of this research were to:

- To describe the available TB control and prevention services in Kampala.
- It is to determine the factors that are thought to be affecting the prevention and control of Tuberculosis.
- To determine what extent each factor affects the available TB control and prevention programs in the capital city of Uganda.

In our study, a respond rate of 100% was attained as 413 TB patients participated in this study.

Patients' Residence

Majority of our participants resided in Rubaga division (183), Makindye division (93) and Central division (76). This is shown in table 4.1 below.

Table 4.1. Patients' Residence

Variable	**N**	**%**
Central	76	18.4
Kawempe	24	5.8
Makindye	93	22.5
Nakawa	37	9.0
Rubaga	183	44.3
Total	413	100

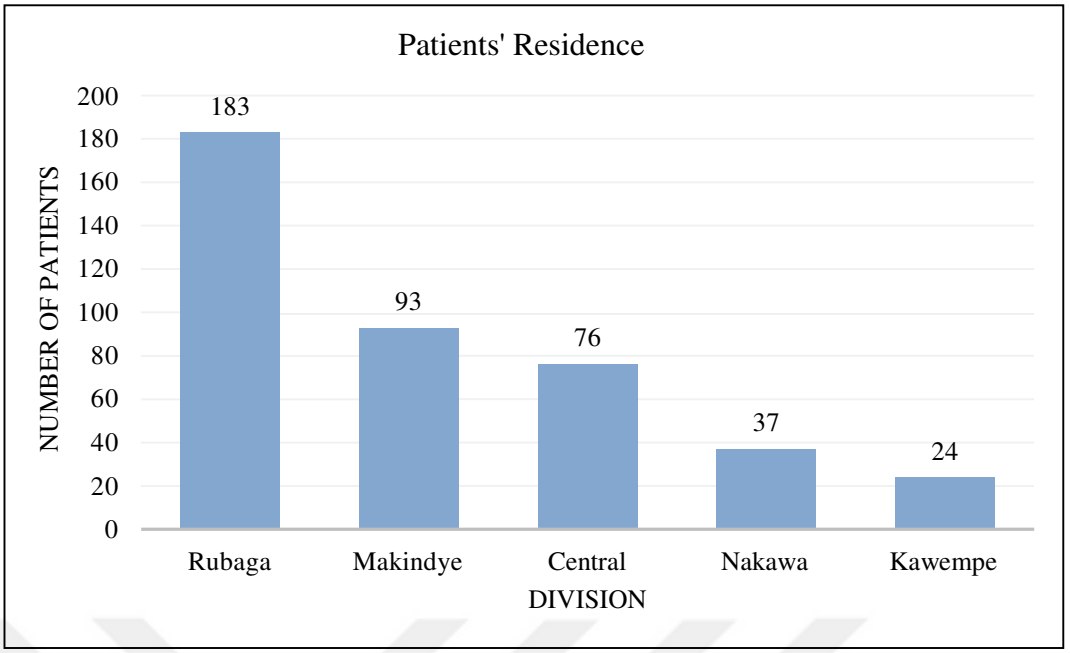

Figure 4.1. Patient's residence

The questionnaire grouped the respondents into age groups. The majority of the patients 124 (30%) were between 34 and 41 years of age. The age distributions were as shown in table 4.2 below.

Table 4.2. Age of the Patients

Variable	**N**	**%**
(18-25)	68	16.5
(26-33)	116	28.1
(34-41)	124	30.0
(42-49)	54	13.1
(50-57)	34	8.2
(58-65)	171	4.1
Total	413	100

Gender disclosure was requested of respondents. 151 (36.6%) of the 413 respondents were female while 262 (63.4%) were male. This is shown in table 4.3.

Table 4.3. Gender

Variable	Frequency	Percentage
Male	262	63.4
Female	151	36.6
Total	413	100

We inquired about each respondent's marital status (married, widowed, separated, single or cohabiting). The majority of the participants, 189 (45.8%) were married. This is all shown in table 4.4 below.

Table 4.4. Marital Status

Variable	N	%
Married	189	45.8
Separated	79	19.1
Cohabiting	34	8.2
Widowed	31	7.5
Single	80	19.4
Total	413	100

The respondents were questioned regarding their highest degree of schooling. Table 4.5 and figure 4.2 below demonstrate that 163 (39.5%) of the respondents had at least a secondary education where as 44 people (10.3%) were completely uneducated.

Table 4.5. Level of Education

Variable	N	%
None	44	10.3
Primary	150	36.3
Secondary	163	39.5
Tertiary	56	13.6
Total	413	100

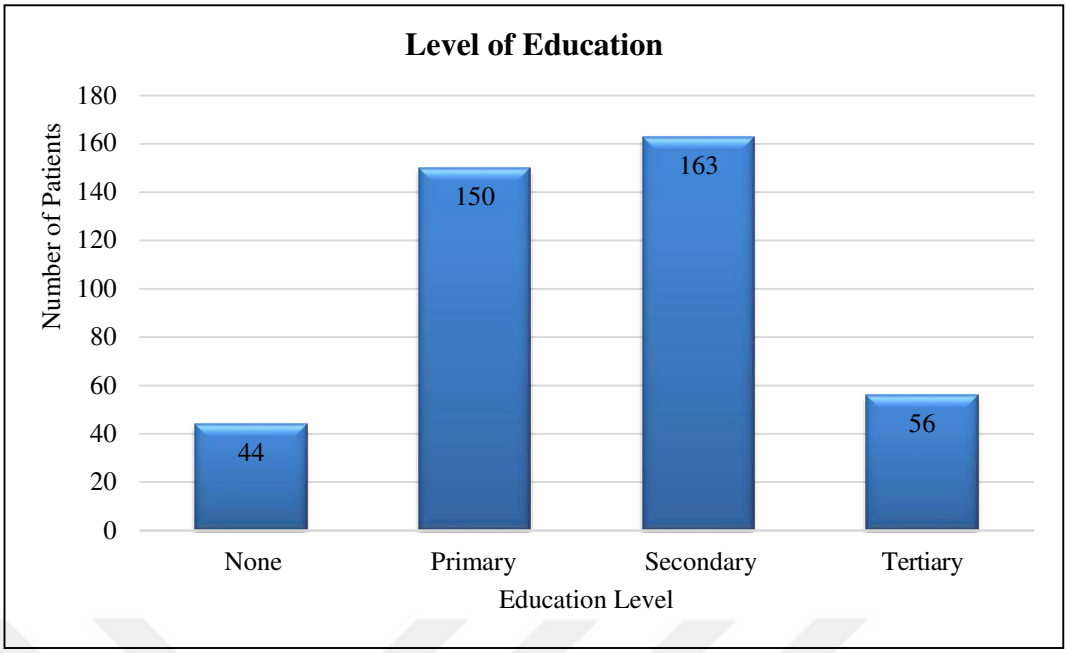

Figure 4.2. Education level

When patients were asked about their employment status, 36.3% of them said they were self-employed. This is shown in table 4.6.

Table 4.6. Employment Status

Variable	Frequency	Percentage
Employed	147	35.6
Self employed	150	36.3
Unemployed	116	28.1
Total	413	100

We also tested to find out how many women or men were employed, un employed or self-employed, was made and the results are shown in table 4.7 and figure 4.3 below. More males were more employed than females.

Table 4.7. Gender-Employment

Gender	Employed	Unemployed	Self employed
	N (%)	N (%)	N (%)
Male	106 (40.45)	63 (24.05)	93 (35.5)
Female	41 (27.15)	53 (35.1)	57 (37.75)
Total	147 (35.6)	116 (28.1)	150 (36.32)

Figure 4.3. Gender-Employment Status

According to our study, only 15(3.6%) of the participants received a high monthly income. This is shown in table 4.8 and figure 4.4 below.

Table 4.8. Monthly income

Variable	**N**	**%**
Low	275	66.6
Medium	123	29.8
High	15	3.6
Total	413	100

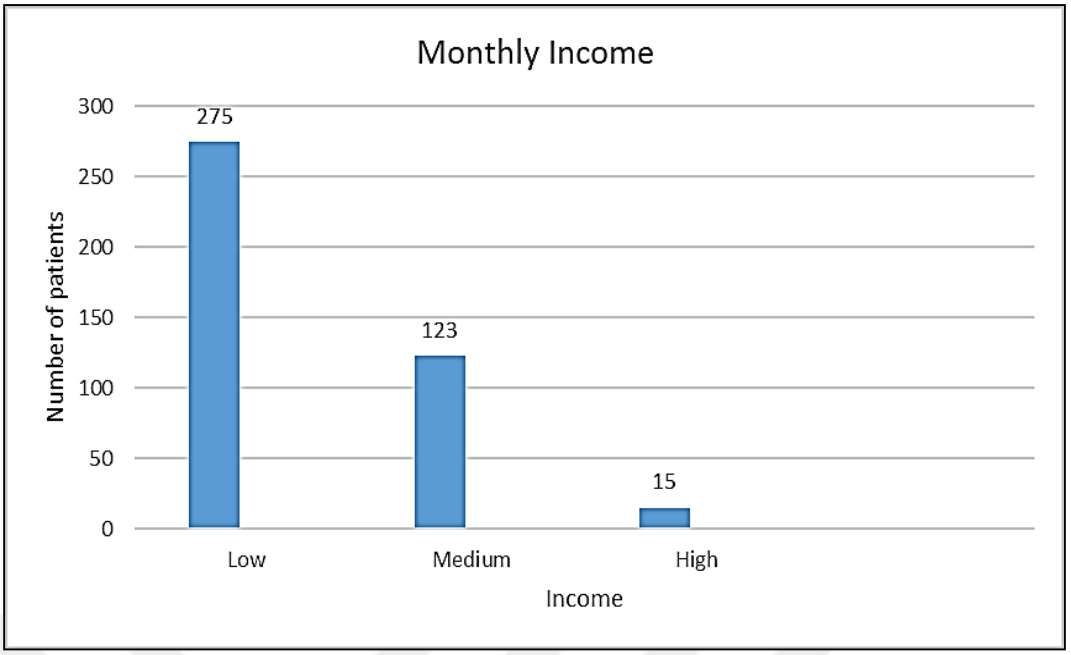

Figure 4.4. Monthly Income

Respondents were asked whether they smoked. There was a high number of non-smokers than smokers. Only a percentage of 32.4 reported to have been regular smokers of cigarettes. This is shown in figure 4.5 below.

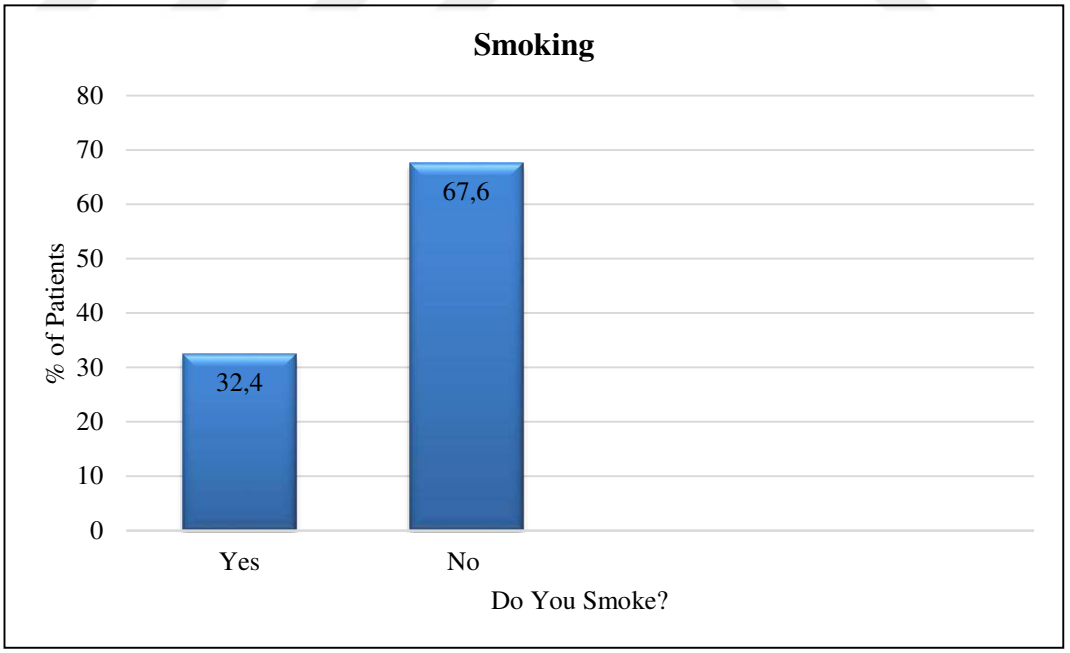

Figure 4.5. Smoking

Respondents were asked whether they were alcohol drinkers. A percentage of 47.5 reported to have been drinking Alcohol. This is shown in figure 4.6 below.

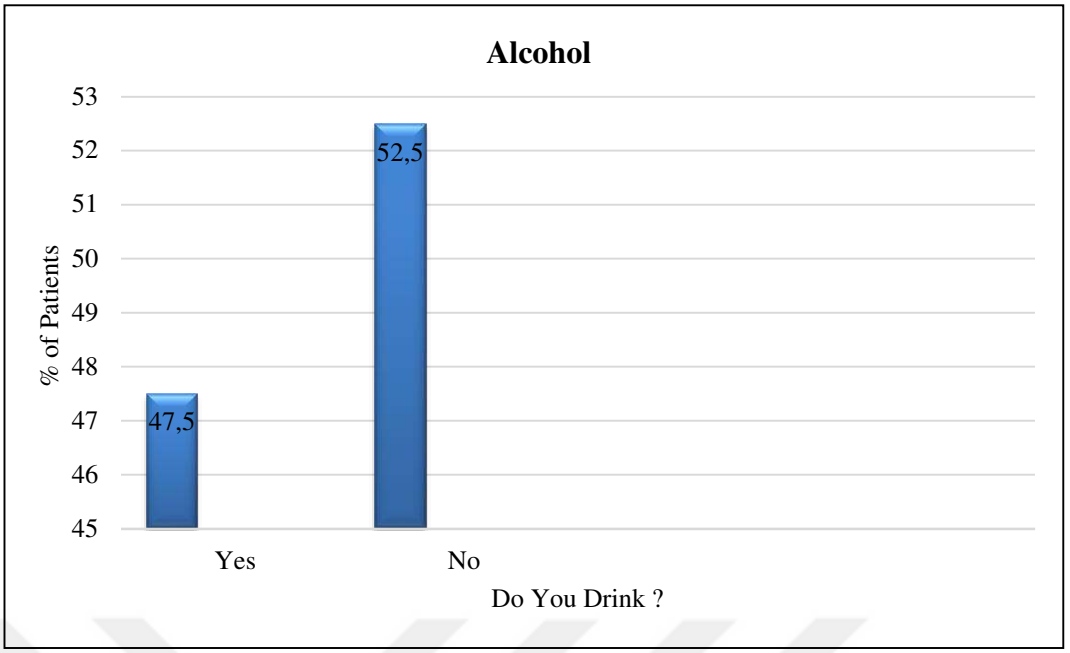

Figure 4.6. Alcohol

Patients were asked whom they lived with. Most of them 298 (72.2%) lived with their family. This can be shown in table 4.9 below.

Table 4.9. Who do you live with?

Variable	N	%
Family	298	72.2
Friends	60	14.5
Alone	55	13.3
Total	413	100

According to this study, the majority, 46.2% shared the same dwelling between 1 and 3 people. This can be shown in table 4.10 below.

Table 4.10. Number of People in the same house

Variable	N	%
0	115	27.8
1-3	191	46.2
4-6	78	19
7+	29	7.0
Total	413	100

When asked how big the housing was, majority of the patients 62.5% said they lived in one room. More details are shown in table 10 below.

Table 4.11. Number of Rooms

Variable	N	%
0-1	258	62.5
2-3	128	31.0
5+	27	6.5
Total	413	100

In this study, patients were asked about the presence of food during the intake of TB medication, only 139 patients said food was always available. This is shown in table 4.12 below.

Table 4.12. Availability of Food

Variable	N	%
Always available	139	33.7
Available most of the time	143	34.6
Not always available	115	28
Never available	16	3.9
Total	413	100

Respondents were questioned whether they had a treatment support while they were taking medicine. Majority 307 (74.3%) answered ‘’Yes’’ This is shown in figure 4.7 below.

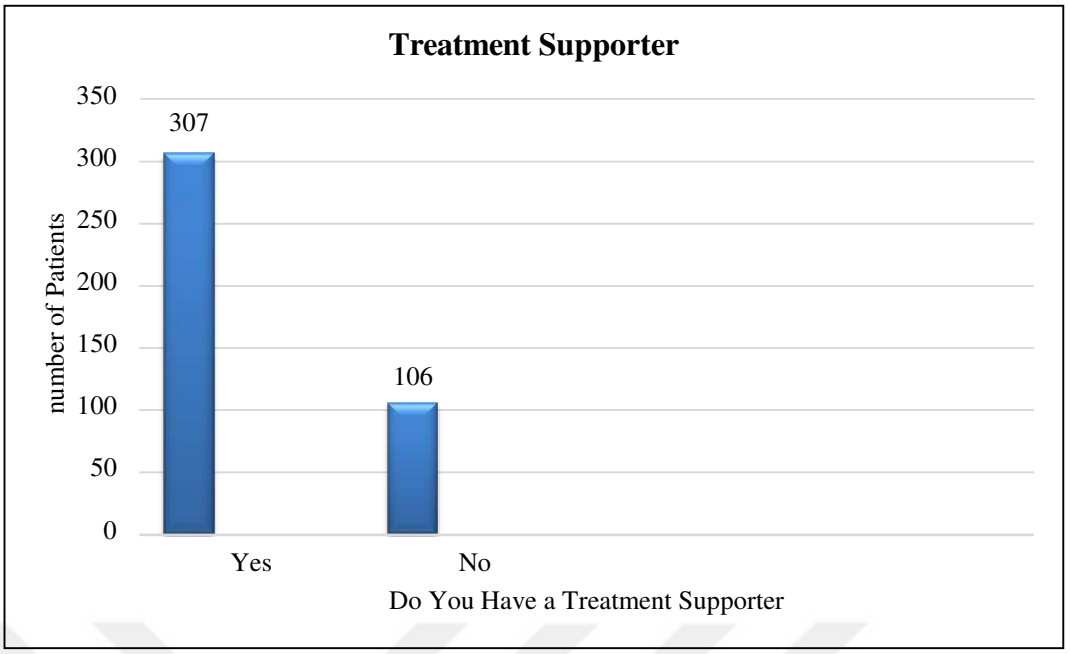

Figure 4.7. Do you have Treatment Supporter?

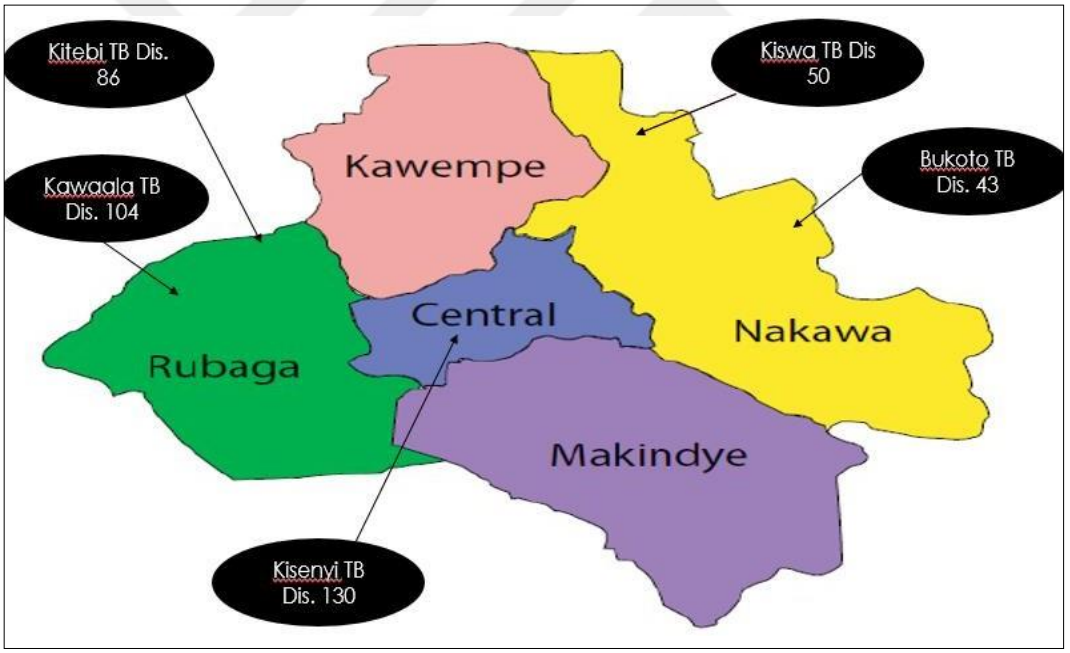

Figure 4.8. Map of Kampala showing different KCCA TB dispensaries and the number of patients

According to this study, 61.5% of the patients found ‘’between 8am and 5pm’’ as appropriate working time for TB facilities for them to be able to collect TB medicine from the dispensaries. Table 4.13 shows it all.

Table 4.13. Convenient working times

Variable	N	%
Before 8am to 5pm	67	16.2
Between 8am and 5pm	254	61.5
From 8am to after 5pm	77	18.6
Before 8am to after 5pm	15	3.6
Total	413	100

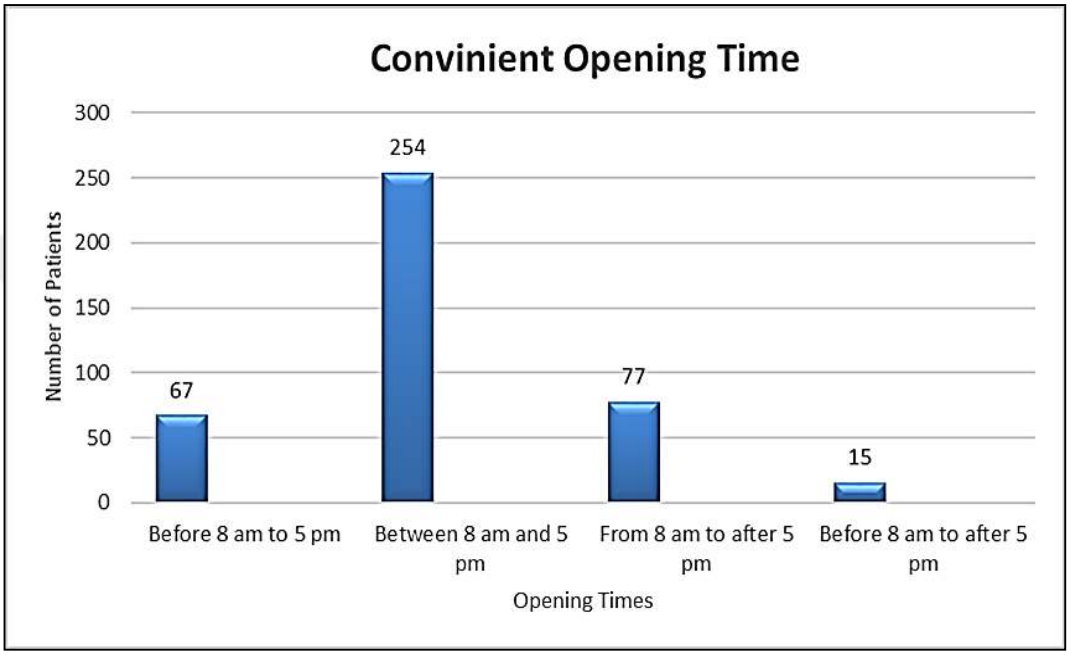

Figure 4.9. Convenient opening time at the TB facility

Patients were asked of the time they spent at dispensary during their visitations, only 13 patients claimed that they had spent more than two hours there. This can be shown in table 4.14.

Table 4.14. Waiting hours

Variable	N	%
Less than an hour	202	48.9
Between 1 and 2 hours	198	47.9
More than 2 hours	13	3.1
Total	413	100

Respondents were questioned about the distance between their homes and dispensaries, only 33 patients spent between 5 and 10 dollars. This is shown in table 4.15 below.

Table 4.15. Transport costs

Variable	N	%
Walkable distance	110	26.6
Less than 3 USD	270	65.4
Between 5-10 USD	33	8.0
Total	413	100

When patients were asked for the supervisor during the times they were taking medicines, 46.0% used family members as their supervisor. This is all shown in table 15.

Table 4.16. Who supervises you while taking the TB medicines

Variable	N	%
Health worker	101	24.5
Family member	190	46.0
Community worker	18	3.1
None	109	26.4
Total	413	100

One of the most important factors is staff attitude. Patients were asked about the health workers' attitude and only 6 patients found them very unfriendly. This is shown in figure 8 below.

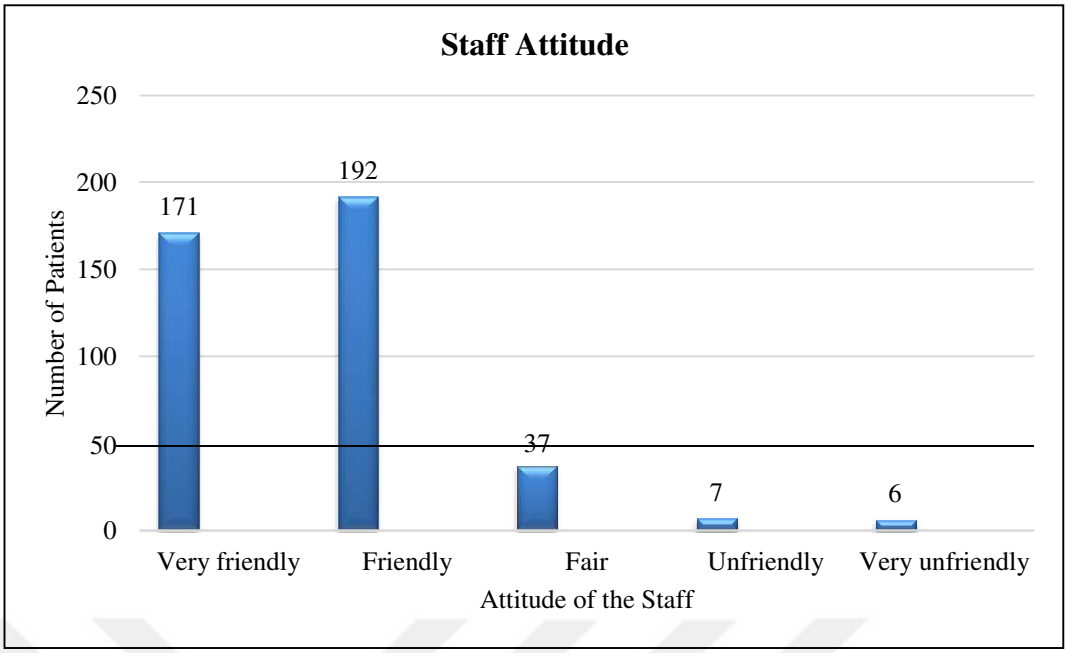

Figure 4.10. Staff attitude

Respondents were questioned about the availability of TB medicines at their given dispensaries, 360 patients 87.17% said the medicines were always available.

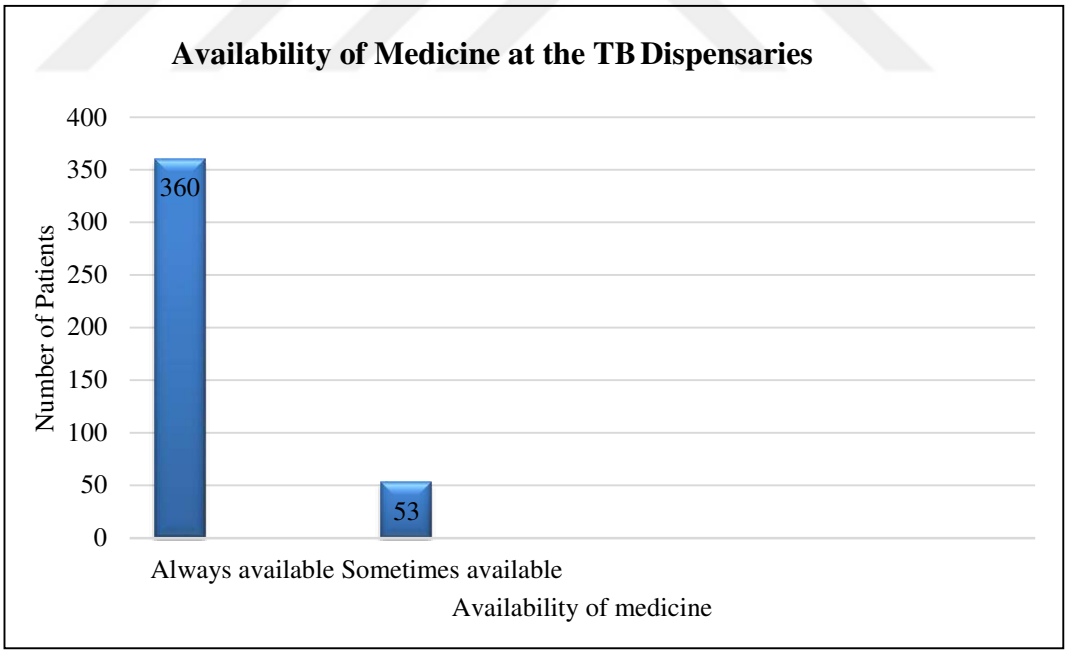

Figure 4.11. Availability of Medicine at the TB Dispensaries

In order to measure patients' level of TB knowledge, they were asked to choose one from a list of symptoms of TB. 238 patients 57.6% gave coughing as the main TB symptom. The rest of the information is shown in the table 4.17 and figure 4.12 below.

Table 4.17. Symptoms of TB

Variable	N	%
Coughing	238	57.6
Night sweats	68	16.5
Loss of weight	53	12.8
Chest pain	54	13.1
Total	413	100

NB: patients were only asked to choose their main symptom experienced

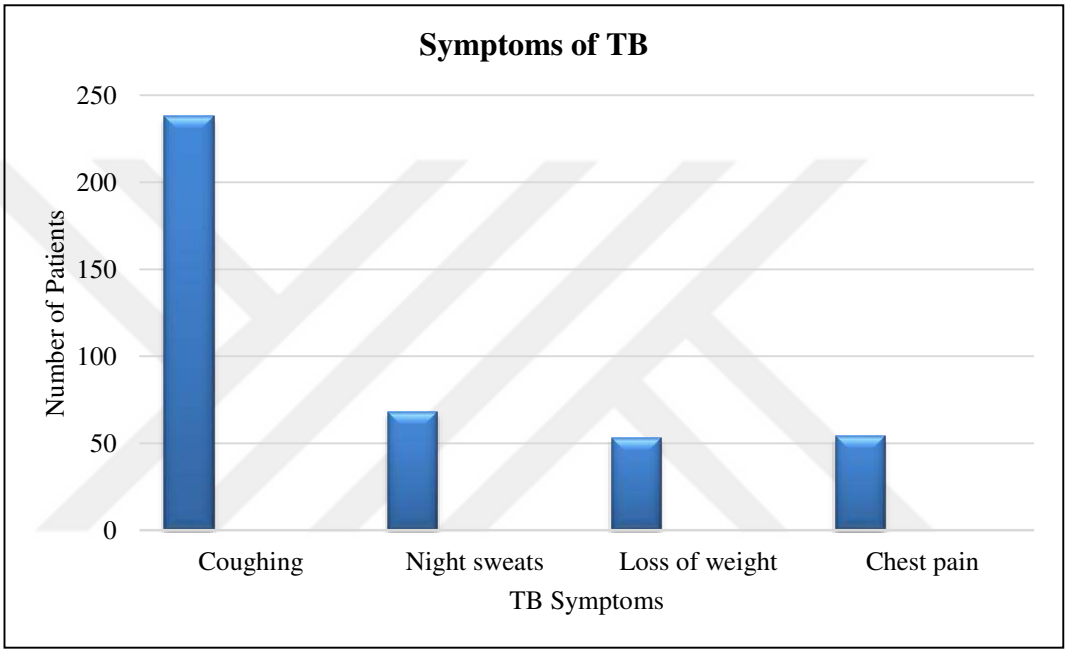

Figure 4.12. Symptoms of TB

Respondents were also asked for how long they were supposed to take the medicines. Majority unfortunately said drugs must be taken for 6months only. More information is shown in table 4.18 below.

Table 4.18. TB medicines should be taken until?

Variable	N	%
6 months completed and health worker stops you	191	46.2
6 months	203	49.2
Feel better stop medication	19	4.6
Total	413	100

To assess the levels of stigma and discrimination, the respondents were asked if they had disclosed their TB status to anyone. Non-disclosure could point to presence of stigma and or discrimination. Out of the 413 patients that took part in this study, only 36.6% had informed their family or friend. The rest, 63.4% never informed any one and out of these, 117 patients gave ‘’fear of being isolated’’ as the main reason as to why they never informed anyone. More information has been given in the table 4.19 below.

Table 4.19. Reasons for not telling anyone about your TB medication

Variable	**N**	**%**
Fear of being isolated	117	44.7
No one to trust	46	17.6
Others	99	37.8
Total	262	100

When the respondents were asked whether they had experienced any side effects, only 4 patients said ‘’No’’ and the rest experienced at least one side effect. Details are shown in table 4.20 below.

Table 4.20. Side effects of TB medicines

Variable	**N**	**%**
Headaches and dizziness	171	41.4
Painful limbs	90	21.8
Skin rashes	56	13.6
Diarrhea	41	9.9
Numb feet or hands	27	6.5
Others	17	2.7
Yellow eyes	11	4.1
Total	413	100

Patients were asked for how long it took before they could feel better. Most of them, 64.2% said it took them less than 2 months to feel better. More information has been shown in table 4.21 below.

Table 4.21. How long did it take for you to feel better?

Variable	N	%
Less than 2 months	265	64.2
2-4 months	126	30.5
5-6 months	17	4.1
Didn't feel any better	5	1.2
Total	413	100

We went on to ask for the patients' TB classification according to their TB cards, more than half percent were PTB-SM+. The rest are shown in the table 4.22 below.

Table 4.22. TB classification

Variable	N	%
PTB-SM+	212	51.3
PTB-SM-	86	20.8
EPTB	32	7.7
PTB and EPTB	71	17.2
Not indicated	12	2.9
Total	413	100

Patients were questioned about their HIV status, some had their status written on their TB cards while others just said it directly. Only 18 patients never revealed their status. This is all shown in table 4.23 and figure 4.13 below.

Table 4.23. HIV status

Variable	N	%
Positive	246	59.6
Negative	149	36.1
Not indicated	18	4.4
Total	413	100

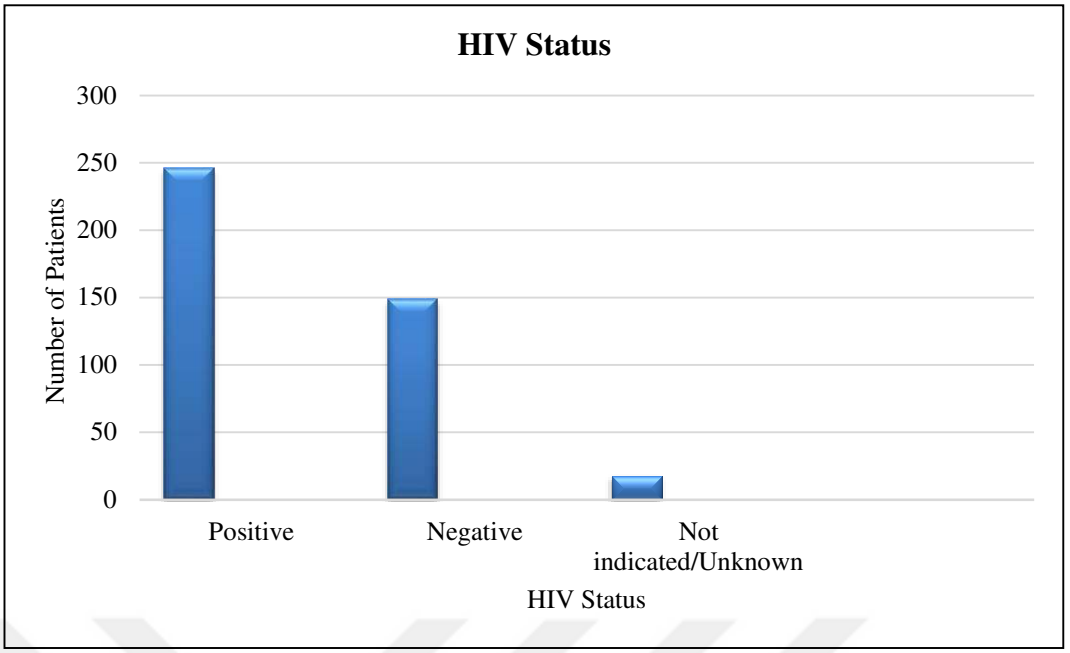

Figure 4.13. HIV status

When asked whether they were taking other medicines besides TB medicines, only 39 (9.4%) gave'' No'' as an answer. The rest were taking other medicines besides TB medicines. This is shown in the table below.

Table 4.24. Other medicines taken besides TB medicines

Variable	N	%
Antiretroviral therapy (ART)	241	64.3
Psychiatric	7	1.9
Anti-hypertensive	8	2.1
Others	119	31.7
Total	375	100

Patients were lastly asked to give their opinions about TB control and prevention. To get their perspective on what would motivate TB patients to finish their treatment, the responders were asked an open-ended question. The responses ranged widely, including; 135 patients gave financial and food support, 54 patients wished for counselling and education and 52 patients craved for transport support as a way to improve TB services. This is shown in table 4.25 and figure 4.14 below.

Table 4.25. Patients' opinions about a Successful TB Treatment

Variable	N	%
Financial support	75	18.1
Food support	60	14.5
Counselling and education	54	13.1
Transport support	52	12.6
Psychosocial support	48	11.6
More privacy	44	10.6
Good relationship with doctors	38	9.2
Constant reminders about TB medicines	22	5.3
Time management by health workers	12	2.9
Awarding those who complete TB medication	7	1.7
Completely satisfied	1	0.2
Total	413	100

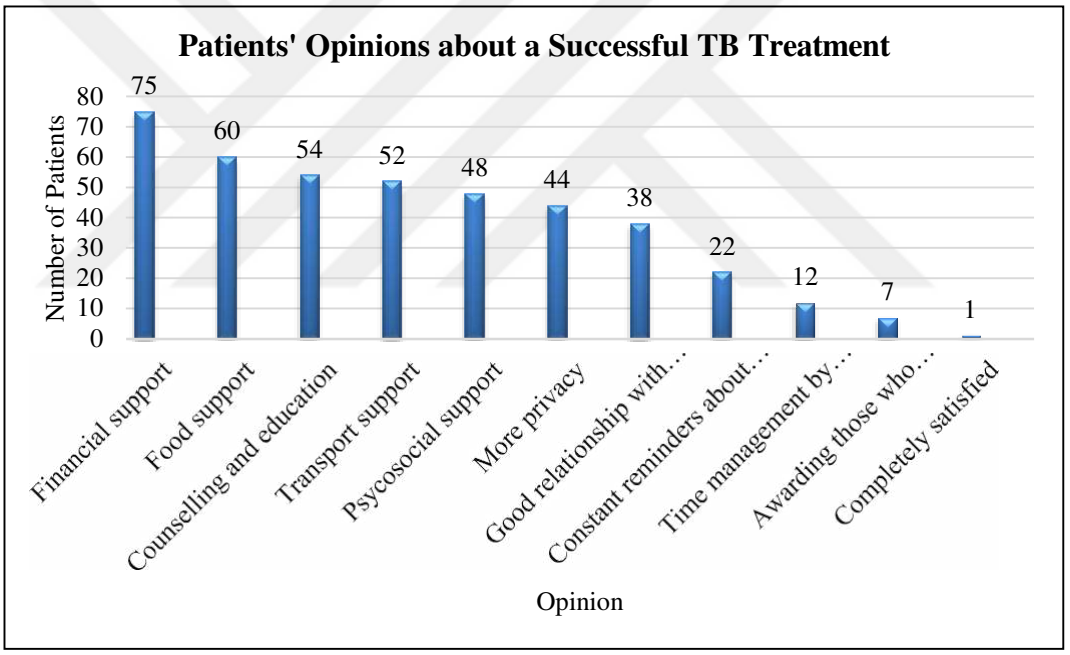

Figure 4.14. Shows patients' opinions

Bivariate Analysis

The dependent question, "did you inform anyone you live with?" was tested using the chi-square association test between the independent variables at a significance level of <0.05. Internal individual factors such as age, gender and marital status never revealed a significant difference with the above dependent variable. However, from external individual factors, TB classification showed a significant

difference with the dependent variable as 47.7% of those who were PTB-SM+ were more likely not to inform anyone about their TB status. This is shown in table 4.26.

Table 4.26. The association between ‘’did you inform anyone you live with?’’ and external individual factors

		Did you inform anyone you live with?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
TB classification	PTB-SM+	87 (57.6)	125 (47.7)	0.034*
	PTB-SM-	32 (21.2)	54 (20.6)	
	EPTB	06 (4.0)	26 (9.9)	
	PTB &EPTB	25 (16.6)	46 (17.6)	
	Not indicated	1 (0.7)	11 (4.2)	

**P<0.05*

When the association between the dependent variable ‘’did you inform anyone you live with?’’ and internal social factors was tested for, ‘’Who do you live with?’’ was statistically significant (P<0.012). 176 participants (67.2%) of those who said ‘’No’’ to the question lived with their families. Furthermore, 40.5% of those who said ‘’No’’ lived with about one to three people in the same dwelling. This is shown in the table 4.27.

Table 4.27. The association between ‘’did you inform anyone you live with? ‘’ and internal social factors

		Did you inform anyone you live with?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Do you live with	Family	122 (80.8)	176 (67.2)	0.012*
	Friends	15 (9.9)	45 (17.2)	
	Alone	14 (9.3)	41 (15.6)	
Number of people in the same house	0	20 (13.2)	95 (36.3)	<0.001*
	1-3	85 (56.3)	106 (40.5)	
	4-6	32 (21.2)	46 (17.6)	
	7+	14 (9.3)	15 (5.7)	
How big is the house	1-2 rooms	78 (51.7)	180 (68.7)	0.001*
	3-4 rooms	63 (41.7)	65 (24.8)	
	5+ rooms	10 (6.6)	17 (6.5)	

**P<0.05*

For external social factors, only transport cost showed a significant difference with the dependent variable. Walkable and less than 3 dollars (91.2%) which was a shorter distance were more likely not to inform anyone about their TB status than people with who came from a longer distance. This is shown in table 4.28.

Table 4.28. The association between ‘‘did you inform anyone you live with? ‘’ and external social factors

		Did you inform anyone you live with?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Transport costs	Walkable	51 (33.8)	59 (22.5)	0.034*
	Less than 3dollars	90 (59.6)	180 (68.7)	
	More than 3dollars	10 (6.6)	23 (8.8)	

**P<0.05*

The dependent question, ‘’do you have a treatment supporter?" was tested using the chi-square association test between the independent variables at a significance level of <0.05. The association with internal individual factors such as age and marital status were statistically significant as their p-values were 0.023 and 0.042 respectively. 307 participants (74.51%) answered ‘’Yes’’ to the above question. 90 participants (29.3%) who said ‘’Yes’’ to the question were between 26 and 33 years old. On the other hand, 148 participants (48.2%) who said ‘’Yes’’ to the dependent question were married. This is shown in the tables 4.29.

Table 4.29. The association between "do you have a treatment supporter?" and internal individual factors

		Do you have a treatment supporter?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Age	18-25	50 (16.3)	18 (17)	0.023*
	26-33	90 (29.3)	26 (24.5)	
	34-41	89 (29.0)	35 (33.0)	
	42-49	33 (10.7)	21 (19.8)	
	50-57	32 (10.4)	02 (1.9)	
	59-65	13 (4.2)	04 (3.8)	
Marital status	Married	148 (48.2)	41 (38.7)	0.042*
	Separated	58 (18.9)	21 (14.0)	
	Cohabiting	19 (6.2)	15 4.6)	
	Widowed	26 (8.5)	05 (6.3)	
	Single	56 (18.2)	24 (13.6)	

**P<0.05*

The association between "do you have a treatment supporter?" and external individual factors such as smoking, alcohol consumption and food availability were tested for. Alcohol consumption was not statistically significant as it's p-value was greater than 0.05 (p=0.875). However, the association with smoking and food availability were statistically significant with p-values 0.038 and 0.009 respectively. 216 (70.4%) participants who were non-smoked had treatment supporters. This can be shown in the table 4.30.

Table 4.30. The association between "do you have a treatment supporter?" and internal individual factors

		Do you have a treatment supporter?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Smoking	Yes	91 (29.6)	43 (40.6)	0.038*
	No	216 (70.4)	63 (59.4)	
Alcohol	Yes	145 (47.2)	51 (48.1)	0.875
	No	162 (52.8)	55 (51.9)	
Food availability	Always available	110 (35.8)	29 (27.4)	0.009*
	Available most of the times	113 (36.8)	30 (28.3)	
	Not always available	72 (23.5)	43 (40.6)	
	Never available	12 (3.9)	4 (3.8)	

**P<0.05*

When the association between having a treatment supporter and external social factor such as transport costs, there was no statistical difference. However, when the same relationship was tested for with internal social factors such as ''who do you live with'', ''number of people in a house'', '' how big is the house'' and ''who supervises you'' was tested for. There was a statistical difference between the dependent variable and the independent variables as 79.5% of those who answered ''Yes'' lived with their families, 51.1% stayed with between one and three people in the same house, 61.6% lived in houses that had between one and two rooms while 50.81% were supervised by their families. This is shown in table 4.31 below.

Table 4.31. The association between "do you have a treatment supporter?" and internal social factors

		Do you have a treatment supporter?		
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Do you live with	Family	244 (79.5)	54 (50.9)	<0.001*
	Friends	44 (14.3)	16 (15.1)	
	Alone	19 (6.2)	36 (34.0)	
Number of people in the same house	0	75 (24.4)	40 (37.7)	0.007*
	1-3	157 (51.1)	34 (32.1)	
	4-6	55 (17.9)	23 (21.7)	
	7+	20 (6.5)	09 (8.5)	
How big is the house	1-2 rooms	189 (61.6)	69 (65.1)	0.001*
	3-4 rooms	105 (34.2)	23 (21.7)	
	5+ rooms	13 (4.2)	14 (13.2)	
DOTS	HW	72 (23.5)	29 (27.4)	0.001*
	FM	156 (50.8)	34 (32.1)	
	CM	05 (1.6)	08 (7.5)	
	None	74 (24.1)	35 (33.0)	

**P<0.05*

The dependent question, "treatment should be taken until?" was categorized as knowledge and then tested using the chi-square association test between the independent variables at a significance level of <0.05. The association with internal individual factors was tested for. Only the relationship with gender was statistically significant, p=0.015. Females were more knowledgeable than men as 70.4% and 57.9% of the males gave wrong answers that is to say; ‘’6 months only’’ and ‘’when one feels better ‘’, respectively. This can be seen in table 4.32.

Table 4.32. The association between "knowledge" and internal individual factors

		Knowledge			
Variable	**Categories**	**6months complete and health worker stops you N (%)**	**6months only N (%)**	**When one feels better N (%)**	**P-value**
Age	18-25	34 (17.8)	33 (16.3)	01 (5.3)	0.868
	26-33	51 (26.7)	60 (29.6)	05 (26.3)	
	34-41	57 (29.8)	61 (30)	06 (31.6)	
	42-49	25 (13.1)	25 (12.3)	04 (21.1)	
	50-57	16 (8.4)	17 (8.4)	01 (5.3)	
	58-65	08 (4.2)	07 (3.4)	02 (10.5)	
Gender	Male	108 (56.5)	143 (70.4)	11 (57.9)	0.015*
	Female	83 (43.5)	60 (29.6)	08 (42.1)	
Education status	None	18 (9.4)	25 (12.3)	01 (5.3)	0.817
	Primary	72 (37.7)	69 (34)	09 (47.4)	
	Secondary	77 (40.3)	79 (38.9)	07 (36.8)	
	Tertiary	24 (12.6)	30 (14.8)	02 (10.5)	

**P<0.05*

The association between ‘’knowledge’’ and external individual factors was tested for. The association with TB classification, HIV status, food availability and months taken to feel better was statistically significant. 57.1% of those who gave the correct answer (6 months complete and a health worker stops you) were HIV positive. Furthermore 78.3% of those who gave ‘’6 months only’’ were those who felt better in less than two months of using the TB medicines. This and more can be seen in table 4.33.

Table 4.33. The association between "knowledge" and external individual factors

		Knowledge			
Variable	**Categories**	**6months complete and health worker stops you N (%)**	**6months only N (%)**	**When one feels better N (%)**	**P-value**
TB classification	PTB-SM+	111 (58.1)	94 (46.3)	07 (36.8)	0.002*
	PTB-SM-	41 (21.5)	41 (20.2)	04 (21.1)	
	EPTB	15 (7.9)	15 (7.4)	02 (10.5)	
	EPTB &PTB	22 (11.5)	46 (22.7)	03 (15.8)	
	Not indicated	02 (1)	07 (3.4)	03 (15.8)	
HIV status	Positive	109 (57.1)	128 (63.1)	09 (47.4)	<0.001*
	Negative	78 (40.8)	66 (32.5)	05 (26.3)	
	Not indicated	04 (21)	09 (4.4)	05 (26.3)	
Food availability	Always available	62 (32.5)	74 (36.5)	03 (15.8)	0.005*
	Available most of the time	64 (33.5)	72 (35.5)	07 (36.8)	
	Not always available	63 (33)	46 (22.7)	06 (31.6)	
	Never available	02 (1)	11 (5.4)	03 (15.8)	
Months taken to feel better	<2months	97 (50.8)	159 (78.3)	09 (47.4)	<0.001*
	2-4months	82 (42.9)	38 (18.7)	06 (31.6)	
	5-6months	09 (4.7)	06 (3)	02 (10.5)	
	Didn't feel better	03 (1.6)	00 (0)	02 (10.5)	

**P<0.05*

Internal social factors such as who supervises you and staff attitude were considered. Both associations were statistically significant. 55.5% who gave the correct answer, were supervised by their families. This can be seen in table 4.34.

Table 4.34. The association between "knowledge" and internal social factors

		Knowledge			
Variable	**Categories**	**6months complete and health worker stops you N (%)**	**6months only N (%)**	**When one feels better N (%)**	**P-value**
DOTS status	HW	57 (29.8)	34 (16.7)	10 (52.6)	<0.001*
	FM	106 (55.5)	81 (39.9)	03 (15.8)	
	CM	03 (1.6)	08 (3.9)	02 (10.5)	
	None	25 (13.1)	80 (39.4)	04 (21.1)	
Staff attitude	Very friendly	85 (44.5)	80 (39.4)	06 (31.6)	<0.001*
	Friendly	92 (48.2)	93 (45.8)	07 (36.8)	
	Fair	09 (4.7)	26 (12.8)	02 (10.5)	
	Unfriendly	03 (1.6)	02 (1)	02 (10.5)	
	Very unfriendly	02 (1.0)	02 (1)	02 (10.5)	

**P<0.05*

The association with external social factors was tested for. Transport and medicine availability at TB dispensaries association was statistically significant. 94.2% of those who gave the correct answer (6 months complete and a health worker stops you) also said that the drugs were always available at the TB dispensaries. This can be seen in table 4.35 below.

Table 4.35. The association between "Knowledge" and external social factors

		Knowledge			
Variable	**Categories**	**6months complete and health worker stops you N (%)**	**6months only N (%)**	**When one feels better N (%)**	**P-value**
Transport	Walkable	60 (31.4)	43 (21.2)	07 (36.8)	<0.001*
	<10K	112 (58.6)	153 (75.4)	05 (26.3)	
	15k-30k	19 (9.9)	07 (3.4)	07 (36.8)	
Availability of medicines at the facility	Always available	180 (94.2)	171 (84.2)	09 (47.4)	<0.001*
	Sometimes available	11 (5.8)	32 (15.8)	10 (52.6)	

**P<0.05*

The dependent question, "preferred drug collection point" variable was tested using the chi-square association test between the independent variables at a significance level of <0.05. The association with internal individual factors was tested for. However, there a was statistically significant difference between "preferred drug collection point'' variable and residence and monthly income. Majority of participants, 130 patients attended Kisenyi HC IV. This can be seen in table 4.36.

Table 4.36. The association between "preferred drug collection point" and internal individual factors

		Name of the Facility					
Variable	**Categories**	**Bukoto**	**Kawaala**	**Kisenyi N (%)**	**Kiswa**	**Kitebi**	**P-value**
Residence	Central	4 (9.3)	7 (6.7)	56 (43.1)	4 (8)	5 (5.8)	<0.001*
	Kawempe	4 (9.3)	3 (2.9)	2 (1.5)	15 (30)	0 (0)	
	Makindye	16 (37.2)	21 (20.2)	43 (33.1)	11 (22)	2 (2.3)	
	Nakawa	15 (34.9)	5 (4.8)	6 (4.6)	10 (20)	1 (1.2)	
	Rubaga	4 (9.3)	68 (65.4)	23 (17.7)	10 (20)	78 (90.7)	
Monthly income	Low	32 (74.4)	75 (72.1)	80 (61.5)	31 (62)	57 (66.3)	0.026*
	Medium	11 (25.6)	29 (27.9)	40 (30.8)	17 (34)	26 (30.2)	
	High	0 (0)	0 (0)	10 (7.7)	2 (4)	3 (3.5)	

**P<0.05*

When the association of the dependent variable and external individual factors was considered. Only TB classification showed a significant statistical difference. 80.2% participants with PTB-SM+ picked their TB drugs from Kitebi Health center III. This is shown in table 4.37.

Table 4.37. The association between "preferred drug collection point" and external individual factors

		Name of the Facility					
Variable	**Categories**	**Bukoto**	**Kawaala**	**Kisenyi N (%)**	**Kiswa**	**Kitebi**	**P-value**
TB Classification	PTB-SM+	23 (53.5)	50 (48.1)	55 (42.3)	15 (30)	69 (80.2)	<0.001*
	PTBSM-	7 (16.3)	16 (15.4)	41 (31.5)	8 (16)	14 (16.3)	
	EPTB	5 (11.6)	7 (6.7)	6 (4.6)	14 (28)	0 (0)	
	PTB&EPTB	8 (18.6)	28 (26.9)	21 (26.9)	12 (24)	2 (2.3)	
	Not indicated	0 (0)	3 (2.9)	7 (5.4)	1 (2)	1 (1.2)	

**P<0.05*

When the association between the dependent variable above and internal social factors was tested for, ‘’who supervises you while taking TB medicines’’ and staff attitude showed a statistically significant relationship. Kisenyi health center IV had 47.7% of their patients supervised by a health worker. Furthermore 50% of the patients who attended this health center said that the health workers at this facility were very friendly. This is shown in table 4. 38.

Table 4.38. The association between "preferred drug collection point" and internal social factors

		Name of the Facility					
Variable	**Categories**	**Bukoto**	**Kawaala**	**Kisenyi N (%)**	**Kiswa**	**Kitebi**	**P-value**
DOTS	HW	5 (11.6)	9 (8.7)	62 (47.7)	13 (26)	12 (14)	<0.001*
	FM	23 (53.5)	64 (61.5)	37 (28.5)	8 (16)	58 (67.4)	
	CM	1 (2.3)	0 (0)	7 (5.4)	3 (6)	2 (2.3)	
	None	14 (32.6)	31 (29.8)	24 (18.5)	26 (52)	14 (16.3)	
Staff attitude	V.friendly	16 (37.2)	39 (37.5)	65 (50)	15 (30)	36 (41.9)	0.032*
	Friendly	22 (51.2)	54 (51.9)	46 (35.4)	26 (52)	44 (51.2)	
	Fair	4 (9.3)	11 (10.6)	10 (7.7)	07 (14)	05 (5.8)	
	Unfriendly	0 (0)	0 (0)	5 (3.8)	1 (2)	01 (1.2)	
	V.unfriendly	1 (2.3)	0 (0)	4 (3.1)	1 (2)	0 (0)	

**P<0.05*

The association with external social factors such as transportation, facility working duration and waiting time and availability of TB drugs at the facility were

tested for. There was a significant difference between the independent variables and the dependent variables as 65% could commute to their preferred TB dispensaries at less than 3 US dollars. 61% were comfortable with ‘’from 8am to 5pm‘’ as facility working time, 50% spent less than an hour at the TB drug collection point yet 87% said that TB drugs were always available at their preferred TB dispensaries. This is shown in table 4.39.

Table 4.39. The association between "preferred drug collection point" and external social factors

		Name of the Facility					
Variable	**Categories**	**Bukoto**	**Kawaala**	**Kisenyi N (%)**	**Kiswa**	**Kitebi**	**P-value**
Transportation	Walkable	08 (18.6)	11 (10.6)	44 (33.8)	4 (8)	43 (50)	<0.001*
	Less than 3USD	33 (76.7)	85 (81.7)	70 (53.8)	39 (78)	43 (50)	
	Between 5-10USD	02 (4.7)	08 (7.7)	16 (12.3)	7 (14)	0 (0)	
Facility working time	Before 8-17	2 (4.7)	5 (4.8)	41 (31.5)	2 (4)	17 (19.8)	<0.001*
	8-17	33 (76.7)	70 (67.3)	57 (43.8)	34 (68)	60 (69.8)	
	After 8- 17	8 (18.6)	27 (26)	23 (17.7)	11 (22)	8 (9.3)	
	Before 8-17	0 (0)	2 (1.9)	9 (6.9)	3 (6)	1 (1.2)	
Waiting time	<1 hour	18 (41.9)	53 (51)	76 (58.5)	26 (52)	29 (33.7)	<0.001*
	1 - 2 hours	25 (58.1)	51 (49)	43 (33.1)	23 (46)	56 (65.1)	
	> 3 hours	0 (0)	0 (0)	11 (8.5)	1 (2)	1 (1.2)	
Availability of TB drugs	Always available	37 (86)	96 (92.3)	111 (85.4)	31 (62)	85 (98.8)	<0.001*
	Not available	06 (14)	08 (7.7)	19 (14.6)	19 (38)	01 (1.2)	

**P<0.05*

The dependent question, " Taking other medicines " was tested using the chi-square association test between the independent variables at a significance level of <0.05. The association with internal individual factors such as gender and monthly income were tested for. Both relations were statistically significant, p<0.05. There were more males (65.5%) taking other medicines besides TB drugs compared to females (34.5%). This can be seen in table 4.40.

Table 4.40. The association between "taking other medicines" and internal individual factors

Taking other medicines				
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Gender	Male	245 (65.5)	17 (43.6)	0.007*
	Female	129 (34.5)	22 (56.4)	
Monthly income	Low	255 (68.2)	20 (51.3)	0.020*
	Medium	108 (28.9)	15 (38.5)	
	High	11 (2.9)	4 (10.3)	

**P<0.05*

The association between ‘’taking other medicines’’ variable and external individual factors was tested for. However only food availability, treatment period and HIV status showed a statistical difference as 65.5% of those who answered ‘’Yes’’ to this question in the HIV status variable were HIV positive. About Food availability, 36.6% claimed that food was available most of the times they were taking TB drugs while those who had low TB treatment literacy, 50.5% took other medicines. This can be seen in table 4.41.

Table 4.41. The association between "taking other medicines" and internal individual factors

Taking other medicines				
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
Food availability	Always available	115 (30.7)	24 (61.5)	0.001*
	Available most of them time	137 (36.6)	6 (15.4)	
	Not always available	106 (28.3)	9 (23.1)	
	Never available	16 (4.3)	0 (0)	
Treatment period	6months complete and health worker stops you.	166 (44.4)	25 (64.1)	0.039*
	6 months only	189 (50.5)	14 (35.9)	
	When you feel better	19 (5.1)	0 (0)	
HIV status	Positive	245 (65.5)	1 (2.6)	<0.001*
	Negative	112 (29.9)	37 (94.9)	
	Not indicated	17 (4.5)	1 (2.6)	

**P<0.05*

The association between ‘’taking other medicines’’ variable and internal social factors was tested. There was a statistical difference only between ‘’who supervises you while taking the TB drugs’’ and ‘’taking other medicines besides TB drugs’’. 46 % of those who answered ‘’Yes’’ to this question were supervised by family members. This can be seen in table 4.42.

Table 4.42. The association between "taking other medicines" and internal social factors

Taking other medicines				
Variable	**Categories**	**Yes N (%)**	**No N (%)**	**P-value**
DOTS	HW	82 (21.9)	19 (48.7)	<0.001*
	FM	172 (46)	18 (46.2)	
	CM	13 (3.5)	0 (0)	
	None	107 (28.6)	2 (5.1)	

**P<0.05*

5. DISCUSSION

The internal individual, external individual, internal social and external social factors were discussed in the previous chapter and the outcomes were merged. Within this chapter, the extent to which other studies are identical or different to the findings of this study was analyzed with respect to research aims. The effectiveness of the initiatives for TB control and prevention is impacted by a number of factors. The most frequently mentioned barriers to these programs in under-developed nations are illiteracy regarding TB treatment, the patient's perception of being healed once the medication starts to work and they start to feel better, drug side effects, economic issues, and transportation difficulties (82,114,151,154).

Internal Individual Factors

The internal individual factors include age, gender, marital status, level of formal education, monthly income and employment status. In this study, there was no statistical difference between the dependent variable ‘’did you inform anyone you live with about your TB status ‘’ and the above internal individual factors despite the fact that majority (63.43%) of the patients answered ‘’no’’ to the above question. Whether it was by coincidence or not, the fact that the percentage of those who never informed anyone they lived with about their TB medication has deadly results on the current TB control and prevention programs since it keeps a lot of infected people in the society. A Malawian study however claims that TB patients disclosed their TB status to their close family members (197).

When the above internal individual factors were run against the dependent variable question, ‘’do you have a treatment supporter’’. There was a statistical difference with age and marital status. This points to the fact that the age of a patient and their marital status influenced them not to or find a treatment supporter during their TB medication process. Out of the 74.3% patients who answered ‘’yes’’ majority (29.3% patients) were between 26 and 33 years whereas 48% patients were married. This implies that married people and those aged between 26 and 33 were more likely to have a treatment supporter. This is one of the TB good practices thus enabling DOTS-WHO to be practiced. A study showed that TB programs that give patients the option of receiving care monitoring in a community setting or a medical center

generally operated efficiently and had acceptable clinical outcomes (198). In another study, patients aged 20–39, on the other hand showed poor behaviour compared to those aged 60 and up (120).

There was a significant difference between gender and our dependent variable of knowledge. Females were more knowledgeable than men as 70.4% and 57.9% of the males gave wrong answers that is to say; ‘’6 months only’’ and ‘’when one feels better ‘’, respectively. Individuals with poor literacy were more likely to exhibit non-self-report compliance practices as reported by other studies (118,119). This meant that females are more inclined to complying with the available TB prevention and control programs as compared to males. However, Bangladesh, males were more positive in utilizing of TB services than females (117).

Monthly income and residence showed a statistical difference with the dependent variable, ‘’name of the preferred drug collection facility’’. From this we can see that a patient’s monthly income played a role in determining where the patient collected their TB medication as 61.5% of the patients who went to Kisenyi HC IV were low-income earners. This could have been due to the central strategic location of Kisenyi HC IV hospital which is walkable to some patients and requires little fee for other patients thus easy accessibility. According to another study, expense of TB treatment for patients in needy circumstances can be reduced thanks to easy transportation (116).

Furthermore, 44.31% received their TB medication from Kitebi HC III and Kawaala HC IV despite the fact that some patients were not residents of Rubaga division. Kisenyi HC IV also received patients from all over Kampala districts. However, only 43.1% of those who attended Kisenyi HC IV were from Central division. The rest came from other divisions due to various reasons such as stigma, others preferred a facility that was close to their work place. Those from Makindye and Kawempe divisions especially claimed that long waiting hours at the regional referral hospitals made them to move to other TB dispensaries around Kampala district.

Similarly, there was a statistical difference between the dependent variable’’ taking other medicines besides TB medicines’’ and gender plus monthly income.

65.5% of males were at least were taking other medicines besides TB. More so, there were 68.2% of low-income earners who used other medicines apart from TB medicines. This could be because low-income earners are under the risk group of morbidities due to poor feeding and housing especially in the urban areas. For example, in this study, 62.5% (258 patients) of the TB infected people lived in small houses of about one to two rooms yet out of these people, 48.1% (124patients) lived with at least one to three other people. These small poor ventilated houses don't allow privacy for the patients yet their ventilation systems too are against the advised ones in the national end TB guidance rules.

External Individual Factors

Among the external individual factors, TB classification showed a significant difference with the variable '' did you inform anyone you live with about your TB medication''. This implies that the TB class influenced patients to inform their friends or family about their TB status. In this study patients with PTB-SM+ were less likely to inform someone about their TB medication as 47.7% of those who answered ''no'' were PTB-SM+. This limits important the national TB control programs such as TPT in Uganda.

External individual such as smoking and food availability also showed a significant difference with the dependent variable ''do you have a treatment supporter''. Majority of the non- smokers (70.3%) claimed to have a treatment supporter. Cigarette smoking was linked to a reduced likelihood of treatment success in a Ugandan study (134). In addition, a Turkish study found that smoking had significant independent effects on TB patients' treatment adherence (135). About food availability, only 35.8% and 36.8% said'' always available'' and ''available most of the times'' respectively. This implies that almost 27.4% patients lacked food at the time of taking their medicines. More so, patients made this issue clear when they were asked to suggest what should be done for TB patients to complete their medication as 14.5% asked for food support. A study done in Afghanistan also considered food assistance to be a valuable resource and a crucial component of the national TB control plan (199).

There was a significant difference between TB classification, HIV status, food availability and months taken to feel better with the dependent variable of knowledge. More than half percent (53.8%) gave a wrong answer. Sadly, 64.4% of those who felt better within less than two months gave a wrong answer. This shows a low TB treatment literacy in Kampala TB patients. There was a significant difference between TB classification with the dependent variable of knowledge ($p<0.001$) as 92 % of the patients treated in Kitebi were PTB-SM+ patients.

There was a significant difference between HIV status and food availability with the dependent variable ‘’taking other medicines’’. 90.6% of the participants were taking other medicines during their TB medication process. Out of these, only 30.8% claimed that food was always available. 65.5% were HIV positive and so taking a lot of medicines. HIV has been linked to poor TB treatment outcomes in some studies (139,140). TB and HIV diagnosis have also been linked to stigma, which may have negative consequences for TB therapeutic efficacy (138). As a result, it is critical friends and family members to support and encourage patients to recognize TB, as well as to assist patients in sticking to TB therapy.

Internal Social Factors

This study revealed a significant difference between internal social factors such as ‘’Who do you live with’’, ‘’Number of people living in the same house’’, ‘’Number of rooms’’, ‘’Who supervises you while taking TB drugs’’ and the dependent variable ‘’did you inform anyone you live with about your TB medications’’. From this study, 63.44% of the TB patients never informed anyone about their TB treatment yet 176 patients were living with either their family or friends, 106 patients revealed that they were living with at least one to three people in the same house.

62.47% of the respondents lived in small houses of between one and two rooms. Out of 258 people in such living condition, 48.06% live with at least to three other people. To make matters worse 180 patients who never informed anyone they lived with about their TB status lived in between one and two rooms. Non-disclosure could point to the presence of stigma and or discrimination. Out of the 413 patients that took part in this study, only 36.6% had informed their family or friend. The rest ,63.4% never informed any one and out of these, 117 patients gave ‘’fear of being isolated’’,

46 patients gave ‘’no one to trust’’ while 99 patients gave ‘’others’’ such as ‘’no need for unnecessary stress’’ and ‘’fear of losing their jobs’’ as the main reason to why they never informed anyone. Due to potential lack of privacy, congestion might make it difficult for patients to take their TB medications. This has unbelievable effects on the available TB control and prevention programs especially early TB detection programs and TPT.

Care, support, and supervision of patients is a crucial component of DOTS. Numerous patients in a large metropolitan area like Kampala lack treatment supporters because they generally live by themselves or with strangers who are unable to offer the necessary assistance. There was also a significant difference between internal social factors such as ‘’Who do you live with’’, ‘’Number of people living in the same house’’, ‘’Number of rooms’’, ‘’Who supervises you while taking TB drugs’’ and dependent variable “do you have a treatment supporter”. Treatment supporters are required to act as DOT advocates by watching the patient take his or her TB medications. In practice, this might not be the case since some of the treatment supporters do not even share a residence with the patient and are therefore unlikely to see the patient regularly taking medications.

79.48% of the patients with treatment supporters lived with their families. This implies that although many never informed anyone they lived with, they had a treatment supporter outside family or friends. However, this behavior limits TB control programs such as early diagnosis as well as TPT. Furthermore, 51.14% of the participants who said that they had treatment supporters to watch them over while taking TB medicines lived with about one to three other people in the same house. Majority of the patients with treatment supporter (61.56%) lived in one or two rooms implying poor ventilation which is against the Ugandan TB control guidelines (195).

Limited knowledge about TB treatment remains a crucial hazzard in the community as 72.52% who gave a wrong answer were supervised by a family member (36.49%) or had no supervisor (36.03%) while taking the TB medications. Patients who receive inadequate health education may not be aware of the consequences of not conforming to treatment recommendations. It is crucial that all patients who have begun TB medication complete it as directed by their healthcare provider in accordance with national recommendations. This study also demonstrated that some

TB patients stopped taking their medication once they felt better and were symptom-free because they believed they had been healed. Similar conclusions regarding feeling better being connected with ceasing TB treatment and therefore negatively affecting the TB control programs were drawn from other studies (155,193).

‘’Who supervises you while taking TB medication’’ and staff attitude were found to have a significant difference with our dependent variable ‘’name of the preferred TB drug collection point’’. 47.69% of the patients who attended Kisenyi HC IV were supervised by health workers whereas 50% claimed that the staff at that center were very friendly.

Similarly, there was a significant difference between the dependent variable, knowledge and ‘’staff attitude’’. 92.67% of the patients who gave a correct answer also claimed that they were being supervised by ‘’very friendly’’ (44.5%) and ‘’friendly’’ (48.2%) health workers. This emphasizes the role played service providers in the available TB control and prevention programs. Several studies have shown how important patient-healthcare provider communication is to the success of TB control and prevention strategies (15,150,160,166–168).

There was a significant difference between the dependent variable,’’ taking other medicines’’ and ‘’who supervises you while taking TB drugs’’. 74.6% of the patients who took other medications besides TB drugs, had no supervisor (28.6%) or were supervised by their families (46%). This could point out to the low level of TB treatment literacy among individuals. Too much medicines can also create bias about swallowing TB medicines especially after feeling better thus increasing the transmission of TB within communities and MDR-TB with its deadly repercussions. Previous research found that patients with support from friends and family were more motivated to take their medication on a regular basis; additionally, economical and nourishment support also importantly ranked among the factors specifically mentioned (123,157– 159).

External Social Factors

With external social factors, only transport cost showed a significant relationship with the dependent variable ‘’Did you inform anyone’’. Transport cost was also used to show the distance between area of residence and TB dispensaries. Those who said

walkable and less than 3 dollars, which was a shorter distance, were 91.2%. Those with a shorter distance were more likely not to inform anyone about their TB status than people who had to travel a longer distance. This could be linked to stigma and discrimination from their neighbors.

Several studies have indicated that significant influences on TB treatment and prevention include health worker attitudes, facility hours, the availability of medications, and accessibility concerns (travel cost). This is due to the fact that negative attitudes among health care providers often discourage patients from seeking treatment or returning to pick up finished medications. In this study too, transport cost, facility working hours, waiting times at the TB dispensary and TB drug availability had a statistically significant difference when tested with the dependent variable ‘’name of the preferred facility for TB drugs’’. Among those who said ‘’walkable’’ (79.1%), 40% collected their drugs from Kisenyi HC IV whereas 39.1% collected their drugs from Kitebi HC III. Kisenyi HC IV was preferred due to its strategic location (located in the heart of Kampala) making it easier for patients to commute there, most patients have their jobs around this area and besides, since it is a level IV hospital, a wide range of services are provided.

More than half percent (77.72%) of the patients who utilized these TB dispensaries were fine with health facilities working ‘’before 8am to 5pm’’ (20.87%) and ‘’between 8am and 5pm’’ (56.85%) as these clinic hours are frequently the same as patients' working hours, they are especially helpful to patients who are also employed. 49% of the patients reported to have spent less than an hour at the TB dispensary. This shows how effective the facilities in Kampala district worked as compared to the most of the studies done in other under-developed countries where TB patients complain of long waiting hours at the TB facilities (161,162,178,179). This study also revealed that 87.2% of the patients said that TB drugs were always available at the TB dispensaries. This a key factor in the fight against TB.

When asked what they thought could be done to assist TB patients in completing their treatments, the patients offered a variety of suggestions. As they could not function adequately at work while ill, 18.1% of respondents requested for financial assistance. 14.5% of patients wanted food provided while receiving the TB therapy,

13.1% desired for extra counselling and education, and 12.6% requested for transportation assistance up until their treatment was over.

Patients also suggested psychosocial support, stronger privacy, positive doctor-patient relationships, frequent reminders about TB medications, time management by healthcare professionals, and rewarding those who finish TB medication as ways to assist TB patients in completing their treatment and averting unfavorable outcomes that could have an impact on the programs for TB control and prevention. The comments from the patients confirmed the need of addressing food insecurity, financial aid, more health education and counselling and transport aid. Therefore, efforts should be made to cater for such issues for the better functioning of the available TB control and prevention programs in the pearl of Africa.

6. CONCLUSION AND RECOMMENDATION

Lack food at the time of taking medications, patients' non-disclosure of their TB status to their households, fear of stigma and discrimination, low level of TB treatment literacy, feeling well so quickly, TB-HIV comorbidity as well as taking other medicines besides, TB medications were the factors limiting the effectiveness of the current TB prevention and control programs.

Whereas patients having a treatment supporter (DOT), the fact that TB dispensaries were within walkable distances or less than 3dollars transport cost distances, availability of TB drugs at the TB dispensaries, staff attitude, convenient working times and short waiting times at the TB facilities were considered to be facilitating the functioning of the available TB prevention and control programs in Kampala district of Uganda.

According to this study, providing transportation incentives, ensuring that patients have trained treatment supporters and obey them, improving patient TB treatment literacy, including teaching patients the benefits of informing their friends or family for simple and early diagnosis, and making food available to patients on TB treatment through linkages would all help the existing TB control and prevention systems function more effectively.

6.1. Limitations

The limitations of this study were that only adult patients in the random sample were included in this study. The TB dispensaries were only from three divisions yet patients from five divisions. This is because permission was granted for specific TB dispensaries.

6.2. Recommendations

The TB-fight is going well for Turkey and other nations who follow the WHO's strategy recommendations. Uganda must work to at least improve diagnostic and treatment services, improve information management, including the use of digital technologies to ensure tracking and monitoring of TB infected individuals, and

intensify TB management, accountability, cross-sector collaborative effort, and resource mobilization if she is to achieve her goal of eliminating TB by 85%.

From this study, we call for increased community and overall TB patient health education, especially at the beginning of the therapy, and reinforce it at each visit using the best language a patient understands. Complete information should be provided, including treatment duration, any side effects, and instructions on how to handle them.

More education to health workers as well on how to handle, follow-up and ensure that the patient's households and close people are supervised to cut down on the number of patients who don't inform anyone about their health statuses TB in particular.

Improve the DOT at the institution for patients staying nearby. This would make it possible for as many people as possible to have a health professional watch them take their medications.

Moreover, more TB dispensaries might be established in the neighborhood, putting them within walkable distance of TB patients, possibly reducing the expense of transportation and allowing for early screening.

Include TB patients in the creation of plans to boost care coordination.

Make use of technology through by applying VDOT to the available methods to enable every TB patient receive monitoring from a health care worker during the period of swallowing medicines.

Incentives in terms of food could also help in the fight against TB. The government should work hand in hand with World Food Program and other Non – Governmental Organizations for a special package for TB and HIV patients.

This paper describes the available programs in place for TB prevention and control in Kampala, Uganda. It also figures out both the facilitating and limiting factors and provides the go about to these diminishing factors. We also call upon further studies about these in this angle to curb down on the escalating TB incidence in this beautiful country of Uganda.

7. REFERENCES

1. World Health Organization. Tuberculosis [Internet]. 2022 [cited 2022 Oct 3]. Available from: https://www.who.int/health-topics/tuberculosis#tab=tab_1

2. World Health Organization. Tuberculosis [Internet]. 2023 [cited 2023 Feb 24]. Available from: https://www.who.int/news-room/fact-sheets/detail/tuberculosis

3. World Health Organization. Uganda Ministry of Health launches the National Coordination Committee for Tuberculosis | WHO | Regional Office for Africa [Internet]. 2021 [cited 2022 Nov 7]. Available from: https://www.afro.who.int/news/uganda-ministry-health-launches-national-coordination-committee-tuberculosis

4. World Health Organization. Global Tuberculosis Programme [Internet]. 2021 [cited 2022 Mar 31]. Available from: https://www.who.int/teams/global-tuberculosis-programme/tb-reports

5. Jonathan Joseph Greene. Factors Associated with Defaults from treatment among Tuberculosis Patients in Western Sierra Leone [Internet]. 2014 [cited 2022 Oct 3]. Available from: https://ugspace.ug.edu.gh/handle/123456789/7286

6. World Health Organization. Implementing the End TB Strategy [Internet]. 2014 [cited 2022 Apr 2]. Available from: https://www.who.int/westernpacific/activities/implementing-the-end-tb-strategy

7. World Health Organization. Western Pacific regional framework to end TB: 2021-2030: brief summary [Internet]. 2021 [cited 2022 Oct 3]. Available from: https://apps.who.int/iris/handle/10665/352375

8. Oyediran K, Kirenga B, Turyahabwe S, Davis N, Chauffour J, Muttamba W, et al. Quality of Tuberculosis Services Assessment in Uganda: Report — MEASURE Evaluation [Internet]. 2020 [cited 2022 Apr 1]. Available from: https://www.measureevaluation.org/resources/publications/tr-20-398.html

9. WHO global lists. WHO global lists of high burden countries for tuberculosis (TB), TB/HIV and multidrug/rifampicin-resistant TB (MDR/RR-TB), 2021-2025 Background document. 2021 [cited 2022 Apr 2]; Available from: http://apps.who.int/bookorders.

10. Satcher D, Gayle HD, Acting Director M, Castro KG, Program Office Stephen Thacker EB, Richard Goodman DA, et al. Project Editor. 1995;

11. World Health Organization. Global tuberculosis control [Internet]. 2003 [cited 2022 Apr 2]. Available from: https://apps.who.int/iris/handle/10665/63835

12. World Health Organization. Global Tuberculosis Control: Surveillance, Planning, Financing : WHO Report 2006 - World Health Organization - Google Books [Internet]. 2006 [cited 2022 Apr 2]. Available from: https://books.google.com.tr/books?id=CDyzDwAAQBAJ&pg=PR2&lpg=PR2&dq=World+Health+Organization.+Global+tuberculosis+control:+surveillance,+planning,+financing.+WHO/HTM/TB/2006.362.+Geneva,+Switzerland:+WHO,+2006.&source=bl&ots=-pwm9cvjOE&sig=ACfU3U3Cb2MYRO

13. Godfrey-Faussett P, Kaunda H, Kamanga J, Beers S van, Cleeff M van, Kumwenda- RP, et al. Why do patients with a cough delay seeking care at Lusaka urban health centres? A health systems research approach - PubMed [Internet]. 2002 [cited 2022 Apr 2]. Available from: https://pubmed.ncbi.nlm.nih.gov/12234135/

14. Yimer S, Bjune G, Alene G. Diagnostic and treatment delay among pulmonary tuberculosis patients in Ethiopia: a cross sectional study. BMC Infect Dis [Internet]. 2005 Dec 12 [cited 2022 Apr 2]; 5: 112. Available from: /pmc/articles/PMC1326202/

15. Shetty N. SM. & AA. Knowledge, attitudes and practices regarding tuberculosis among immigrants of Somalian ethnic origin in London: a cross-sectional study - PubMed [Internet]. 2004 [cited 2022 Apr 2]. Available from: https://pubmed.ncbi.nlm.nih.gov/15137287/

16. Edginton ME, Sekatane CS, Goldstein SJ. Patients' beliefs: do they affect tuberculosis control? A study in a rural district of South Africa - PubMed [Internet]. 2002 [cited 2022 Apr 2]. Available from: https://pubmed.ncbi.nlm.nih.gov/12546115/

17. Abebe M, Doherty M, Wassie L, Demissie A, Mihret A, Engers H, et al. TB case detection: can we remain passive while the process is active? Pan Afr Med J [Internet]. 2012 [cited 2022 Apr 3]; 11: 50. Available from: /pmc/articles/PMC3343678/

18. Murray CJL SJ. Expanding the WHO tuberculosis control strategy: rethinking the role of active case-finding - PubMed. 1998 [cited 2022 Apr 3]; Available from: https://pubmed.ncbi.nlm.nih.gov/9755959/

19. World Health Organization. Recommendations for investigating contacts of persons with infectious tuberculosis in low- and middle-income countries. World Heal Organ. 2012;28–41.

20. Hwang TJ, Ottmani S, Uplekar M. A rapid assessment of prevailing policies on tuberculosis contact investigation. Int J Tuberc Lung Dis. 2011 Dec;15(12):1620–2.

21. Ayakaka I, Ackerman S, Ggita JM, Kajubi P, Dowdy D, Haberer JE, et al. Identifying barriers to and facilitators of tuberculosis contact investigation in Kampala, Uganda: A behavioral approach. Implement Sci. 2017 Mar 9;12(1).

22. UBOS. Uganda Bureau of Statistics,2021 Statistics Abstract. 2021.

23. GOU. Facts & Figures | Uganda National Web Portal [Internet]. 2022 [cited 2022 Oct 10]. Available from: https://www.gou.go.ug/content/facts-figures.

24. UBOS. uganda profile - Uganda Bureau of Statistics [Internet]. 2022 [cited 2022 Oct 10]. Available from: https://www.ubos.org/uganda-profile/

25. The World Bank. Age dependency ratio (% of working-age population) - Uganda | Data [Internet]. 2023 [cited 2023 Mar 7]. Available from: https://data.worldbank.org/indicator/SP.POP.DPND?locations=UG.

26. World meters(b). Life Expectancy by Country and in the World (2021) – World meter [Internet]. 2020 [cited 2021 Mar 31]. Available from: https://www.worldometers.info/demographics/life-expectancy/

27. Wage Indicator. Minimum wage - Uganda - WageIndicator.org [Internet]. 2023 [cited 2023 Jan 18]. Available from: https://wageindicator.org/salary/minimum-wage/ Uganda.

28. KPMG Uganda. Economic commentary Economic Performance. 2022 [cited 2022 Oct 10]; Available from: https://assets.kpmg/content/dam/kpmg/ug/pdf/tax/2022/Uganda Budget Brief 2022-23 Final.pdf

29. Uganda Ministry of Health. Ministry of Health Knowledge Management Portal | Republic of Uganda [Internet]. 2021 [cited 2021 Jul 1]. Available from: http://library.health.go.ug/

30. Okwero P, Tandon A, Sparkes S, McLaughlin J, Hoogeveen JG. Fiscal Space for Health in Uganda. 2010 Mar 1 [cited 2022 Oct 10]; Available from: https://openknowledge.worldbank.org/handle/10986/5949

31. USAID. Uganda Health System Assessment 2011. Health Systems. 2012;

32. Uganda Ministry of Health. Ministry of Health Knowledge Management Portal | Republic of Uganda [Internet]. 2022 [cited 2022 Oct 12]. Available from: http://library.health.go.ug/

33. MOUHOUMED HM. Barriers in Primary Healthcare Service Utilization among Adults in Borama in the Northwestern Awdal Region of Somaliland [Internet]. 2020 [cited 2022 Oct 12]. Available from: http://acikerisim.ybu.edu.tr:8080/xmlui/handle/123456789/2558

34. Ahmat A, Okoroafor SC, Kazanga I, Asamani JA, Jacques J, Millogo S, et al. The health workforce status in the WHO African Region: findings of a cross-sectional study. BMJ Glob Heal [Internet]. 2022 [cited 2022 Oct 12]; 7: 8317. Available from: http://gh.bmj.com/

35. Uganda Ministry of Health. Ministry of Health National Health Accounts 2016-2019 | Ministry of Health Knowledge Management Portal [Internet]. 2022 [cited 2022 Oct 11]. Available from: http://library.health.go.ug/publications/health-financing-accounting/ministry-health-national-health-accounts-2016-2019

36. Macro trends. Uganda Healthcare Spending 2000-2023 | MacroTrends [Internet]. 2023 [cited 2023 Mar 1]. Available from: https://www.macrotrends.net/countries/UGA/uganda/healthcare-spending

37. World Health Organization & Alliance for Health Policy and Systems Research. Primary health care system: A case of Uganda. 2017;1–20.

38. Ministry of Health U. Health Financing Strategy. 2016.

39. Dowhaniuk N. Exploring country-wide equitable government health care facility access in Uganda. Int J Equity Health [Internet]. 2021 Dec 1 [cited 2023 Jan 3];20(1):1–19. Available from: https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-020-01371-5

40. World data. Turkey country data and statistics [Internet]. Available from: https://www.worlddata.info/asia/turkey/index.php

41. TURKSAT. Turkish Statistics Institute. 2023.

42. Ajari EE, Ojilong D. Assessment of the preparedness of the Ugandan health care system to tackle more COVID-19 cases. J Glob Health. 2020 Dec 1;10(2):1–3.

43. The World Bank. New World Bank country classifications by income level: 2022-2023 [Internet]. 2023 [cited 2023 Mar 21]. Available from: https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2022-2023

44. Yee D. Health promotion and disease prevention. Vol. 33, Gerontologist. 1993. 431–432 p.

45. TRT WORLD. Tuberculosis once again surpasses Covid as biggest infectious killer [Internet]. 2022 [cited 2022 Oct 26]. Available from: https://www.trtworld.com/life/tuberculosis-once-again-surpasses-covid-as-biggest-infectious-killer-61891

46. WHO (f). Tuberculosis deaths and disease increase during the COVID-19 pandemic [Internet]. 2022 [cited 2022 Oct 29]. Available from: https://www.who.int/news/item/27-10-2022-tuberculosis-deaths-and-disease-increase-during-the-covid-19-pandemic

47. WHO. Country cooperation strategy at a glance: Uganda. Who [Internet]. 2018;0–1. Available from: https://apps.who.int/iris/bitstream/handle/10665/136975/ccsbrief_uga_en.pdf?sequence=1&isAllowed=y

48. Daniel TM. doi:10.1016/j.rmed.2006.08.006. Respir Med. 2006;100:1862–70.

49. Chatterjee D, Pramanik AK. Tuberculosis in the African continent: A comprehensive review. Pathophysiology. 2015 Mar 1;22(1):73–83.

50. M Cristina G, Brisse S, Brosch R, Fabre M, Omaïs B, Marmiesse M, et al. Ancient Origin and Gene Mosaicism of the Progenitor of Mycobacterium tuberculosis. PLOS Pathog [Internet]. 2005 [cited 2022 Oct 19];1(1):e5. Available from: https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.0010005

51. Daniel TM. The early history of tuberculosis in central East Africa: insights from the clinical records of the first twenty years of Mengo Hospital and review of relevant literature-The International Journal of Tuberculosis and Lung Disease, Volume 2, Number 10, October 1998, pp. 784-790(7). 1998;

52. USAID. UGANDA TUBERCULOSIS ROADMAP OVERVIEW, FISCAL YEAR 2021. 2021;

53. Grange JM, Zumla AI. Tuberculosis. Manson's Trop Dis. 2009;983–1038.

54. Wynne A, Richter S, Banura L, Kipp W. Challenges in tuberculosis care in Western Uganda: Health care worker and patient perspectives. Int J Africa Nurs Sci. 2014 Jan 1;1:6–10.

55. Cambridge University Press. AFFECT | meaning, definition in Cambridge English Dictionary [Internet]. 2022 [cited 2022 Oct 5]. Available from: https://dictionary.cambridge.org/dictionary/english/affect

56. Merriam Webster. Program Definition & Meaning - Merriam-Webster [Internet]. 2022 [cited 2022 Oct 5]. Available from: https://www.merriam-webster.com/dictionary/program

57. Ministry of Health. TB / Leprosy Control Program - Ministry of Health | Government of Uganda [Internet]. 2022 [cited 2022 Nov 8]. Available from: https://www.health.go.ug/programs/tb-leprosy-control-program/

58. Treat TB. Uganda – TREAT TB [Internet]. 2019 [cited 2022 Oct 22]. Available from: https://treattb.org/trial-sites/uganda/

59. Ramy Mohamed Ghazy, Haider M. El Saeh SA, Esraa Abdellatif Hammouda, Amira Mohamed Elzorkany HK, Nardine Zarif EE, ElHafeez SA. A systematic review and meta-analysis of the catastrophic costs incurred by tuberculosis patients. 123AD [cited 2023 Apr 11]; Available from: https://doi.org/10.1038/s41598-021-04345-x

60. World Health Organization. Global Tuberculosis Report 2022 [Internet]. 2022 [cited 2022 Oct 29]. Available from: https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2022

61. Li J, Shen X, Yeoh EK, Chung PH. Tuberculosis control programs and challenges in developed cities with intermediate disease burden: China experience. J Thorac Dis [Internet]. 2017 May 1 [cited 2022 Oct 29];9(5):E525. Available from: /pmc/articles/PMC5465162/

62. Cole B, Nilsen DM, Will L, Etkind SC, Burgos M, Chorba T. Essential Components of a Public Health Tuberculosis Prevention, Control, and Elimination Program: Recommendations of the Advisory Council for the Elimination of Tuberculosis and the National Tuberculosis Controllers Association. MMWR Recomm reports Morb Mortal Wkly report Recomm reports [Internet]. 2020 [cited 2022 Oct 29];69(7):1–27. Available from: https://pubmed.ncbi.nlm.nih.gov/32730235/

63. Centers for Disease control and prevention. TB Infection Control in Health Care Settings | Health Care Settings | TB |CDC [Internet]. 2019 [cited 2022 Oct 29]. Available from: https://www.cdc.gov/tb/topic/infectioncontrol/TBhealthCareSettings.htm

64. Li J, Chung PH, Leung CLK, Nishikiori N, Chan EYY, Yeoh EK. The strategic framework of tuberculosis control and prevention in the elderly: A scoping review towards End TB targets. Infect Dis Poverty [Internet]. 2017 Jun 1 [cited 2022 Oct 29];6(1):1–12. Available from: https://idpjournal.biomedcentral.com/articles/10.1186/s40249-017-0284-4

65. Huynh GH, Klein DJ, Chin DP, Wagner BG, Eckhoff PA, Liu R, et al. Tuberculosis control strategies to reach the 2035 global targets in China: The role of changing demographics and reactivation disease. BMC Med. 2015 Dec 12;13(1).

66. World Health Organization. Implementing the WHO Stop TB Strategy: A Handbook for National Tuberculosis Control Programmes. Geneva. 2008.

67. Ghotbi N, Nishimura S, Takatsuka N. Japan's national tuberculosis control strategies with economic considerations. Environ Health Prev Med [Internet]. 2005 Jul [cited 2022 Oct 29];10(4):213. Available from: /pmc/articles/PMC2723316/

68. Verma G, Chuck AW, Jacobs P. Tuberculosis screening for long-term care: a cost-effectiveness analysis. Int J Tuberc Lung Dis [Internet]. 2013 Sep 1 [cited 2022 Oct 29];17(9):1170–7. Available from: https://pubmed.ncbi.nlm.nih.gov/23928166/

69. Smith PW, Rajagopalan S, Yoshikawa TT. Tuberculosis in long-term-care facilities. Infect Control Hosp Epidemiol [Internet]. 2000 Sep [cited 2022 Oct 29];21(9):611–6. Available from: https://pubmed.ncbi.nlm.nih.gov/11001270/

70. Kowada A, Deshpande GA, Takahashi O, Shimbo T, Fukui T. Cost effectiveness of interferon-gamma release assay versus chest X-ray for tuberculosis screening of BCG-vaccinated elderly populations. Mol Diagn Ther [Internet]. 2010 Aug [cited 2022 Nov 2];14(4):229–36. Available from: https://pubmed.ncbi.nlm.nih.gov/20799765/

71. Thrupp L, Bradley S, Smith P, Simor A, Gantz N, Crossley K, et al. Tuberculosis prevention and control in long-term-care facilities for older adults. Infect Control Hosp Epidemiol [Internet]. 2004 Dec [cited 2022 Nov 2];25(12):1097–108. Available from: https://pubmed.ncbi.nlm.nih.gov/15636299/

72. Van Den Brande P. Revised guidelines for the diagnosis and control of tuberculosis: impact on management in the elderly. Drugs Aging [Internet]. 2005 [cited 2022 Nov 2];22(8):663–86. Available from: https://pubmed.ncbi.nlm.nih.gov/16060717/

73. Zevallos M, Justman JE. Tuberculosis in the elderly. Clin Geriatr Med [Internet]. 2003 Feb [cited 2022 Nov 2];19(1):121–38. Available from: https://pubmed.ncbi.nlm.nih.gov/12735118/

74. Dryden-Peterson S, Hosford J, Acuña-Villaorduña C, Worodria W, Fennelly KP, Jones-López EC, et al. High Mortality Associated with Retreatment of Tuberculosis in a Clinic in Kampala, Uganda: A Retrospective Study. Am J Trop Med Hyg. 2015 Jul 8;93(1):73–5.

75. Manabe YC, Hermans SM, Lamorde M, Castelnuovo B, Mullins CD, Kuznik A. Rifampicin for Continuation Phase Tuberculosis Treatment in Uganda: A Cost-Effectiveness Analysis. PLoS One. 2012 Jun 18;7(6):e39187.

76. Jones-López EC, Ayakaka I, Levin J, Reilly N, Mumbowa F, Dryden-Peterson S, et al. Effectiveness of the Standard WHO Recommended Retreatment Regimen (Category II) for Tuberculosis in Kampala, Uganda: A Prospective Cohort Study. PLoS Med. 2011 Mar 15;8(3):e1000427.

77. Jang JG, Chung JH. Diagnosis and treatment of multidrug-resistant tuberculosis. Yeungnam Univ J Med [Internet]. 2020 Oct 31 [cited 2023 Apr 7];37(4):277. Available from: /pmc/articles/PMC7606956/

78. Baluku JB, Nakazibwe B, Naloka J, Nabwana M, Mwanja S, Mulwana R, et al. Treatment outcomes of drug resistant tuberculosis patients with multiple poor prognostic indicators in Uganda: A countrywide 5-year retrospective study. J Clin Tuberc Other Mycobact Dis. 2021 May 1;23.

79. Schaaf HS, Collins A, Bekker A, Davies PDO. Tuberculosis at extremes of age. Respirology [Internet]. 2010 Jul [cited 2022 Nov 4];15(5):747–63. Available from: https://pubmed.ncbi.nlm.nih.gov/20546192/

80. van der Westhuizen HM, Nathavitharana RR, Pillay C, Schoeman I, Ehrlich R. The high-quality health system 'revolution': Re-imagining tuberculosis infection prevention and control. J Clin Tuberc Other Mycobact Dis. 2019 Dec 1;17.

81. Makerere University Lung Institute. National TB and Leprosy Programme | Makerere University Lung Institute [Internet]. [cited 2022 Nov 8]. Available from: http://mli.mak.ac.ug/content/national-tb-and-leprosy-programme

82. Needham DM, Bowman D, Foster SD, Godfrey-Faussett P. Patient care seeking barriers and tuberculosis programme reform: a qualitative study. Health Policy (New York). 2004 Jan 1;67(1):93–106.

83. Friedena TR, Sbarbarob JA. Promoting adherence to treatment for tuberculosis: the importance of direct observation. Bull World Health Organ [Internet]. 2007 May [cited 2022 Nov 22];85(5):407. Available from: /pmc/articles/PMC2636637/

84. Davis JL, Turimumahoro P, Meyer AJ, Ayakaka I, Ochom E, Ggita J, et al. Home-based tuberculosis contact investigation in Uganda: a household randomised trial. ERJ Open Res [Internet]. 2019 Jul 1 [cited 2022 May 12];5(3). Available from: https://openres.ersjournals.com/content/5/3/00112-2019

85. Ssemmondo E, Mwangwa F, Kironde JL, Kwarisiima D, Clark TD, Marquez C, et al. Population-based active TB case finding during large-scale mobile HIV testing campaigns in rural Uganda. J Acquir Immune Defic Syndr [Internet]. 2016 Nov 1 [cited 2022 Apr 18];73(3):e46. Available from: /pmc/articles/PMC6269148/

86. Chamie G, Kwarisiima D, Clark TD, Kabami J, Jain V, Geng E, et al. Leveraging Rapid Community-Based HIV Testing Campaigns for Non-Communicable Diseases in Rural Uganda. PLoS One [Internet]. 2012 Aug 20 [cited 2022 Apr 18];7(8). Available from: /pmc/articles/PMC3423366/

87. Chamie G, Kwarisiima D, Clark TD, Kabami J, Jain V, Geng E, et al. Uptake of community-based HIV testing during a multi-disease health campaign in rural Uganda. PLoS One [Internet]. 2014 Jan 2 [cited 2022 Apr 18];9(1). Available from: https://pubmed.ncbi.nlm.nih.gov/24392124/

88. Suthar AB, Ford N, Bachanas PJ, Wong VJ, Rajan JS, Saltzman AK, et al. Towards universal voluntary HIV testing and counselling: a systematic review and meta-analysis of community-based approaches. PLoS Med [Internet]. 2013 Aug [cited 2022 Apr 18];10(8). Available from: https://pubmed.ncbi.nlm.nih.gov/23966838/

89. Michael Iseman. Types of Tuberculosis (TB); National Jewish Health. [Internet]. 2013 [cited 2022 Apr 22]. Available from: https://www.nationaljewish.org/conditions/tuberculosis-tb/types

90. Volmink J, Garner P. Directly observed therapy for treating tuberculosis. Cochrane Database Syst Rev. 2007;(4).

91. Karumbi J, Garner P. Directly observed therapy for treating tuberculosis. Cochrane database Syst Rev [Internet]. 2015 May 29 [cited 2022 Apr 22];2015(5). Available from: https://pubmed.ncbi.nlm.nih.gov/26022367/

92. Cook R, Lamont T, Martin R. Smartphones can improve adherence rates for TB treatment. BMJ [Internet]. 2019 [cited 2022 Apr 22];366. Available from: https://pubmed.ncbi.nlm.nih.gov/31466942/

93. Haberer JE, Musiimenta A, Atukunda EC, Musinguzi N, Wyatt MA, Ware NC, et al. Short message service (SMS) reminders and real-time adherence monitoring improve antiretroviral therapy adherence in rural Uganda. AIDS [Internet]. 2016 May 15 [cited 2022 Apr 22];30(8):1295–9. Available from: https://pubmed.ncbi.nlm.nih.gov/26760452/

94. Garfein RS, Collins K, Muñoz F, Moser K, Cerecer-Callu P, Raab F, et al. Feasibility of tuberculosis treatment monitoring by video directly observed therapy: a binational pilot study. Int J Tuberc Lung Dis. 2015 Sep 1;19(9):1057–64.

95. Story A, Garfein RS, Hayward A, Rusovich V, Dadu A, Soltan V, et al. Monitoring therapy compliance of tuberculosis patients by using video-enabled electronic devices. Emerg Infect Dis. 2016 Mar 1;22(3):538–40.

96. Sekandi JN, Buregyeya E, Zalwango S, Dobbin KK, Atuyambe L, Nakkonde D, et al. Video directly observed therapy for supporting and monitoring adherence to tuberculosis treatment in Uganda: a pilot cohort study. ERJ Open Res [Internet]. 2020 Jan 1 [cited 2022 Apr 22];6(1). Available from: https://openres.ersjournals.com/content/6/1/00175-2019

97. Sinkou H, Hurevich H, Rusovich V, Zhylevich L, Falzon D, De Colombani P, et al. Video-observed treatment for tuberculosis patients in Belarus: findings from the first programmatic experience. Eur Respir J. 2017 Mar 1;49(3):1602049–1602049.

98. Mirsaeidi M, Farshidpour M, Banks-Tripp D, Hashmi S, Kujoth C, Schraufnagel D. Video directly observed therapy for treatment of tuberculosis is patient-oriented and cost-effective. Eur Respir J. 2015 Sep 1;46(3):871–4.

99. Friedena TR, Sbarbarob JA. Promoting adherence to treatment for tuberculosis: the importance of direct observation. Bull World Health Organ. 2007 May;85(5):407–9.

100. Schlitz MM. The integral model: answering the call for whole systems health care. Perm J [Internet]. 2008 Jun [cited 2022 Oct 14];12(2):61–8. Available from: https://pubmed.ncbi.nlm.nih.gov/21364815/

101. Esbjörn-Hargens S. AN OVERVIEW OF INTEGRAL THEORY An All-Inclusive Framework for the 21st Century. undefined. 2009;

102. Wilber K. Introduction to Integral Theory and Practice IOS Basic and the AQAL map. AQAL Journal of Integral Theory and Practice, 1, 1-38. - References - Scientific Research Publishing [Internet]. 2005 [cited 2022 Oct 14]. Available from: https://www.scirp.org/%28S%28czeh2tfqyw2orz553k1w0r45%29%29/reference/referencespapers.aspx?referenceid=2302988

103. Duffy JD. A Primer on Integral Theory and Its Application to Mental Health Care. Glob Adv Heal Med [Internet]. 2020 Sep 21 [cited 2022 Oct 8];9. Available from: https://journals.sagepub.com/doi/full/10.1177/2164956120952733

104. Petrie D, Kreisberg J, Huffaker G, Short EB, Jarrín O. Integral Medicine: Treating the Whole-Patient, Provider, Healthcare System. International Journal of Whole Person Care,. 2014;1(1).

105. Sondos Ghazi Al-Hachim. Barriers to Preventive Healthcare for Immigrants in Michigan. [Internet]. 2017 [cited 2022 Oct 14]. Available from: https://scholarworks.waldenu.edu/dissertations/4194/

106. Ken Wilber. An Integral Theory of Conciousness. J Conciousness Stud. 1997;4(1):71–92.

107. O'Cuinn C. The Integral Vision of Ken Wilber: New Foundations for a Dialogue Between Science and Religion. Studies: An Irish Quarterly Review. 2007;96(383):309–21.

108. Erbisch PS. Management Style, Organizational Climate, and Organizational Performance in a Public Mental Health Agency: An Integral Model. Doctorate Thesis. West Michigan Univ Public Aff Adm Public Adm Michigan. 2004;

109. Voros J. Reframing Environmental Scanning: an Integral Approach. ForesightThe J Futur Stud Strateg Think Policy. 2001;3(6):533–52.

110. Grunwald S, Mizuta K, Ceddia MB, Pinheiro EF, Wilcox RK, Gavilan CP, et al. The Meta Soil Model: An Integrative Multi Model Framework for Soil Security. S. Esbjörn-Hargens içinde, Integral Theory in action: applied, theoretical, and constructive perspectives on the AQAL Model. 2010;305–317.

111. Al-Hachim S. Barriers to Preventive Healthcare for Immigrants in Michigan. Doctorate thesis. Walden Univ Coll Heal Sci Michigan. 2017;

112. Chang KC, Leung CC, Tam CM. Risk factors for defaulting from anti-tuberculosis treatment under directly observed treatment in Hong Kong. Int J Tuberc Lung Dis. 2004 Dec;8(12):1492–8.

113. Dheeraj Gupta, Kshaunish Das, Balamughesh T, Ashutosh N. Aggarwal, Surinder K. Jindal. ROLE OF SOCIO-ECONOMIC FACTORS IN TUBERCULOSIS PREVALENCE . 2004;51(27–31).

114. Okanurak K, Kitayaporn D, Akarasewi P. Factors contributing to treatment success among tuberculosis patients: A prospective cohort study in Bangkok. 2008;12(10).

115. Zhang T, Tang S, Jun G, Whitehead M. Persistent problems of access to appropriate, affordable TB services in rural China: experiences of different socio-economic groups. BMC Public Health. 2007;7(19).

116. Zhao Q, Wang L, Tao T, Xu B. Impacts of the "transport subsidy initiative on poor TB patients" in Rural China: A Patient-Cohort Based Longitudinal Study in Rural China. 2013;

117. Ehsanul Huq KATM, Moriyama M, Zaman K, Chisti MJ, Long J, Islam A, et al. Health seeking behaviour and delayed management of tuberculosis patients in rural Bangladesh. BMC Infect Dis [Internet]. 2018 Oct 12 [cited 2022 Apr 11];18(1). Available from: /pmc/articles/PMC6186095/

118. Gebremariam MK, Bjune GA, Frich JC. Barriers and facilitators of adherence to TB treatment in patients on concomitant TB and HIV treatment: a qualitative study. BMC Public Health [Internet]. 2010 [cited 2022 Apr 10];10. Available from: https://pubmed.ncbi.nlm.nih.gov/21029405/

119. Yasin Mohammed. Treatment adherence among tuberculosis... - Google Scholar [Internet]. 2014 [cited 2022 Apr 10]. Available from: https://scholar.google.com/scholar_lookup?journal=Am+J+Public+Health+Res&title=Treatment+adherence+among+tuberculosis+and+human+immuno+deficiency+virus+coinfected+patients+in+ginnir+referral+hospital&author=A+Yasin+Mohammed&author=M+Kaso+Adem&volume=2&publication_year=2014&pages=239-243&

120. Zhang R, Pu J, Zhou J, Wang Q, Zhang T, Liu S, et al. Factors predicting self-report adherence (SRA) behaviours among DS-TB patients under the "Integrated model": a survey in Southwest China. BMC Infect Dis [Internet]. 2022 Dec 1 [cited 2022 Apr 10];22(1):201. Available from: /pmc/articles/PMC8889779/

121. Fekadu G, Bekele F, Bekele K, Girma T, Mosisa G, Gebre M, et al. Adherence to Anti-Tuberculosis Treatment Among Pediatric Patients at Nekemte Specialized Hospital, Western Ethiopia. Patient Prefer Adherence [Internet]. 2020 [cited 2022 Apr 10]; 14:1259–65. Available from: http://www.ncbi.nlm.nih.gov/pubmed/32801656

122. Demissie M, Kebede D. Defaulting from tuberculosis treatment at the Addis Abeba tuberculosis centre and factors associated with it. Ethiop Med J. 1994;32(2):97–106.

123. Tekle B MDAA. Defaulting from DOTS and its determinants in three districts of Arsi Zone in Ethiopia - PubMed [Internet]. 2002 [cited 2022 Apr 10]. Available from: https://pubmed.ncbi.nlm.nih.gov/12102295/

124. Kankya CMA (ed.). MA. Myths, perceptions knowledge, attitudes, and practices (KAP) linked to mycobacterial infection management among the pastoralist communities of Uganda [Internet]. 2011 [cited 2022 May 15]. Available from: https://nru.uncst.go.ug/handle/123456789/1919

125. Ncube RT, Takarinda KC, Zishiri C, van den Boogaard W, Mlilo N, Chiteve C, et al. Age-stratified tuberculosis treatment outcomes in Zimbabwe: are we paying attention to the most vulnerable? Public Heal action [Internet]. 2017 Aug 17 [cited 2022 Apr 10];7(3):212–7. Available from: https://pubmed.ncbi.nlm.nih.gov/29201656/

126. Oshi DC, Oshi SN, Alobu I, Ukwaja KN. Profile and treatment outcomes of tuberculosis in the elderly in southeastern Nigeria, 2011-2012. PLoS One [Internet]. 2014 Nov 1 [cited 2022 Apr 10];9(11). Available from: https://pubmed.ncbi.nlm.nih.gov/25369001/

127. Bannon MJ. BCG and tuberculosis. Arch Dis Child [Internet]. 1999 [cited 2022 Apr 21];80(1):80–3. Available from: https://pubmed.ncbi.nlm.nih.gov/10325767/

128. Helen McShane. Vaccine strategies against tuberculosis - PubMed [Internet]. 2009 [cited 2022 Apr 21]. Available from: https://pubmed.ncbi.nlm.nih.gov/19152149/

129. Nankabirwa V, Tumwine JK, Mugaba PM, Tylleskar T, Sommerfelt H GP-E. Child survival and BCG vaccination:a community based prospective cohort study in Uganda. BMC Public Health. 2015; 15:175. PubMed. 2015;

130. Zvolska K, Pankova A, Nohavova I, Huque R, Elsey H, Boeckmann M, et al. A narrative review of facilitators and barriers to smoking cessation and tobacco-dependence treatment in patients with tuberculosis in low- and middle-income countries. Tob Induc Dis [Internet]. 2020 Aug 1 [cited 2022 Apr 10];18. Available from: /pmc/articles/PMC7425757/

131. Jeyashree K, Kathirvel S, Shewade HD, Kaur H, Goel S. Smoking cessation interventions for pulmonary tuberculosis treatment outcomes. Cochrane Database Syst Rev. 2016 Jan 18;2016(1).

132. Bates MN, Khalakdina A, Pai M, Chang L, Lessa F, Smith KR. Risk of tuberculosis from exposure to tobacco smoke: a systematic review and meta-analysis. Arch Intern Med [Internet]. 2007 Feb 26 [cited 2022 Apr 10];167(4):335–42. Available from:https://pubmed.ncbi.nlm.nih.gov/17325294/

133. Basu S, Stuckler D, Bitton A, Glantz SA. Projected effects of tobacco smoking on worldwide tuberculosis control: mathematical modelling analysis. BMJ [Internet]. 2011 Oct 4 [cited 2022 Apr 22];343(7826). Available from: https://www.bmj.com/content/343/bmj.d5506

134. Baluku JB, Namiiro S, Nabwana M, Muttamba W, Kirenga B. Undernutrition and Treatment Success in Drug-Resistant Tuberculosis in Uganda. Infect Drug Resist [Internet]. 2021 [cited 2022 Apr 22]; 14:3673. Available from: /pmc/articles/PMC8437412/

135. Annakkaya AN, Arbak P, Bilgin C. Respiratory symptoms in adults living in pesticides applied fields View project A NEW SYSTEM FOR DIAGNOSING OBSTRUCTIVE SLEEP APNEA SYNDROME BY AUTOMATIC SLEEP STAGING USING PHOTOPLETHYSMOGRAPHY (PPG) SIGNALS AND BREATHING SCORING View project. 2005 [cited 2022 Apr 23]; Available from: https://www.researchgate.net/publication/7770588

136. M McLean. Guidelines for TB control in New Zealand. Wellington , Ministryof Health 2003. [Internet]. 2003 [cited 2022 Apr 17]. Available from: https://scholar.google.com/scholar_lookup?title=Guidelines+for+TB+control+in+New+Zealand&author=M+McLean&publication_year=2003&

137. Awofeso N. Anti-tuberculosis medication side-effects constitute major factor for poor adherence to tuberculosis treatment. Bull World Health Organ [Internet]. 2008 [cited 2022 Apr 17];86(3): B. Available from: /pmc/articles/PMC2647396/

138. Mohammedhussein M, Hajure M, Shifa JE, Hassen TA. Perceived stigma among patient with pulmonary tuberculosis at public health facilities in southwest Ethiopia: A cross-sectional study. PLoS One [Internet]. 2020 Dec 1 [cited 2022 Apr 10];15(12). Available from: https://pubmed.ncbi.nlm.nih.gov/33290413/

139. Ali SA, Mavundla TR, Fantu R, Awoke T. Outcomes of TB treatment in HIV co-infected TB patients in Ethiopia: a cross-sectional analytic study. BMC Infect Dis [Internet]. 2016 Nov 4 [cited 2022 Apr 10];16(1). Available from: https://pubmed.ncbi.nlm.nih.gov/27814693/

140. Engelbrecht MC, Kigozi NG, Chikobvu P, Botha S, Van Rensburg HCJ. Unsuccessful TB treatment outcomes with a focus on HIV co-infected cases: a cross-sectional retrospective record review in a high-burdened province of South Africa. BMC Health Serv Res [Internet]. 2017 Jul 10 [cited 2022 Apr 10];17(1). Available from: https://pubmed.ncbi.nlm.nih.gov/28693508/

141. Katana GG, Ngari M, Maina T, Sanga D, Abdullahi OA. Tuberculosis poor treatment outcomes and its determinants in Kilifi County, Kenya: a retrospective cohort study from 2012 to 2019. Arch Public Heal [Internet]. 2022 Dec 1 [cited 2022 Apr 10];80(1):48. Available from: /pmc/articles/PMC8818215/

142. Cha J, Thwaites GE, Ashton PM. An Evaluation of the 2035 WHO End TB Targets in 40 High Burden Countries. medRxiv [Internet]. 2020 Oct 2 [cited 2022 Apr 11];2020.10.02.20175307. Available from: https://www.medrxiv.org/content/10.1101/2020.10.02.20175307v1

143. Berger CA, Kityamuwesi A, Crowder R, Lamunu M, Kunihira Tinka L, Ggita J, et al. Variation in tuberculosis treatment outcomes and treatment supervision practices in Uganda. J Clin Tuberc Other Mycobact Dis [Internet]. 2020 Dec 1 [cited 2022 Apr 11]; 21:100184. Available from: /pmc/articles/PMC7648165/

144. Morojele NK, Shenoi S V., Shuper PA, Braithwaite RS, Rehm J. Alcohol Use and the Risk of Communicable Diseases. Nutrients [Internet]. 2021 Oct 1 [cited 2022 Apr 10];13(10). Available from: /pmc/articles/PMC8540096/

145. Amuha MG, Kutyabami P, Kitutu FE, Odoi-Adome R, Kalyango JN. Non-adherence to anti-TB drugs among TB/HIV co-infected patients in Mbarara Hospital Uganda: Prevalence and associated factors. Afr Health Sci [Internet]. 2009 [cited 2022 Apr 17];9(Suppl 1): S8. Available from: /pmc/articles/PMC2890989/

146. Louwagie GM, Morojele N, Siddiqi K, Mdege ND, Tumbo J, Omole O, et al. Erratum: Addressing tobacco smoking and drinking to improve TB treatment outcomes, in South Africa: A feasibility study of the ProLife program (Translational Behavioral Medicine DOI: 10.1093/tbm/ibz100). Transl Behav Med. 2022 May 1;12(5):721.

147. Samuel Oyugi, C. M. Garama, K. Kweri J., Nauman Aslam Malik, Shadrack Bett. Patient Factors Influencing Adherence to Anti-tuberculosis Medication in Njoro Sub County Hospital, Nakuru County, Kenya [Internet]. 2017 [cited 2022 Dec 25]. Available from: https://www.virascience.com/document/620f67d2dfc3fcd6a86db7620250ef74820a677a/

148. Lönnroth K, Jaramillo E, Williams BG, Dye C, Raviglione M. Drivers of tuberculosis epidemics: The role of risk factors and social determinants. Soc Sci Med. 2009 Jun 1;68(12):2240–6.

149. Lodi S, Emenyonu NI, Marson K, Kwarisiima D, Fatch R, McDonell MG, et al. The Drinkers' Intervention to Prevent Tuberculosis (DIPT) trial among heavy drinkers living with HIV in Uganda: study protocol of a 2×2 factorial trial. Trials [Internet]. 2021 Dec 1 [cited 2022 Dec 25];22(1). Available from: https://pubmed.ncbi.nlm.nih.gov/34016158/

150. Buregyeya E, Kulane A, Colebunders R, Wajja A, Kiguli J, Mayanja H, et al. Tuberculosis knowledge, attitudes and health-seeking behaviour in rural Uganda. Int J Tuberc Lung Dis [Internet]. 2011 Jul [cited 2022 Mar 31];15(7):938–42. Available from: https://pubmed.ncbi.nlm.nih.gov/21682968/

151. Dewalt DA, Berkman ND, Sheridan S, Lohr KN, Pignone MP. Literacy and Health Outcomes A Systematic Review of the Literature. J GEN INTERN MED [Internet]. 2004 [cited 2022 Dec 25]; 19:1228–39. Available from: www.hsph.harvard.edu/healthliteracy/literature.html

152. Tobin EA, Okojie P-W, Isah EC. Community knowledge and attitude to pulmonary tuberculosis in rural Edo state, Nigeria. 2013;12(3):148–54.

153. Tachfouti N, Slama K, Berraho M, Nejjari C. The impact of knowledge and attitudes on adherence to tuberculosis treatment: a case-control study in a Moroccan region. Pan Afr Med J. 2012;12(1).

154. Priya KY, Sadan S. Non- Adherence of New Pulmonary TuberculosisPatients to Anti- Tuberculosis Treatment. Ann Med Health Sci Res [Internet]. 2013 [cited 2022 Dec 25];3. Available from: www.amhsr.org

155. Kaona FA, Tuba M, Siziya S, Sikaona L. An assessment of factors contributing to treatment adherence and knowledge of TB transmission among patients on TB treatment Title. 2004;4(68).

156. Bhadke BB, Rathod R, Deshmukh DG, Luniya A. Study of various causes of defaulter among tuberculosis patients under revised national tuberculosiscontrol programme: a prospective analysis of 5235 tuberculosis patients. 2016;4(7).

157. Mindachew M, Deribew A, Memiah P, Biadgilign S. Perceived barriers to the implementation of Isoniazid preventive therapy for people living with HIV in resource constrained settings: a qualitative study. Pan Afr Med J [Internet]. 2014 [cited 2022 Apr 10];17. Available from: https://pubmed.ncbi.nlm.nih.gov/24932337/

158. Michael KW, Belachew T, Jira C. Tuberculosis defaulters from the "DOTS" regimen in Jimma zone, southwest Ethiopia. Ethiop Med J. 2004;42(4):247–53.

159. Tadele Eticha and Eden Kassa. Non-Adherence to Anti-TB Drugs and Its Predictors among TB/HIV Co- Infected Patients in Mekelle, Ethiopia. 2014;

160. Craig GM, Daftary A, Engel N, O'Driscoll S, Ioannaki A. Tuberculosis stigma as a social determinant of health: a systematic mapping review of research in low incidence countries. Int J Infect Dis [Internet]. 2017 Mar 1 [cited 2022 Apr 10];56:90–100. Available from: https://pubmed.ncbi.nlm.nih.gov/27810521/

161. Gugssa Boru C, Shimels T, Bilal AI. Factors contributing to non-adherence with treatment among TB patients in Sodo Woreda, Gurage Zone, Southern Ethiopia: A qualitative study. J Infect Public Health [Internet]. 2017 Sep 1 [cited 2022 Apr 10];10(5):527–33. Available from: https://pubmed.ncbi.nlm.nih.gov/28189508/

162. Mesfin MM, Newell JN, Walley JD, Gessessew A, Tesfaye T, Lemma F, et al. Quality of tuberculosis care and its association with patient adherence to treatment in eight Ethiopian districts. Health Policy Plan [Internet]. 2009 Nov [cited 2022 Apr 10];24(6):457–66. Available from: https://pubmed.ncbi.nlm.nih.gov/19651709/

163. Ajao K, Ogundun O, Afolabi O, Ojo T, Atiba B, Oguntunase D. Treatment compliance and challenges among Tuberculosis Patients across selected Health Facilities in Osun State Nigeria. 2014;43(21–28).

164. Jaiswal A, Singh V, Ogden JA, Porter JDH, Sharma PP, Sarin R, et al. Adherence to tuberculosis treatment: lessons from the urban setting of Delhi, India. 2003;7(625–33).

165. Munro SA, Lewin SA, Smith HJ, Engel ME, Fretheim A, Volmink J. Patient adherence to tuberculosis treatment: a systematic review of qualitative research. 2007;7(238).

166. Baris SA, Alkilinc E, Karasal E, Boyaci H, Basyigit I. The knowledge and attitudes of hospital staff about tuberculosis. Eur Respir J. 2018;52.

167. Li Y, Ehiri J, Tang S, Li D, Bian Y, Lin H, et al. Factors associated with patient, and diagnostic delays in Chinese TB patients: a systematic review and meta-analysis. BMC Med [Internet]. 2013 Jun 2 [cited 2022 Apr 8];11(1). Available from: https://pubmed.ncbi.nlm.nih.gov/23819847/

168. Ohnmar O. Knowledge, attitude and practice on tuberculosis in a growing industrialized area in Myanmar. 2012;16(330–335).

169. Kundu D, Katre V, Singh K, Deshpande M, Nayak P, Khaparde K, et al. Innovative social protection mechanism for alleviating catastrophic expenses on multidrug-resistant tuberculosis patients in Chhattisgarh, India. WHO South-East Asia J public Heal [Internet]. 2015 [cited 2022 Apr 11];4(1):69. Available from: https://pubmed.ncbi.nlm.nih.gov/28607277/

170. Kundu D, Sharma N, Chadha S, Laokri S, Awungafac G, Jiang L, et al. Analysis of multi drug resistant tuberculosis (MDR-TB) financial protection policy: MDR-TB health insurance schemes, in Chhattisgarh state, India. Health Econ Rev [Internet]. 2018 Jan 27 [cited 2022 Apr 11];8(1):3. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29374822

171. Mao W, Jiang W, Hamilton C, Zhang H, Huang F, Lucas H, et al. Over- and under- treatment of TB patients in Eastern China: an analysis based on health insurance claims data. Trop Med Int Heal [Internet]. 2019 Sep 1 [cited 2022 Apr 11];24(9):1078. Available from: /pmc/articles/PMC6851836/

172. Oliosi JGN, Reis-Santos B, Locatelli RL, Sales CMM, da Silva Filho WG, da Silva KC, et al. Effect of the Bolsa Familia Programme on the outcome of tuberculosis treatment: a prospective cohort study. Lancet Glob Heal [Internet]. 2019 Feb 1 [cited 2022 Apr 12];7(2):e219–26. Available from: https://pubmed.ncbi.nlm.nih.gov/30584050/

173. Andrade D, Freitas KV, Nery JS, de Souza RA, Pereira SM. Effects of social protection on tuberculosis treatment outcomes in low or middle-income and in high-burden countries: systematic review and meta-analysis. Cad Saude Publica [Internet]. 2018 [cited 2022 Apr 12];34(1). Available from: https://pubmed.ncbi.nlm.nih.gov/29412320/

174. Jakubowiak WM, E Bogorodskaya M, Borisov SE, Danilova ID, Lomakina OB, Kourbatova E V. Social support and incentives programme for patients with tuberculosis: experience from the Russian Federation - PubMed [Internet]. 2007 [cited 2022 Apr 12]. Available from: https://pubmed.ncbi.nlm.nih.gov/17958983/

175. Lutge EE, Wiysonge CS, Knight SE, Sinclair D, Volmink J. Incentives and enablers to improve adherence in tuberculosis. Cochrane database Syst Rev [Internet]. 2015 Sep 3 [cited 2022 Apr 12];2015(9). Available from: https://pubmed.ncbi.nlm.nih.gov/26333525/

176. Richterman A, Steer-Massaro J, Jarolimova J, Nguyen LBL, Werdenberg J, Ivers LC. Cash interventions to improve clinical outcomes for pulmonary tuberculosis: systematic review and meta-analysis. Bull World Health Organ [Internet]. 2018 Jul 1 [cited 2022 Apr 12];96(7):471–83. Available from: https://pubmed.ncbi.nlm.nih.gov/29962550/

177. Baluku JB, Nakazibwe B, Twinomugisha B, Najjuuko R, Isabella N, Nassozi S, et al. One dollar incentive improves tuberculosis treatment outcomes in programmatic settings in rural Uganda. Sci Rep. 2021 Dec 1;11(1).

178. Nezenega ZS, Gacho YHM, Tafere TE. Patient satisfaction on tuberculosis treatment service and adherence to treatment in public health facilities of Sidama zone, South Ethiopia. BMC Health Serv Res [Internet]. 2013 [cited 2022 Apr 10];13(1). Available from: https://pubmed.ncbi.nlm.nih.gov/23521921/

179. Alene M, Assemie MA, Yismaw L, Gedif G, Ketema DB, Gietaneh W, et al. Patient delay in the diagnosis of tuberculosis in Ethiopia: a systematic review and meta-analysis. BMC Infect Dis. 2020 Dec 1;20(1).

180. Finnie RKC, Khoza LB, van den Borne B, Mabunda T, Abotchie P, Mullen PD. Factors associated with patient and health care system delay in diagnosis and treatment for TB in sub-Saharan African countries with high burdens of TB and HIV. Trop Med Int Health [Internet]. 2011 Apr [cited 2022 Apr 8];16(4):394–411. Available from: https://pubmed.ncbi.nlm.nih.gov/21320240/

181. Mercaldo R, Whalen C, Kakaire R, Nakkonde D, Handel A, Sekandi JN. Community drivers of tuberculosis diagnostic delay in Kampala, Uganda: a retrospective cohort study. BMC Infect Dis. 2021 Dec 1;21(1).

182. Getnet F, Demissie M, Assefa N, Mengistie B, Worku A. Delay in diagnosis of pulmonary tuberculosis in low-and middle-income settings: systematic review and meta-analysis. BMC Pulm Med [Internet]. 2017 Dec 13 [cited 2022 Apr 8];17(1). Available from: /pmc/articles/PMC5729407/

183. Buregyeya E, Criel B, Nuwaha F, Colebunders R. Delays in diagnosis and treatment of pulmonary tuberculosis in Wakiso and Mukono districts, Uganda. BMC Public Health [Internet]. 2014 Jun 11 [cited 2022 Apr 8];14(1):586. Available from: /pmc/articles/PMC4078937/

184. Uys PW, Warren RM, van Helden PD. A Threshold Value for the Time Delay to TB Diagnosis. PLoS One [Internet]. 2007 Aug 22 [cited 2022 Apr 8];2(8). Available from: /pmc/articles/PMC1942086/

185. Kiwuwa MS, Charles K, Harriet MK. Patient and health service delay in pulmonary tuberculosis patients attending a referral hospital: a cross-sectional study. BMC Public Health [Internet]. 2005 Nov 24 [cited 2022 Apr 8];5:122. Available from: /pmc/articles/PMC1310609/

186. Sendagire I, Van der Loeff MS, Mubiru M, Konde-Lule J, Cobelens F. Long Delays and Missed Opportunities in Diagnosing Smear-Positive Pulmonary Tuberculosis in Kampala, Uganda: A Cross-Sectional Study. PLoS One [Internet]. 2010 [cited 2022 Apr 8];5(12). Available from: /pmc/articles/PMC3012078/

187. Burns N and GSK. The Practice of Nursing Research: Conduct, Critique and Utilization. Elsevier Saunders, Missouri. 2005;5th Edition.

188. Brink H. Fundamentals of research methodology for health care professionals. . Cape Town, RSA. 2007;2nd edition.

189. Joubert GKJER and AK. Epidemiology: A research manual for South Africa. South Africa Oxford Univ Press. 2008;2nd edition.

190. Kampala Capital City Authority. Kampala Capital City Authority | For a better City [Internet]. 2022 [cited 2022 May 26]. Available from: https://www.kcca.go.ug/

191. On the world map.com. Kampala Map | Uganda | Maps of Kampala [Internet]. 2021 [cited 2022 May 26]. Available from: https://ontheworldmap.com/uganda/city/kampala/

192. University of Florida. Determining Sample Size Degree Of Variability. 2003;

193. Chani Kudakwashe. Factors Affecting Compliance to Tuberculosis Treatment in Andara Kavango Region Namibia. 2010;

194. Moses Owori. Poverty in Uganda: National and regional data and trends [Internet]. 2020 [cited 2023 Jan 18]. Available from: https://devinit.org/documents/850/Poverty_in_Uganda_-_National_and_regional_data_and_trends.pdf

195. take-profit.org. Take profit [Internet]. 2023. Available from: https://take-profit.org/en/statistics/wages-low-skilled/uganda/

196. Google Finance. UGX/USD 0.00027 (▲0.21%) | Google Finance [Internet]. 2023 [cited 2023 Jan 18]. Available from: https://www.google.com/finance/quote/UGX-USD?sa=X&ved=2ahUKEwj8t6O3odH8AhXyRvEDHYqyCoYQmY0JegQIEhAc

197. Zolowere D, Manda K, Panulo B, Muula AS. Experiences of self-disclosure among tuberculosis patients in rural Southern Malawi. Rural Remote Health [Internet]. 2008 Dec 1;8(4):1–9. Available from: https://search.informit.org/doi/10.3316/informit.470203048327129

198. Maher D. The role of the community in the control of tuberculosis. Tuberculosis [Internet]. 2003;83(1):177–82. Available from: https://www.sciencedirect.com/science/article/pii/S1472979202000665

199. Pedrazzoli D, Houben RM;, Grede N, Pee D, S; Boccia D. Food assistance to tuberculosis patients: lessons from Afghanistan. Public Heal Action. 2016 Jun 21;6(7):147–53.

8. APPENDICES

8.1. Informed Consent Form

INFORMED CONSENT FORM

PLEASE TAKE THE TIME TO READ THIS DOCUMENT CAREFULLY

I take this opportunity to invite you to the study entitled "investing the factors affecting the available Tuberculosis prevention and control programs in Kampala, Uganda" conducted by Hadijah Mbonde a student at Ankara Yıldırım Beyazit University in Turkey.

Before deciding whether or not to participate in this research, you need to know why and how the research will be conducted. Therefore, it is very important to read and understand this form. If there is something that you do not understand or is not clear to you, or if you want more information, please ask me.

Participation in this study is completely voluntary. You have the right not to participate in the study or to withdraw from the study at any time after participating. Your response to the study will be interpreted as your consent to participate in this study. Do not be under pressure or influence from anyone while answering the questions on the forms given to you. The information obtained from these forms will be used for research purposes only.

I will keep the answers confidential. After this data collection, I will lock up your data in a safe hidden place. Then when this study has been completed, I will do away with the data. Feel free not to anwer uncomfortable questions in this study.

I have read the information above, which must be given to the participant/volunteer before the research, and I fully understand the scope and purpose of the study I am asked to participate in, and my responsibilities as a volunteer. Written and verbal explanations about the study were made by the researcher named below, I had the opportunity to ask questions and discuss, and I received satisfactory answers. I was also verbally explained to the possible risks and benefits of the study. I understood that I could leave this work whenever I wanted and without having to give any reason, and that I would not face any negative consequences if I quit.

Participant's (own handwriting)
Name and surname:..... .....
.....
Signature:

Researcher's
Name and surname:..... .....
.....

82. Questionnaire

QUESTIONNAIRE

Annexure 1: Questionnaire

Individual Patient's Questionnaire Number: ----------

Date of Interview: .....

Internal individual questions

1. Division: .....

2. Age in Years

1. (18-25)
2. (26-33)
3. (34-41)
4. (42-49)
5. (50-57)
6. (58-65)

3. Gender

1) Male
2) Female

4. Marital Status

1) Married
2) Separated
3) Cohabiting
4) Widowed
5) Single

5. How much formal education did you get?

1) None
2) Primary education
3) Secondary education
4) Tertiary education

6. Employment Status

1) Employed
2) Unemployed
3) Self-employed

7. What is your monthly income (U g x)?

1) Low (<300k)
2) Medium (300-1000k)
3) High (>1000k)

External individual questions (behavior)

8. Do you smoke cigarettes?

1) Yes
2) No

9. Do you drink alcohol?

1) Yes
2) No

10. During the time you were taking TB medicines, what would say was your situation in terms of food availability?

1) Always available to take with medicines
2) Available most of the time
3) Not always available
4) Never available

11. Did you experience any side effects when you were taking TB treatment?

1) Yes
2) No

12. If Yes to above the question, which side effects did you experience?

1) Diarrhea & Vomiting
2) Skin rashes
3) Headaches and dizziness
4) Numb feet or hands
5) Yellow eyes
6) Painful limbs
7) Other

13. From the day you started taking your TB medicines, how long did it take you before you felt better? (months)

1) (<2)
2) (2-4)
3) (5-6)
4) (Did not feel better)

14. Disease Classification (Tick appropriately according to treatment card or TBregister)

1) PTB-SM+
2) PTB-SM-
3) EPTB
4) PTB and EPTB
5) Not Indicated

15. HIV Status (as indicated on TB treatment card or TB register)

1) Positive
2) Negative
3) Not known/indicated

16. Are you taking other medicines besides TB treatment?

1) Yes
2) No

17. If yes to the above question, which medicines were you taking?

1) ART
2) Psychiatric (antipsychotic, antidepressants)
3) Anti-hypertensive
4) Other

18. I just want to take some time to find out what you know about TB. Tick the symptoms of TB:

1) Coughing
2) Night sweats
3) Loss of Weight
4) Chest Pains

19. TB treatment should be taken until

1) 6 months completed and the health worker tells you to stop
2) 6 months
3) One feels better then stop on your own

External social questions

20. Where do you normally collect your TB medicines? (Name of the facility) the: ……

21. What would be the most convenient TB clinic opening times for you?

1) Before 8 am to 5 pm
2) Between 8 am and 5 pm
3) From 8 am to after 5 pm
4) Before 8 am to after 5 pm

22. How much time do you usually wait at the TB clinic before being attended to?

1) Less than 1 hour
2) Between 1-2 hours
3) More than 2 hours

23. How much does it cost you to get to the health facility (Ugandan shillings)

1) Nothing (walkable distance)
2) Less than 10k
3) Between 15-30k

24. When you go to pick up your medicines at the TB clinic, what would you say about the availability of medicines there?

1) Always available
2) Sometimes not available

Internal social questions (attitude of family and friends)

25. Did you inform your family or friends that you were on TB treatment?

1) Yes
2) No

26. If not, why?

1) Fear of being isolated by friends or relatives
2) No one to trust
3) Others

27. Do you have a Treatment Supporter?

1) Yes
2) No

28. Who supervises you while taking your TB medicine? (DOT Status)

1) Health Worker at the facility
2) Family member
3) Community member
4) None

29. How would you rate the attitude of the staff who attend to you at the health facility?

1) Very friendly
2) Friendly
3) Fair
4) Unfriendly
5) Very unfriendly

30. Whom do you live with?

1) Family
2) Friends
3) Alone
4) Other

31. How many other people live with you?

1) (0)

2) (1-3)

3) (4-6)

4) (>7)

32. How big is your dwelling/ house (number of rooms)?

1) (1-2)

2) (3-4)

3) (>5)

33. In your opinion, what could make patients complete their TB treatments?

THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION