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Knowledge, Attitude and Practices of Tuberculosis Among Selam Health Center Outpatients, Gulele Sub City, Addis Ababa, Ethiopia

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Addis Ababa, Ethiopia

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DECLARATION

I, Chalachew Ayal declare that this thesis is my original work and all sources of materials used in this research paper have been duly acknowledged. The matter embodied in this research paper has not been submitted earlier for award of any master degree best of my knowledge and belief.

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This is to certify that the thesis prepared by **Chalachew Ayal**, entitled; "**Knowledge, Attitude and Practices of Tuberculosis Among Selam Health Center Outpatients, Gulele Sub City, Addis Ababa, Ethiopia"** and submitted in partial fulfilment of the requirements for MSc Degree in Biology complies with the regulations of the university and meets the accepted standard with respect to originality and quality.

Signed by the Examining Committee:

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ABBREVIATION/ACRONYMS

KAP	Knowledge, Attitude and Practice
TB	Tuberculosis
Mtb	*Mycobacterium tuberculosis*
LTBI	Latent tuberculosis infection
MDR-TB	Multidrug-Resistant Tuberculosis
HIV	Human Immunodeficiency virus
AIDS	Acquired Immunodeficiency Syndrome
RNA	Ribonucleic Acid
DNA	Deoxyribonucleic Acid
WHO	World Health Organization
FMOH	Federal Ministry of Health
HSTP	Health Sector Transformation Plan
DOT	Direct- Observed Treatment
USAID	US Agency for International Development
SDGs	Sustainable Development- Goals
MDG	Millennium Development Goals
IQR	Inter-Quartile Range

TABLE OF CONTENTS

Contents **Pages**

Contents **Pages**

LIST OF TABLES Pages

List of figures

ABSTRACT

Tuberculosis (TB) is killing a number of people in Ethiopia. This study was designed to assess the knowledge, attitude and practices (KAP) among Selam Health Center outpatients/attendants on TB in Gullele Sub city Addis Ababa, Ethiopia. A cross sectional research design was applied to measure differences between or from among individuals 18 and above years of age. The data were collected using well-structured questionnaires. The data were entered and statistical analysis was performed using SPSS version 20 software. Association between variables was done using chi-square and statistical significance was considered at *p*- value <0.05. Findings indicated that 35.9% (AOR = 1.33, CI, 0.88-1.54) of the participants were in the age range 31-40 years of old with poor knowledge level. On the other hand, 46.9% (AOR = 1.33, CI, 0.88-1.54) were also in the same age range (31-40 years) with good knowledge level and 22 (33.8%) of them had high knowledge level (p = 0.001). Regardless of the sources of information, all study participants had heard about TB, 253 (65.9%) of them described TB as a very serious disease and 235 (61.2%) knew that bacteria is the causative agent of TB. One-hundred and thirty- nine (36.2%) of the participants did not take any training on TB due to the lack of willingness. There was a statistically significant difference in KAP scores in relation to educational status and residence of the participants. There was great association between college students among outpatients and knowledge score at the 25^{th}, 50^{th} and 75^{th} quantile. Moreover, there was association between college students among outpatients and attitude score at 50^{th} quantile. The lack of KAP was the main factor for the high rate of TB infection. It was identified that there was a gap in KAP on tuberculosis and its way of transmission among the study participants. So, it would be better for the health centers to give education for the community to be able to reduce the spread of TB and its consequences.

Keywords: **knowledge, attitude, practice, tuberculosis, cross sectional study, Selam Health Center.**

1. INTRODUCTION

1.1 Background of the study

Tuberculosis (TB) is an infectious disease which is mainly caused by a bacterium called *Mycobacterium tuberculosis* and usually affects the lungs. But, it can also affect any of the body parts. It is a major global public health problem that affects millions of people across the world (WHO, 2018). Among people who are affected by TB and human immune deficiency virus (HIV), parts of the body outside the lungs are often affected. TB remains one of the major global health threats leading to morbidity and mortality. Tuberculosis is inequitably distributed and clustered among disadvantaged and socio-economically deprived population groups (Jackson, *et al*., 2006). Tuberculosis is primarily a disease of the poor and its magnitude is high in socially disadvantaged populations or people residing in poor living conditions, which are characterized by lack of education, poor housing, inadequate nutrition, overcrowding and socioeconomic factors. The lack of awareness prevails in populations living in poor conditions, which leads to delay in health care _seeking due to lack of knowledge about the symptoms of TB and prevention measures. Lack of knowledge in turn leads further transmission of the disease and poor treatment outcomes. The decline of TB in developed countries with improved living conditions (Carter, *et al*., 2018) indicates that poor living conditions, as reflected by lack of awareness, stigma, poor health care-seeking behavior and deficient health systems, favor TB transmission and occurrence of disease (Barter, *et al*., 2012). In addition, distance, cost and socio-cultural barriers limit care seeking (Summerland, *et al*., 2017). Tuberculosis is contagious, but it is not easy to catch. The chances of catching TB from someone who live or work together are much higher than from a stranger. The number of TB cases is increasing, especially within countries where HIV infection is pandemic (Johnston, *et al*., 2009).

It has been estimated that one third of the world's population has TB infection and 9.4 million people are affected annually with approximately 2 million deaths. Most people with active TB who have received appropriate treatment for at least two weeks are no longer contagious. It is spread through the air when people with TB (whose lungs are affected) cough, sneeze, laugh or talk (Farhanah, *et al*., 2016).

According to Michael (2013), there are two types of TB: Latent and active TB. In the case of Latent TB, the bacterium remains in the body in an inactive state. It has no symptoms and not

contagious, but become active. In most people who are exposed to TB and become infected, the immune system responds to the infection within two to eight weeks; by isolating TB-infected cells. The TB bacteria remain alive, but inactive. Today, an estimated of 2 billion people worldwide have latent TB infection (LTBI). Humans are the main reservoir of *M. tuberculosis* (Mtb) and human to human spread primarily occurs through inhalation of respiratory aerosols and secretions containing Mtb exhaled from a patient with active pulmonary TB. Despite intense study over the past six decades, the sequence of human host-Mtb interactions and pathophysiological events following primary or secondary infection, remain a mystery (Zumla, *et al*., 2011).

Most people undergo complete healing of this initial infection. Children are at higher risk of contracting TB infection and disease. Studies have shown that 60–80% exposed to sputum smear-positive case became infected compared to only 30–40% who are exposed to a sputum smear-negative source case (Marais, *et al*., 2004). Majority of the children less than 2 years of age get infected from the household source case, whereas, with children more than 2 years of age, majority of them became infected in the community. Household sputum positive source case is the single most important risk factor for children and remained an important contributor to infection up to 5–10 years of age (Marais, *et al*., 2004). Most of the disease manifestations develop within the first year following primary infection, identifying the first year following exposure as the time period of greatest risk. Children with primary infection before 2 years or after 10 years of age were at increased risk for disease development (Marais, *et al*., 2009). The highest risk for TB-related mortality following primary infection occurred during infancy. The risk declined to 1% between 1 and 4 years of age, before rising to more than 2% from 15 to 25 years of age (Marais, *et al*., 2009). These findings provided the scientific basis for classical contact investigation practices, which focus on children less than 5 years of age in most developing countries and all household contacts in most industrialized countries. In 2014, there were an estimated 9.6 million new TB cases. Of this, an estimated 5.4 million were men, 3.2 million were women and 1 million were children (WHO, 2015). There were also 1.5 million TB deaths of which approximately 890,000 were men 480,000 were women and 140,000 were children (WHO, 2015). The number of cases is estimated to be 12 million worldwide (WHO, 2015). The South East Asia and Western pacific regions collectively accounted for 58% of the world's TB cases in 2014 (WHO, 2015). The African region had 28 % of the world's TB cases (WHO, 2015). India, Indonesia and china had the largest numbers of cases, 23%, 10% and 10% respectively (WHO, 2015).

The spread of HIV and drug resistant TB have aided in posing serious health-care. Drug resistant TB threatens the national TB control programs in many countries. The World Health Organization (WHO) recommends that standard drug –susceptibility testing be performed at the same time that the Xpert MTB/RIF assay is performed to confirm rifampin resistance and the susceptibility of the *M. tuberculosis* isolate to other drugs. Other screening tests for drug resistance include the microscopic-observation drug-susceptibility (MODS) assay, the nitrate reductase assay and colorimetric reductase methods. The MODS assay simultaneously detects *M. tuberculosis* bacilli, on the basis of cording formation, and isoniazid and rifampin resistance (Moore, *et al*., 2006). Since most of these methods are not currently available in countries in which TB is highly endemic, it is estimated that only 10% of cases of multidrug-resistant tuberculosis are currently diagnosed worldwide and only half of them receive appropriate treatment (WHO, 2012).

The infection usually occurs only after lengthy contact with a contagious individual. A susceptible host has a 50% chance of becoming infected after spending either eight hours a day for six months with an infectious TB patient or twenty-four hours a day for two months with an infectious TB patient. Certain groups are at increased risk for TB exposure and infection. These include: healthcare workers, residents of long-term care facilities, homeless people, residents of correctional facilities, people from countries where TB is common, HIV/AIDS, alcoholics and intravenous drug users, medically underserved low income populations and people with household contact with suspected or confirmed active TB (Lonnroth, *et al*.,2008).

Whereas, in case of active TB, the bacteria cause symptoms and it can be transmitted to others. About one-third of the world's population is believed to have latent TB. There is a ten percent chance of latent TB becoming active, but this risk is much higher in people who have compromised immune system, that means, people living with HIV or malnutrition or people who smoke. The majority of TB cases can be cured when the right medication is available and administered correctly. One in ten people infected with the TB *bacterium* will develop active TB disease at some point in their lives. This happens when the immune system is weakened, and can no longer contain the TB bacterium. Active TB disease may develop immediately or soon after infection, if the immune system is not able to contain the TB bacteria. Many years later, when the immune system is weakened and the bacteria are able to break out and become active. TB rates in Hispanics are almost eight times those of non-

Hispanic whites (CDC, 2012). For the third consecutive year, more TB cases were reported among Hispanics than any other racial/ethnic population. TB rates in non-Hispanic blacks are over eight times those of non-Hispanic whites (CDC, 2012). In Ethiopia, TB is still a major public health problem (WHO, 2017). The country is still among the 22 high TB burden countries with high number of missed and infectious TB cases in the community (WHO, 2017). Increasing the trends of multidrug resistance TB (2 % among new cases in 2006 vs. 4.5 % among new cases in 2016) is a serious public health challenge for the country (WHO, 2014). TB is among the top ten causes of admission and death in adults in Ethiopia (FMOH, 2015). In 2017, there were 22,807 TB notified cases out of the 21.1 million population in Amhara Region and 43, 321 notified TB cases out of the 35.8 million populations in Oromia Region (USAID, 2017). Information revolution is one of the core agenda items of the HSTP to inform decision makers for timely action. However, Ethiopia still does not have a strong health management information system to capture the burden of TB and track the progress of TB interventions. Because of weak health information system and very few national surveys, the burden of TB was not comprehensively assessed in Ethiopia over the last three decades (Amare Deribew, *et al*., 2018). However, pieces of evidence show that poor treatment adherence remains a major obstacle to fight TB epidemic in the country. The poor treatment adherence can be attributed to both organizational and personal related factors. It is largely known that low literacy level, discriminatory behavior by health care professionals, self-denial due to stigma, long treatment duration and inaccessibility of public health facilities or shortage of drugs are some of the challenges compromising successful treatment outcomes (Mesfin Mengiste, *et al*., 2009). Global trends in TB treatment success rate shows a reduction from 87 % in 2013 to 83 % in 2014 (WHO, 2014). Recent report shows a growing burden of HIV associated TB (Stephen, *et al*., 2013). This factor and also drug-resistant TB have been proposed as factors contributing to unsuccessful treatment (Sinshaw Yenework, *et al*., 2017). The disease is more prevalent in congregate settings such as prisons (Baussano, *et al*., 2010). In Ethiopian prisons, four to nine fold higher prevalence of TB was reported compared to the general population (Adane Kelemework, *et al*., 2016). Moreover, in culturally diversified countries like Ethiopia, TB knowledge level has been reported to show significant spatial variations (Amo Adjei, *et al*., 2013). Generally, TB-related knowledge and attitude vary across the countries, ranging from an understanding of its infectious cause to the belief that its cause is the evil eye and from supportive to highly stigmatized views towards the disease and patients. Therefore, understanding knowledge, attitude and practices related to TB and their underlying causes is important to design national responses to improve TB services in

the communities of Ethiopia. And this study was designed to assess the knowledge, attitude and practices among Selam Health Center outpatients on tuberculosis in Gulele Sub City Addis Ababa, Ethiopia.

1.2 Statement of the problem

TB is the common cause of mortality and morbidity in Ethiopia and also number one killer disease of the world. The prevalence of TB was estimated according to the WHO to be increased as about 20,000 subjects are infected and 5000 died from the disease every day. In Ethiopia, the estimated incidence of all cases of TB has reached 224 per 100,000 populations. Ethiopia ranks 7th among the worlds' 22 high burden TB countries and 3rd in Africa (Shallo Daba, *et al*., 2016). According to WHO global TB report 2019, the country has an estimated incidence rate of 500 cases per 100,000 populations. The situation is more because of lack of people's awareness and knowledge about TB. In line with this, (Abebe Merchew, *et al*.,2018) showed that a low knowledge score was more likely to be observed among the illiterate, females, rural residences, low income and youngest age groups. This study helps to indicate the current situation of TB KAP on the community.

Several reasons and risk factors for poor TB treatment outcomes have been reported. High age, male sex, low income, no or limited access to transport, distance from home to the treatment center, incomplete treatment compliance, limited interest in information about the disease and its treatment, limited social support, multidrug resistance, and comorbidity have all been found to be related to unsuccessful treatment outcomes (Minaleshewa Biruk, *et al*., 2016).

In addition to these, other scholars' revealed that factors contributed to the disease acquiring, epidemiological burden and disease development (Mushtaq, 2010). Among which low income, HIV, inadequate nutrition, cigarette smoking, low access health services infrastructure, lack of consciousness and information about the cause, transmission mode and sign-symptoms of the disease, demographic features, poor health education and tradition or culture related beliefs (Mushtaq, 2011). So, this study was designed to assess the knowledge, attitude and practices among Selam Health Center outpatients towards tuberculosis in Gulele Sub City, Addis Ababa, Ethiopia.

1.3 Objective of the study

1.3.1 General objective

The general objective of this study was to assess the knowledge, attitude and practices among Selam Health Center Outpatients on TB in Gulele Sub city Addis Ababa, Ethiopia.

1.3.2 Specific objectives

1. To undertake knowledge, attitude and practice survey on Selam Health Center Outpatients.
2. To identify the factors which contribute to the lack of knowledge, attitude and practices towards TB on those patient outpatients in Selam Health Center.
3. To indicate the ways to create awareness onto the community about TB.

1.4 Research question

1. What is the level of Selam Health Center Outpatients' knowledge, attitude and practices towards TB?
2. What are the contributing factors for the lack of awareness about TB?
3. What are the ways forwarded to create awareness onto the community about TB?

1.5 Significance of study

It is KAP that has been the subject of recent empirical investigation. Lack of up to date information in respect of this issue is the identified gap for the case of Selam Health Center. So, this study is important to bridge this gap by identifying the factors which contribute to the lack of knowledge, attitude and practice towards TB on outpatients in Selam Health Center and indicate the ways to create awareness onto the community about TB. This study helps the Health Center to understand as there is lack of awareness on TB and work more on it. This study will serve as the source to empirical findings for the futuristic researchers in this area of research.

1.6 Scope of the study

KAP is a broad concept, which consists of numerous interactions but the scope of this study is restricted to the particular topical and spatial areas. Topical approach of the study is limited to identify the factors which contribute to the lack of knowledge, attitude and practice towards tuberculosis and the spatial aspect of the study is limited to Selam Health Center.

1.7 Limitation of the study

The study was done on outpatients' rather than community members using cross sectional study design in a single health center in Addis Ababa. Study participants were not given the chance to respond for qualitative type questions so that we might not include their deep insight about their KAP on TB. There were also respondents who were not voluntary in filling the questionnaires. The study addressed only clients who came to health facilities. The samples are taken only from one health center.

2. REVIEW OF RELATED LITERATURE

2.1 History of TB

Tuberculosis is known since the earliest ages of antiquity, and some have even thought about it in the literature of Ancient India and China. Due to its infectious nature, complex immunological response, chronic progression and the need for long-term treatment TB has always been a major health burden; in more recent years, the appearance of multi-drug resistant forms and the current TB-HIV epidemic, associated with its sever social implications, treating and preventing TB have represented a permanent challenge over the course of human history (Luca, *et al*., 2013). At the same time, French Balye tested an initial classification of lesions observed and described six forms of "consumption" that are: tuberculosis, the grainy, the melanin, the ulcer, the calculus and cancer.

In 1865, Villemin demonstrated that TB was a communicable disease. It succeeded in inoculating rabbits tuberculoses lesions to reproduce the disease in them. It also reproduces by injecting sputum consumptive products, and concluded the first this disease is contagious. In 1882, the German physician Robert Koch discovered the bacillus which bears his name, a few years later he managed to cultivate. In 1909, the tuberculin was used by Charles Mantoux to highlight the allergy to tubercle bacilli. The doctor Albert Calmette (1863-1933) and veterinarian Camille Guérin (1872-1961) had found that the seeding of a virulent strain of *M. bovis* in a medium made of potatoes, beef bile and glycerin did not alter the induction of allergy although it softened its pathogen. In 1921, on a limited basis since 1924 worldwide vaccination with BCG was used in humans and led to the decline in the incidence of tuberculosis in the late 19th century.

In 1952, isoniazid and pyrazinamide was introduced but was discovered abandoned because of its side effects. However, he was reintroduced in 1968 at a lower dose which allowed reducing the duration of treatment. In 1956, ethionamide and prothionamide were put on the market. In 1969, rifampicin conferred to anti-tuberculosis its current profile. Tuberculosis was also known as *phthisis* and *consumption* from Hippocrates through to the 18th century, *the white death* and *the great white plague* during the 19th century, and other names which evoked the despair and horror of the disease such as *the robber of youth*6, the *Captain of all these men of Death*, the *graveyard cough*, and the *King's-Evill*. During the 18th and 19th centuries, TB was epidemic in Europe and caused millions of deaths, particularly in the poorer classes of society.

TB declined after the late 19th century but remained a major public health issue as it still is today.

Tuberculosis is an important disease for the military. During both World War I and World War II in the US Army, TB was the leading cause of discharge. Annual incidence of TB in the military of Western countries is very low, however in the last several decades micro epidemics have occurred in small close knit units on US and British Naval warships and land based units deployed overseas. Living and working in close quarters and overseas deployment to tuberculosis-endemic areas of the world such as Afghanistan, Iraq and South-East Asia remain significant risk factors for tuberculosis infection in military personnel, particularly multidrug resistant TB. In recent decades, the gradual and general decline of TB deaths in countries continued industrializes with the advent of DOTS (Direct- Observed Treatment, Short-course) in contrast to emerging economies where it is still difficult to control. If TB treatment poses no more than adherence problems, the development of infection with HIV, increasing poverty and MDR (Multi-Drug Resistant) are a major concern of governments and renewed interest researcher.

2.2 Knowledge and attitudes about TB

Knowledge and attitude have played significant roles in prevention of complications and progression of TB disease as reported by previous studies. For example, (Mngesho, *et al*.,2017), explored to assess the knowledge, attitudes and practice as regards to TB and its treatment in Mpwapwa district, central Tanzania. The result revealed although TB was an important health problem that the communities of the districts have a low knowledge on the causes and the transmission of TB which is a likely cause of the delay in seeking treatment.

Even though the incidence of TB has decreased worldwide, it remains a global health challenge. An estimated 10.4 million people developed TB in the year 2015 of which one-quarter was from Africa. The disease is more prevalent in congregate settings such as prisons (Baussano, *et al*., 2010). Especially, it is much worse in sub-Saharan prisons due to the added problems of human immunodeficiency virus (HIV) and poverty.

The global focus of TB control programs is on early diagnosis and treatment of cases in high TB and HIV-endemic areas. However, the low TB case detection rate and the emergence of multi-drug-resistant strains have been a challenge (Adane Kelemework, *et al*., 2016). Raising

communities' awareness contributes for early diagnosis of TB which is one of the pillars of the End TB Strategy.

Studies documented a positive association between TB knowledge and care seeking and treatment adherence. In this regard, in the general populations of sub-Saharan countries documented misconceptions ranging from 66.3% to 99.7% of the population on the etiology (cause) of TB, 27.6% to 90.1% on the symptoms, 0.1% to 48.6% on the transmission and 33.4% to 92.9% on prevention methods. Stigma towards TB patients has been reported in up to 58.3% of the respondents. Literacy status, socio-cultural differences, gender and spatial variations have been reported to be factors affecting TB knowledge, attitude and practices (KAP) (Adane Kelemework, *et al*., 2016). Baseline data regarding prisoners' knowledge of TB and related factors are limited. Studies conducted in prisons of Brazil and Texas reported gaps on some specific tuberculosis KAP variables.

In a Brazilian prison, only 5.0% and 3.6% of the prisoners could mention the TB symptoms and prevention methods, respectively, and in a USA prison 43.0% of the prisoners had a perceived stigma towards TB. To our knowledge, in sub-Saharan prisons, only one study assessing prisoner's knowledge was conducted six years ago in Eastern Ethiopian prisons.

This study reported a moderate level of knowledge about TB and revealed some misconceptions about causes, control and prevention. This study was however, limited in scope in that it did not address the attitude and was only conducted among presumptive TB cases. Moreover, in culturally diversified countries like Ethiopia, TB knowledge-level has been reported to show significant spatial variations. In addition, through the internet and intensive educational campaigns, healthcare information can reach many people quickly and increase the level of knowledge among people. In a previous study among Ethiopian prisons, we observed quite some TB cases with long-lasting symptoms without being diagnosed. So, we expect that KAP among Ethiopian prisoners is still very low. This study aimed at assessing the level of knowledge, attitude and practices of prisoners about TB and related factors.

In another related study by Bacay-Domingo & Ong-Lim, (2009), described the knowledge, attitude and practices on TB among treatment partners of pediatric patients in Tarlac city, the results revealed that most of the respondents were aware that TB is highly infectious but curable disease. However, still, a significant number would not reveal if they were infected with the disease for fear of being excommunicated by the community. From the study, the

researchers claimed that knowledge, attitudes and practices played significant roles in adherence to anti-TB treatment and thus in the prevention of complications and progression of the disease. The study results were consistent with other studies such as Hoa, Thorson, Long & Diwan (2003), described knowledge of TB and associated health-seeking behavior among rural Vietnamese adults with a cough for at least three weeks where they reported that people with better knowledge of TB were more likely to seek health care and medical treatment.

Hashim, Kubaisy and Dulayme (2003), to evaluate knowledge, attitude and practices towards TB among health care workers and tuberculosis patients in Iraq. The results showed that 80.2% knew tuberculosis was a highly infectious disease and 90.0% that TB is curable, and 54.8% were reluctant to seek care for fear of being diagnosed with TB. The findings agreed with other studies reporting that knowledge alone is not the only factor determining the health-seeking behavior of patient or their adherence to treatment, but mainly the patient's attitudes and practices (Rabbami, Siddiqui, Zaidi, Virani, 2003). Mohamed, Yousif, Ottoa and Bayoumi (2007) in study to measure the patients' knowledge about TB and its treatment in Omdurman, Sudan, reported that respondent's satisfactory knowledge was statistically significant when correlated to respondent's age, gender, and residence, level of education and source of prescription. They also reported that respondents who previously caught the disease knew the duration of the therapy better compared to new cases.

2.3 Factors influencing knowledge and attitude of TB

Many factors influence knowledge and attitude about TB. For example, in California, Rubel reported that the fear of social stigma strongly figured Mexican immigrants' patient's perceptions of their illness and its implications. Male patients had not discussed to those with whom they lived with the nature of their illness, others reduced contacts with family and friends with whom they had enjoyed extensive relationships, and still others expressed fear that a spouse would discover their illness, others reduced contacts with family and friends with whom they had enjoyed extensive relationships, and still others expressed fear that a spouse would discover their illness, refuse to eat or sleep with them, and even break the relationship.

Studies documented that a positive association between TB knowledge, care seeking and treatment adherence (Cramm, *et al*., 2010). In areas where antiretroviral treatment is not available, positive messages about TB cure are less likely to be believed by TB-HIV co-

infected patients, and this may further increase stigma. TB perception is inherited from one generation to the other, therefore might imply both negative and positive outcomes. Since the infected person and close family members may be segregated by the community, it accelerates stigma and discrimination, on one hand. On the other hand, it prevents the spread of the infections to the wider community by consciously avoiding to those infected. Mistreating of People with TB in fear of catching the disease has been shown in some studies.

2.4 Epidemiology of TB

In 2013, there were 9.0 million TB new cases, and 1.5 million TB deaths occurred around the globe (Shallo Daba, *et al*., 2016. It has been estimated that there were 310,000 incident cases of multidrug-resistant TB, caused by organisms resistant to at least isoniazid and rifampin, among patients who were reported to have tuberculosis in 2011. More than 60% of these patients were in China, India, the Russian Federation, Pakistan and South Africa. A total of 84 countries have reported cases of extensively drug-resistant TB, a subset of multidrug-resistant tuberculosis with added resistance to all fluoroquinolones plus any of the three injectable anti-tuberculosis drugs, kanamycin, amikacin and capreomycin.1-3 Sub-Saharan Africa has the highest rates of active TB per capita, driven primarily by the HIV epidemic. The absolute number of cases is highest in Asia, with India and China having the greatest burden of disease globally. In the United States and most Western European countries, the majority of cases occur in foreign-born residents and recent immigrants from countries in which TB is endemic.

2.5 Pathogenesis of TB

Patients with active pulmonary TB are the source of TB. In more than 90% of persons infected with *M. tuberculosis;* the pathogen is contained as asymptomatic latent infection. Recent studies raise the possibility that some persons acquire and eliminate acute infection with *M. tuberculosis*.

Those who abuse alcohol, smoke cigarettes or are underweight or malnourished are at slightly increased risk for LTBI reactivation (Kiazyk, *et al.,* 2017). The risk of active disease is estimated to be approximately 5% in the 18 months after initial infection and then approximately 5% for the remaining lifetime. An estimated 2 billion persons worldwide have latent infection and are at risk for reactivation. The presence of latent infection reduces the

risk of re-infection on repeated exposure, whereas active TB is associated with an increased risk of a second episode of TB on re-exposure.

2.6 Multidrug-resistant tuberculosis (MDR-TB)

Multidrug-resistant tuberculosis (MDR-TB) is TB due to organisms which show high-level resistance to both isoniazid and rifampicin, with or without resistance to other anti-TB drugs. In Ethiopia, low socioeconomic status of the population, high prevalence of infectious diseases including HIV, poor treatment outcomes, longer treatment duration, high treatment costs, and many more social and economic complications make MDR-TB a more complex disease than drug susceptible TB (Eshetie Setegn, *et al*., 2017).The molecular basis of resistance to isoniazid and rifampicin (and some other drugs) is now largely understood. In 2018, there were about half a million new cases (Houben, *et al*., 2016) of rifampicin-resistant TB (of which 78% had multi-drug resistant TB). Resistance to isoniazid is due to mutations at one of two main sites, in either the *katG* or *inhA* genes. Resistance to rifampicin is nearly always due to point mutations in the *rpo* gene in the beta subunit of DNA-dependent RNA polymerase. These mutations are not directly connected, and so separate mutations are required for organisms to change from a drug-susceptible isolate to MDR-TB (WHO, 2019).

The accurate diagnosis of MDR-TB requires a positive culture of *M. tuberculosis* and drug susceptibility. Globally in 2018, 51% of people with bacteriologically confirmed TB were tested for rifampicin resistance, up from 41% in 2017(WHO, 2019). The treatment of multidrug-resistant TB is based on expert opinion and requires the creation of combination drug regimens chosen from five hierarchical groups of first-line and second-line drugs. Such therapy is associated with a high risk of intolerance and serious toxic effects. Regimens may be chosen on a standardized or empirical basis and then switched to individualized therapy after data regarding drug susceptibility testing become available. However, reliable drug-susceptibility testing is not widely available in regions in which tuberculosis is endemic, particularly for second-line drugs. A fluoroquinolone and an injectable agent should routinely be included to provide a regimen with at least four second-line drugs that will have certain or nearly certain effectiveness, as well as pyrazinamide. Such therapy should be administered for at least 20 months in patients who have not received previous treatment for multidrug-resistant tuberculosis and for up to 30 months in those who have received previous treatment. An observational study showed that a shorter regimen with treatment given for 9 to 12 months (the so-called Bangladesh regimen) had acceptable efficacy with fewer adverse

reactions in a population with no previous exposure to second line drugs. This regimen is being more widely evaluated in the ongoing Standardized Treatment Regimen of Anti-tuberculosis Drugs for Patients with Multidrug-Resistant Tuberculosis (STREAM) trial. Since most of the recommended drugs have serious side effects that render treatment particularly difficult, expert consultation is always advised for the treatment of multidrug-resistant tuberculosis. The best estimate is that, worldwide in 2017, 558 000 people (range, 483 000–639 000) developed TB that was resistant to rifampicin, the most effective firstline drug, and of these, 82% had multidrug-resistant TB (MDR-TB) (WHO, 2018). Extensively drug-resistant TB is extremely difficult to diagnose and treat in countries in which the disease is endemic. The condition has been associated with death rates as high as 98% among HIV-infected persons (WHO, 2019).

2.7 Types of Drug-Resistant TB

Drug-resistant TB disease can develop in two different ways, called **primary** and **secondary** resistance (Shallo Daba, *et al*., 2016). Primary resistance occurs in persons who are initially infected with resistant organisms. Secondary resistance or acquired resistance develops during TB therapy; either because the patient was treated with an inadequate regimen, did not take the prescribed regimen appropriately or because of other conditions such as drug mal-absorption or drug-drug interactions that led to low serum levels.

2.8 Clinical Features of TB

The classic clinical features of pulmonary TB include chronic cough, sputum production, appetite loss, weight loss, fever, night sweats and hemoptysis. Extra pulmonary tuberculosis occurs in 10 to 42% of patients, depending on race or ethnic background, age, presence or absence of underlying disease, genotype of the *M. tuberculosis* strain and immune status. Extra pulmonary TB can affect any organ in the body, has varied and protean clinical manifestations, and therefore requires a high index of clinical suspicion. HIV co-infection poses special challenges to clinical management in patients with active TB.

The risk of active TB increases soon after infection with HIV and the manifestations of pulmonary TB at this stage are similar to those in HIV-negative persons. At CD4 counts of less than 200 per cubic millimeter, the presentation of TB may be atypical, with subtle infiltrates, pleural effusions, hilar lymphadenopathy and other forms of extra-pulmonary TB

in as many as 50% of patients. At CD4 counts of less than 75 per cubic millimeter, pulmonary findings may be absent and disseminated tuberculosis, manifested as a nonspecific, chronic febrile illness with widespread organ involvement and *mycobacterium*, is more frequent, with high early mortality; polyclonal disease has also been described. Such cases may be mistakenly diagnosed as other infectious diseases and are often identified only on autopsy (Mudenda, *et a*l., 2012).

Asymptomatic, subclinical tuberculosis, with negative findings on sputum smear and chest radiography and positive culture results, is a common feature of HIV-associated TB and may account for 10% of cases in regions in which tuberculosis is endemic. Up to 25% of patients presenting for HIV care in such regions have undiagnosed active TB.

The most potent risk factor is human immunodeficiency virus (HIV) infection. Those with HIV and latent TB co-infection have more than a 100-fold increased risk of developing active TB disease (Kiazyk, *et al*., 2017). (Therefore, screening for TB is recommended for all patients with HIV infection to identify patients with active disease and before instituting isoniazid preventive therapy in the remainder. The presence of any one of four symptoms (cough, fever, night sweats, or weight loss) has been shown to have sensitivity in the range of 80% for identifying patients in whom further diagnostic evaluation is warranted, even in resource-constrained regions. TB mortality among HIV-positive people is hard to measure, even when VR systems are in place, because deaths among HIV-positive people are coded as HIV deaths, and contributory causes (e.g. TB) are often not reliably assessed and recorded (WHO, 2018). A recent systematic review on the cascade of care in diagnosis and treatment of LTBI confirmed that important losses occur at each of the steps of initial screening, completing medical evaluation, and starting therapy (Salame, *et al*., 2017). Proactive screening for TB is recommended in areas where the disease is highly endemic, since subclinical TB in patients with HIV infection or non-communicable diseases (e.g., diabetes mellitus and tobacco-related chronic lung disease) may otherwise be missed.

2.9 Socio-economic impact of tuberculosis on patients and family

Tuberculosis has many socio-economic impacts on the patients and the family. Tuberculosis is an obstacle to socioeconomic development; 75% of people affected by TB are within the economically productive age group of 15–54 years (Minaleshewa Biruk, *et al*., 2016). The direct and indirect costs included money spent on diagnosis, drugs, investigations, travel and loss of wages. Total costs were projected for the entire 6 months of treatment. Tuberculosis

affects the most productive age group and the resultant economic cost for society is high. Even though some studies have tried to measure the economic effects of TB, little has been written on the differential impact of the disease on men and women. Women often face obstacles in gaining access to diagnostic facilities, investigations and in completing adequate treatment. In addition, the triple burden of housework, childcare and employment allows them very little time to access health care and TB care for themselves.

2.10 Transmission of TB

TB is spread from person to person by aerogenic transmission. The source of infection is a patient with pulmonary TB who coughs and spreads tiny droplets (Abebe Merchew, *et al*., 2018). A single cough may produce up to 3000 droplets where each one contains one or more tubercle bacilli (WHO,2000). Under normal circumstances,only a small portion (about 10 %) of all individuals who are infected by the tubercle bacilli develop the disease in their life time. *M. bovis* TB is transmitted by the inhalation of airborne organisms. The tubercle bacillus will be issued upon coughing, sneezing and speech, the droplets Pflug. These virulent bacilli once inhaled will stay in the pulmonary alveoli, where they will be phagocytosed and give the canker of inoculation. It is the primary infection may be asymptomatic. Once infectious particles are aerosolized, they are spread throughout a room or building by air currents and can be inhaled by another individual. One droplet nuclei contains no more than 3 bacilli. Droplet nuclei are so small that they can remain air-borne for extended periods of time. The most infective droplet nuclei tend to have a diameter of 5um. Sneezing generates the most droplet nuclei by far, which can spread to individuals up to 10 feet away. Tuberculosis begins when droplet nuclei reach the alveoli. When a person inhales air that contains droplets, most of the larger droplets become lodged in the upper respiratory tract like nose and throat, where infection is unlikely to develop. However, the smaller droplet nuclei may reach the small air sacs of the lung (alveoli), where infection begins.

2.11 Treatment of TB

The aim of the treatment is to heal the sick, avoid transmission of the disease, its spread and therefore, decrease morbidity and mortality (Abebe Merchew, *et a*l., 2018). The global focus of TB control programs is on early diagnosis and treatment of cases in high TB and HIV-endemic areas (WHO, 2016). In Burkina Faso, the treatment includes anti TB therapy with daily oral doses of Streptomycin (S); Isoniazid (INH, H); Rifampin (R); Pyrazinamide (Z); Etambutol (E) for at least 6 months, retreatment required to add injectable drug

(streptomycin) during the first two months. The treatment of LTBI with isoniazid (INH) substantially reduces this risk by up to 90% (Salame, *et al*., 2017). Longer courses may be required for patients with AIDS or for patients who respond slowly. After 2 to 4 weeks, the disease generally is no longer infectious. The patient can resume his normal lifestyle while taking medication. Some patients may get side-effects from the antibiotics. The most common side-effects are: nausea, joint pain, visual disturbances, burning sensation in the feet, renal failure, red-orange urine, fever, skin flush, reaction, jaundice (yellow skin or eyes), abdominal pain, dizziness, confessional states Deafness. Successful treatment outcomes primarily require a better and deeper understanding of the barriers and enablers the patients experience during the whole treatment period (Meron Mehari, *et al*., 2017).

3. MATERIALS AND METHODS

3.1 Description of the study area

The study was conducted at Selam Health Center which is located in Gulele Sub city, Woreda 9, Addisu Gebeya around St. Paul's Hospital Addis Ababa, Ethiopia. It is one of the governmental health centers in the Sub city.

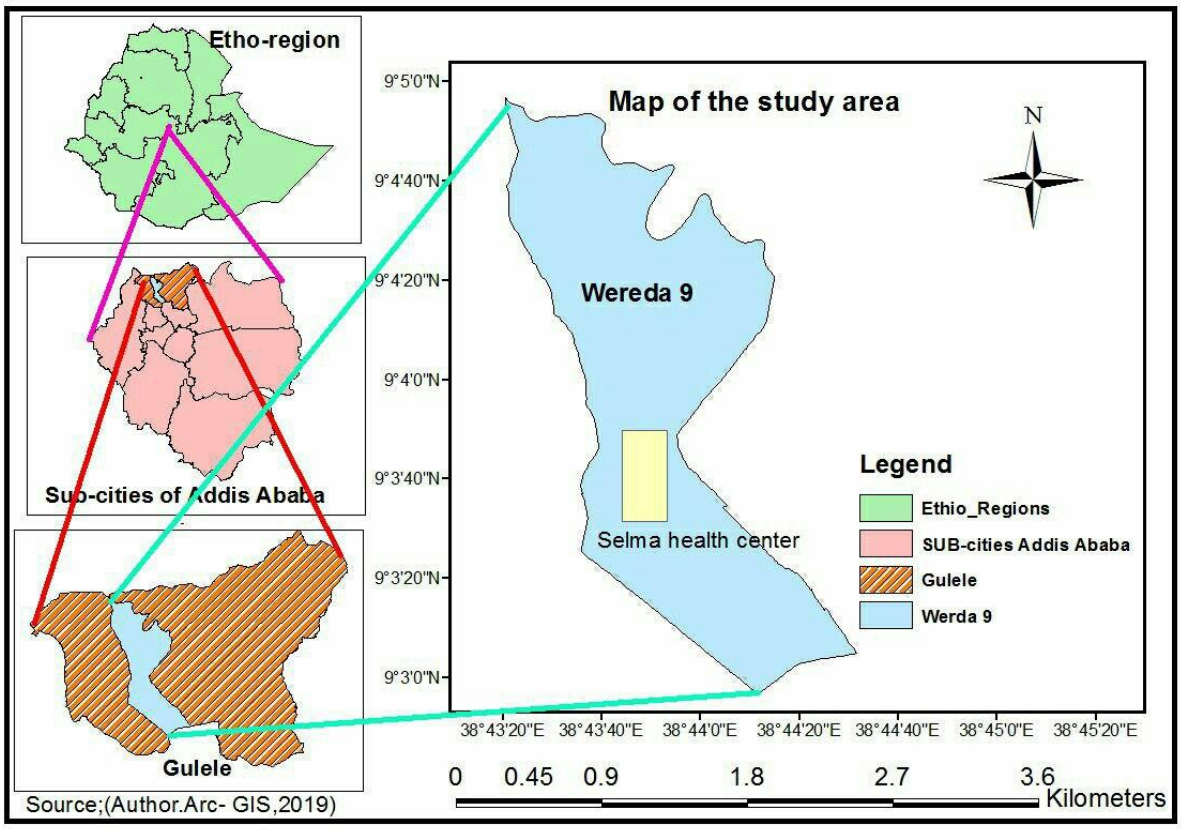

Figure 1: Gulele sub-city health centers

3.2 Study design

A cross-sectional research design was applied. The purpose of using cross-sectional research design was to measure differences between or from among individuals older than 18 years of age who are attending in Selam Health Center at the time of the study (Feb-March, 2019) in respect of KAP of tuberculosis. This research design used quantitative approaches as components of methodology.

3.3 Study population

The primary sources of data were obtained through questionnaire from individuals 18 and above years of age who are attending in Selam Health Center at the time of the study (Feb-March, 2019). This age group is chosen because; it is not ethical to ask questions for those who are in the age below 18 years old in doing diseases related researches.

3.4 Population, sample and sample size of the study

A population is defined as all existing members of the group from which samples are drawn (Fraenkel and Wallen, 2000). Accordingly, the population of this study encompassed all individuals 18 and above years of age who are attending at Selam Health Center at the time of the study (Feb-March, 2019).

The sample size determination was done using the following formula,

$$N = \frac{(Z\alpha/2)^2 p(1-p).}{d^2}$$

p = 50% because no similar study was done at Selam Health Center

n = sample size

α = Level of significance 5% (α= 0.05), Z = 1.96

d = margin of error = 5% (d= 0.05)

And based on this formula, the sample size is 384 and the 10% non-response rate (38) and a total sample size of 422. Non-response rate describes those who did not submit the questionnaire paper. These respondents were selected randomly. This means that, every one of the respondents had equal chance to be the member of the study.

3.5 Sampling technique

The careful design of the sample size and the right selection of sampling techniques are important to ensure the representativeness of the sample that can be dependable to generalize the information obtained from the sample to the whole population of the study. Thus, in this study, systematic random sampling was conducted in order to enroll representative samples.

3.6 Data collection

3.6.1 Survey questionnaires

The survey measure employed in this study comprised four major sections: (1) socio-demographic status (age, sex, marital status, occupational status, educational status, residence, monthly income and distance), (2) knowledge associated factors, (3) attitude associated factors and (4) practice associated factors. The survey was designed selecting relevant questions from previous published studies (Abebe Merchew, *et al*., 2018). The data collection tool was first prepared in English. It was then translated to Amharic. Illiterate participants filled the questions themselves by listening when the researcher read each question.

The study designed 8, 12, 7 and 6 self-administered structured questionnaires to (1) socio-demographic status (age, sex, marital status, occupational status, educational status, residence, monthly income and distance), (2) knowledge associated factors, (3) attitude associated factors and (4) practice associated factors respectively. Moreover, based on (Alotaibi, *et al.,* 2019), a scoring system was developed to score the KAP responses. Incorrect/inappropriate or uncertain (don't know) responses were given a 0 score, while 1 point was given for choosing the correct/appropriate answer. A correct/appropriate response was based on current literature and best practice.

For multiple choice questions with more than one correct answer, 1 score was given for choosing the correct/appropriate response and 0 for not choosing the incorrect/inappropriate responses. The score for the question was then divided by the total number of multiple choices in the question to standardize the result to be between 0 and 1 (Alotaibi, *et al*., 2019). Scores for each section of the questionnaire (knowledge, attitude and practice) were then standardized to give overall scores ranging between 0 and 1.

The overall mean scores were then further divided into 3 categories to reflect the level of KAP among the outpatients. These were: poor (score 0–0.2), good (score 0.2–0.8) and high (score 0.8-1).

3.7 Methods of Data Analysis and Interpretation

Descriptive statistics such as standard deviation (SD) and inter-quartile range (IQR) were computed for quantitative variables and frequencies and percentages were calculated for

categorical variables. Cronbach's α, was used to measure reliability and internal consistency for the KAP questions. Simultaneous effects of covariates towards knowledge, attitude and practice scores were assessed by fitting quartile regression (dividing the samples into four parts) models. Regression models were fitted for 25^{th}, 50^{th}, and 75^{th} percentiles of the scores to evaluate the relationship between covariates and KAP scores.

The covariates were selected by assessing their relationship towards scores in bivariate analysis. Correlation between knowledge, attitude and practice was examined using the Spearman correlation coefficient. In the tests, p-values < 0.05 were considered statistically significant.

3.8 Instrument Reliability and Validity

Validity in instruments of data collection shows the extent to which certain explanatory concepts or qualities account for the indentured objectives of the data collection tools. On the other hand, Franken and Wallen (2003) reported that reliability indicates the consistency of the scores obtained between different respondents or within the responses of the same subjects' overtime. The researcher used reliability and validity of the items to be measured by using Crobanch's alpha method with the help of SPSS version 20 software. After the validity and the reliability of instruments were checked, the revised questionnaires were distributed to sample of respondents.

3.9 Ethical Consideration

To collect data, a written ethical permission letter was obtained from College of Natural and Computational Sciences, Institutional Review Board (CNCS-IRB) of Addis Ababa University. The respondents were asked respectfully to receive the required information based on their willingness. Responses of the respondents were unnamed. The researcher disclosed the privacy of respondents and was kept secretly the information collected from respondents. Confidentiality was considered in all levels of data collection.

3.10 Data analysis

The coded data was entered to the computer using SPSS window version 20 software. Then, the results were summarized into frequency, percentage, standard deviation and tables accordingly. All the analysis was based on the stated objectives. A $p < 0.05$ was considered

as statistically significant (p-value is the probability value which indicates how much the variables affect the KAP of the participants) and factors that contribute to the lack of KAP of TB were identified. Finally, relevant discussion, conclusion and recommendation were made based on the results obtained from the study.

4. RESULTS

4.1 Participant demographics

A total of 384 out of 422 individuals (which is 91 % participation rate) were included in the study (Table 1). This means that, 20 individuals were refused to participate in the study and 18 questionnaires with missing characteristics were excluded. Of the 384 participants, 25.3 % were between the ages 18-30 years, 38.8 % were in the age between 31-40 years, 30.7 % were in the age between 41-50 years and the rest 5.2 % were in the age greater than 50 years. With regard to sex, 50.8% were males and the rest 49.2% were females. Concerning the marital status, 21.4 % were single, 78.4% were married/ divorced and the remaining 0.3% was widowed. Regarding occupation, the majority, 51.0% were employers, 6.8 % were housewives, 19.5 % were merchants, 0.8 % were farmers and 21.9 % were private workers. It was found that 3.1 % were illiterate, 29.4 % were primary school outpatients, 36.2 % were secondary school outpatients and the remaining 31.3 % were higher education outpatients. In terms of monthly income of the respondents, 6.5 % earned below 1000 birr/month, 21.9 % earned 1000-2000 birr/month, 44.3 % earned 2000-3000 birr/month and the remaining 27.3 % earned above 3000 birr/month. In relation to residence, the majority, 97.1 % of the outpatients are living in Urban and the rest 2.9 % are living in the rural areas. Concerning the proximity to the health center, 14.8 % are living very close to the health center, while 28.4 % are living at a distance of 5-10km, 44.5 % are living at a distance of 10-15km and only 12.2 % are living very far from the health center, which is about 15km and above.

Table 1 Sociodemographic characteristics of the study outpatients (*N*=384)

Variables	Category	Frequency	Percent
Sex	Male	195	50.8
	Female	189	49.2
Age in years	18-30	97	25.3
	31-40	149	38.8
	41-50	118	30.7
	50 +	20	5.2
Marital status	Single	82	21.4
	Married/Divorced	301	78.4
	Widowed	1	0.3
Education	Illiterate	12	3.1
	Primary	113	29.4
	Secondary	139	36.2
	College & above	120	31.3
Occupation	Housewife	26	6.8
	Merchant	75	19.5
	Farmer	3	0.8
	Government/private employee	196	51.0
	Private worker	84	21.9
Monthly income	<1000	25	6.5
	1001-2000	84	21.9
	2001-3000	170	44.3
	>3000	105	27.3
Residence	Urban	373	97.1
	Rural	11	2.9
Distance from Selam Health Center	<5km	57	14.8
	5-10km	109	28.4
	10-15km	171	44.5
	>15km	47	12.2

4.2 Knowledge

Regardless of the sources of information, all study participants had heard about TB, 253 (65.9%) of them described TB as a very serious disease and 235 (61.2%) knew that bacteria is the causative agent of TB (Table 2). Two-hundred and forty-eight (64.6%) recognized coughing and sneezing as a mode of transmission, and again the majority, 235 (61.2%) of the respondents knew bacteria as causative agent. Compared this findings to the study conducted

in 2013 on KAP of TB patients in Addis Ababa, Lideta sub city, the respondents had better knowledge (84.51%) towards the TB causative agents. Knowledge level could vary over various kinds of clients. Knowledge about route of transmission of the disease is another factor in TB prevention and control program. In this study, 162 (75.3%) of respondents had recognized coughing and sneezing as a mode of transmission of TB, whilst very few respondents replied other. These results were lower than the study conducted in South West Ethiopia indicated that about (83.8%) of individuals had knowledge about the route of transmission. Out of 384 outpatients, 130 (33.9%) had knowledge about the relationship of inadequate diet and TB. In addition, 285 (74.2%) of them had the knowledge about the diagnosis of TB. In case of the symptoms, 81 (21.1%), 52 (13.5%), 43 (11.2%), 115 (29.9%), 40 (10.4%), 39 (10.2%) of them knew that cough, chest pain, fever, headache, weight lose and nausea are the symptoms of TB respectively while 11 (3.6%) of them do not know what the symptoms of TB are. With regard to the methods of curability, 107 (71.3%) of the outpatients knew that TB can be cured by taking prescribed drugs while only 4 (2.7%) of them knew as it can be cured by take enough rest without medication.

Table 2 Knowledge of Selam Health center outpatients on TB (*N* = 384)

Variables	Category	Frequency	Percent
Sources of information on TB	Radio	67	17.4
	Television	129	33.6
	Health workers	45	11.7
	Teachers	89	23.2
	Family, friends & neighbors	49	12.8
	Religious leaders	5	1.3
How do you describe TB?	Very serious	253	65.9
	Somewhat serious	23	6.0
	Not serious	85	22.1
	Not very serious	23	6.0
Cause of TB	Bacteria	235	61.2
	Viruses	104	27.1
	Fungi	20	5.2
	Protozoa	25	6.5
Do you know TB transmission methods?	Yes	215	56.0
	No	169	44.0
Transmission methods of TB (N=215)	Coldness	27	12.6
	Coughing and sneezing	162	75.3
	Physical contact	11	5.1
	Hand shaking	15	7
Can TB transmitted through blood contact?	Yes	74	19.3
	No	148	38.5
	Don’t know	162	42.2
Body parts affected by TB	Any parts mainly lung	144	37.5
	Don’t know	240	62.5
Do you know the relationship of inadequate diet & TB?	Yes	130	33.9
	Not sure	188	49.0
	Don't know	66	17.2
Symptoms of TB	Cough	81	21.1
	Chest pain	52	13.5
	Fever	43	11.2
	Headache	115	29.9
	Weight loss	40	10.4
	Nausea	39	10.2
	Don’t know	14	3.6
Do you know diagnosis of TB?	Yes	285	74.2
	No	99	25.8
Is TB curable disease?	Yes	150	39.1
	Not sure	149	38.8
	I don't know	85	22.1
How can TB be cured? (N=150)	Taking prescribed drugs	107	71.3

	Taking herbal medicines	28	18.7
	Take enough rest without medication	4	2.7
	Praying	11	7.3

4.3 Attitude

Majority, 238 (62.0%) of Selam Health Center outpatients did not have awareness towards the prevention and control of TB via training by health professionals, while 146 (38 %), get awareness taking training (Table 3). The reason for which about 142 (59.7%) of individuals had no favorable attitude about prevention and control of tuberculosis is the lack of interest to get information about TB while 20 (8.4%) of them had no reason not to take training. If diagnosed with TB, 140 (36.5 %) of the respondents talk to close friends, while 129 (33.6 %) of the participants inform to their parents. On the other hand, most of the respondent, 256 (66.7%) were disagreed that they were not willing to diagnosis if they had the symptoms. However, their attitude towards TB patients by stigma is too high which accounts 223 (58.1%) and 277 (72.1%) of them do not believe that it would change their life. One-hundred and thirty-five (35.2%) of the participants believed that TB can affect anybody while 33 (8.6 %) of them believed that the disease can affect only alcoholics.

Table 3 Attitude of Selam Health Center outpatients on TB (N=384)

Variables	Category	Frequency	Percent
Did you take training about TB?	Yes	146	38.0
	No	238	62.0
Reasons not to take training on TB (N=238)	Distance from the health center	49	20.6
	Lack of willingness	142	59.7
	Problem of the health professionals	27	11.3
	No reason	20	8.4
Whom will you inform if you get TB?	Physicians	105	27.3
	Spouse/parents	129	33.6
	Close friends	140	36.5
	No one	10	2.6
If you developed symptoms of TB, would you be willing to diagnose it?	Agree	110	28.6
	Disagree	256	66.7
	Neutral	18	4.7
If someone has diagnosed with TB, would it change his/her life?	Yes	107	27.9
	No	277	72.1
If someone diagnosed with TB, what would be your response?	Help them	104	27.1
	Discriminate them	223	58.1
	Fear of them	57	14.8
Who can be infected with TB?	Anyone	135	35.2
	HIV-infected people only	106	27.6
	Poor people only	52	13.5
	Alcoholics only	33	8.6
	People who have been in prison	58	15.1

4.4 Practice

With regard to seeking the health centers (Table 4), 115 (29.9%) of the participants went to the health centers once in every five years, while only 77 (20.1 %) of them visit the health center once per year. On the other hand, 112 (29.2%) of the participants did not go to the health centers in the last five years. Slightly less than half (48.7%) of the respondents have replied that covering mouth and nose from coughing and sneezing person as a prevention practices. With regard to respondents experiences if they have coughing, most 315 (82.0%) of them do testing sometimes. Majority, 307 (79.9%) of the respondents looked health care facilities after 3-4 weeks of having the symptoms of TB. Concerning the measures they took for cure, 203 (52.9%) of the respondents went to the health center, while 76 (19.8%) and 19 (4.9%) of them were used pharmacy and other treatment options respectively. One of the main reasons for most, 87 (48.1%) of the participants not to go to the health center is the lack of money while, 35 (19.3%) of the respondents did not go to the health center because, they do not trust the health workers and while other had various reasons.

Table 4 Practices related to TB among the study participants (*N* = 384)

Variables	Category	Frequency	Percent
How frequently visit Selam Health Center?	Twice per year or more	80	20.8
	Once per year	77	20.1
	Once in the past 5 years	115	29.9
	Never in the past 5 years	112	29.2
TB prevention practice	Cover mouth & nose during coughing & sneezing	187	48.7
	Close window & door	51	13.3
	Avoid hand shaking	44	11.5
	Praying	27	7.0
	Avoid sharing dishes	25	6.5
	Good nutrition	14	3.6
	Don't know	36	9.4
TB testing practice whenever there is cough	Always	31	8.1
	Sometimes	315	82.0
	Never	38	9.9
When do you seek health care facilities?	After realizing the TB symptoms	38	9.9
	After 3-4 weeks of symptoms	307	79.9
	I will not go to health center	39	10.2
If you developed symptoms of TB, what would be your treatment option?	Go to health centers	203	52.9
	Go to pharmacy	76	19.8
	Go to spiritual/traditional healers	105	27.3
Reasons not to go to the health center(N=181)	Because of cost	87	48.1
	Do not trust health workers	35	19.3
	Not sure where to go	15	8.3
	Difficulties with transportation	21	11.6
	Fear not to lose their jobs	18	9.9
	Dislike attitudes of health workers	5	2.8

4.5 Summary of logistic regression analysis of knowledge of TB and socio-demographics characteristics

With respect to the associations of outpatients' demographic information and knowledge levels as shown in Table 5; 35.9% (AOR = 1.33, CI, 0.88-1.54) of the participants were in the age range 31-40 years of old with poor knowledge level. On the other hand, 46.9% (AOR = 1.33, CI, 0.88-1.54) were also in the same age range (31-40 years) with good knowledge level and 22 (33.8%) of them had high knowledge level (p = 0.001).

In case of the sex, 48.1 % (AOR = 0.52, CI, 0.45-0.63) are male with poor knowledge, 62 (54.9%) had good knowledge and 52.3 % (AOR = 0.52, CI, 0.45-0.63) were with high knowledge level (p = 0.759). One hundred seven (51.9%) were females with poor knowledge, 51(45.1%) were with good knowledge and 31 (47.7%) were with high knowledge level (p = 0.001).

Concerning the educational status, 35.9 % (AOR = 0.56, CI, 0.16-1.22) completed secondary school while 4.4 % (AOR = 0.43, CI, 0.24-0.35) were illiterates with poor knowledge. With regard to income, 50 % (AOR = 1.03, CI, 0.53-1.03) earned 2000-3000 birr/month and 7.3 % (AOR = 0.24, CI, 0.32-0.43) earned less than 1000 birr/month and had poor knowledge. On the other hand, 33 (50.8%) earned greater than 3000 birr/month and 2 (3.1%) earned less than 1000 birr/month and had high knowledge level (p = 0.001). In case of residence, 96.6 % (AOR = 0.17, CI, 0.54-0.73) of them were living in urban and had poor knowledge while 96.4 % (AOR = 0.17, CI, 0.54-0.73) had good knowledge and 100 % (AOR = 0.17, CI, 0.54-0.73) had high knowledge (p = 0.001). Concerning the distance, 47.6 % (AOR = 0.53, CI, 0.27-0.37) are living at a distance of 10-15km from the health center and 11.2 % (AOR = 0.43, CI, 0.28-0.36) are living close to the health center with poor knowledge (p = 0.001).

Table 5 **Logistic regression analysis of knowledge of TB and socio-demographics characteristics**

Factors	**Category**	**Knowledge level (n, %)**			**AOR**	**95% CI**	***p*-value**
		Poor	**Good**	**High**			
Sex	Male Female	99 (48.1) 107(51.9)	62 (54.9) 51 (45.1)	34 (52.3) 31 (47.7)	0.52 0.02	0.45 - 0.63 0.09- 0.63	0.759
Age	18-30 31-40 41-50 50 +	54 (26.2) 74 (35.9) 66 (32.0) 12 (5.8)	23 (20.4) 53 (46.9) 33 (29.2) 4 (3.5)	20 (30.8) 22 (33.8) 19 (29.2) 4 (6.2)	2.32 1.33 1.23 1	0.16 - 3.12 0.88 - 1.54 0.94 - 2.14	0.001
Marital-status	Single Married Divorced Widow	48 (23.3) 142(68.9) 15 (7.3) 1 (0.5)	18 (15.9) 92 (81.4) 3 (2.7) 0	16 (24.6) 46 (70.8) 3 (4.6) 0	4.22 6.25 0.32	2.16 - 3.72 3.63 - 4.02 0.15 - 0.21	0.001
Educati-on	Illiterate Primary Secondary Above secondary	9 (4.4) 72 (35.0) 7 4 (35.9) 51 (24.8)	3 (2.7) 33 (29.2) 43 (38.1) 34 (30.1)	0 8 (12.3) 22 (33.8) 35 (53.8)	0.43 0.46 0.56 1	0.24 - 0.35 0.22 - 0.37 0.16 - 1.22	0.001
Occupa-tion	Employed Housewife Trader Farmer Daily laborer	45.6 14 (6.8) 45 (21.8) 3 (1.6) 50 (24.3)	53.1 10 (8.8) 23 (20.1) 0 20 (17.7)	64.6 2 (3.1) 7 (10.8) 0 14 (21.5)	2.04 1.02 0.47 0.73	0.48 - 0.55 0.52 - 0.63 0.32 - 0.43 0.37 - 0.53	0.001
Monthly income (ETB)	< 1000 1001-2000 2001-3000 > 3000	15 (7.3) 45 (21.8) 103(50.0) 43 (20.9)	8 (7.1) 28 (24.8) 48 (42.5) 29 (25.7)	2 (3.1) 11 (16.9) 19 (29.2) 33 (50.8)	0.24 0.63 1.03 1	0.32 - 0.43 0.37 - 0.43 0.53 - 1.03 1	0.001
Residen-ce	Urban Rural	199(96.6) 7 (3.4)	109 (96.4) 4 (3.5)	65 (100) 0	0.17	0.54 - 0.73	0.001
Distance from Selam Health Center	<5km 5-10km 10-15km >15km	23 (11.2) 60 (29.1) 98 (47.6) 25 (12.1)	11 (5.3) 35 (17) 55 (26.7) 12 (10.6)	23 (35.4) 14 (21.5) 18 (27.7) 10 (15.4)	0.43 0.63 0.53 1	0.28 - 0.36 0.38 - 0.42 0.27 - 0.37	0.001

Keys: AOR; Adjusted Odds Ratio, CI; Confidence Interval

4.6 Demographic variables and KAP scores & quantile regression results

There was a significant difference in knowledge, attitude and practice scores in relation to educational status and residence of the participants (Table 6). The coefficients in bold indicate statistically significant p-value associated with the coefficient. There was great association between primary school attendants among outpatients and attitude scores at the 25^{th} and 50^{th} quantiles. There was also great association between college students among outpatients and knowledge, attitude and practice scores at the 25^{th}, 50^{th} and 75^{th} quantiles.

In relation to residence, there were associations between outpatients who are living in urban and knowledge scores at the 25^{th}, 50^{th} and 75^{th} quantiles and attitude scores at the 50^{th} quantile. There were also associations between the outpatients who are living in rural and attitude scores at the 75^{th} quantiles and practice scores at the 25^{th} and 50^{th} quantiles. This means that, education and residence are significant factors for the lack of knowledge, attitude and practice scores at the indicated coefficients of the quantile regression.

Table 6 Summary of the association between selected variables and KAP scores of outpatients at the 25th, 50th and 75th quantile.

Variable	Categories	Coef for knowledge scores			Coef for attitude scores			Coef for practice scores		
		(SE)			(SE)			(SE)		
		25th	50th	75th	25th	50th	75th	25th	50th	75th
	Intercept	**0.421**	**0.612**	**0.533**	**0.642**	**0.772**	**0.567**	**0.643**	**0.849**	**0.571**
		(0.063)	(0.057)	(0.072)	(0.067)	(0.041)	(0.058)	(0.079)	(0.064)	(0.052)
Education	Illiterate	0.219	0.325	0.196	0.55	0.724	0.732	0.282	0.221	0.451
		(0.213)	(0.312)	(0.276)	(0.176)	(0.671)	(0.821)	(0.321)	(0.185)	(0.234)
	Primary	0.018	0.000	0.396	**0.12**	**0.072**	0.106	0.068	0.063	0.023
		(0.211)	(0.664)	(0.212)	(0.044)	(0.002)	(0.191)	(0.242)	(0.347)	(0.521)
	Secondary	0.039	0.059	0.060	0.061	0.033	0.022	0.000	0.016	0.189
		(0.294)	(0.231)	(0.137)	(0.706)	(0.629)	(0.661)	(0.852)	(0.294)	(0.231)
	College & above	**0.329**	**0.389**	**0.396**	**0.12**	**0.072**	**0.23**	**0.143**	**0.121**	**0.224**
		(0.003)	(0.003)	(0.013)	(0.044)	(0.002)	(0.051)	(0.023)	(0.014)	(0.034)
Residence	Urban	**0.546**	**0.586**	**0.487**	0.22	**0.084**	0.060	0.058	0.038	0.106
		(0.002)	(0.001)	(0.002)	(0.144)	(0.001)	(0.249)	(0.198)	(0.534)	(0.278)
	Rural	0.019	0.011	0.027	0.030	0.022	**0.000**	**0.000**	**0.018**	0.000
		(0.101)	(0.146)	(0.437)	(0.133)	(0.247)	(0.027)	(0.018)	(0.047)	(0.091)

*Coef; regression coefficient values; SE, Standard error

Coefficient in bold indicates statistically significant p-value associated with the coefficient

5. Discussion

A well-structured close ended questionnaire was developed to assess the TB knowledge, attitude and practice of Selam Health Center outpatients towards TB. According to the finding, the majority 139 (36.2%) of our respondents had finished secondary level, unlike to the previous study report which were the majority of their respondents' had an educational level below secondary level (Koay, 2004). Educational background was an important determinant of the patients' level of knowledge of TB. That means, 53.8 of the outpatients who completed higher level education had high knowledge while only 2.7 % (AOR = 0.43, CI, 0.24-0.35) illiterates had good knowledge. It indicates that those with a higher level of education had better knowledge score than those with lower or no formal education.

This study showed that 54.9% of the males and 45.1% of the females had good knowledge respectively. However, our finding was lower than a similar finding reported by Olusola, *et al*., 2018 with 83.3% of the participants had good knowledge about tuberculosis infection. Being female, illiterates and rural residents are the main discrepancies of having low knowledge score. With regard to the curability, 39.1% of the respondents knew that TB is a curable disease which was less than 97.7 % reported by other study (Farhanah, *et al*., 2016). On the other hand, 49.0% of the respondents were not sure about the relationship of inadequate diet and TB. This finding was in line with the study by Abebe Merchew, *et al*., 2018. The majority, 235 (61.2%) of the respondents knew bacteria as a causative agent of TB, which is greater than 37.6% reported in other study (Abebe Merchew, *et al*., 2018).

Majority, (46.1%) of them were not sure that tuberculosis spread by droplets if there is contact with known TB patients cough and sneeze. This means that study participants had more information about the disease than the study conducted in South west Ethiopia (Abebe Merchew, *et a*l., 2018). With regard to the source of information, in the study conducted (Abebe Merchew, *et al*., 2018), 141 (39.3%) of the participants used radio as their main source of information to hear about TB but, all were informed about the disease. This study found that 67 (17.4%) are used radio as their main source of information. But, in the study conducted in Yirgacheffe Town, Gedeo Zone, Southern Ethiopia (Desalegn Tsegaw and Berhanu Jikamo, 2016), 61.8% of the participants used radio as a source of information. It indicates that the habit of using radio as a source of information is decreasing. In the same study (Abebe Merchew, *et al*., 2018), 99 (27.6%) of the participants used television as their main source of information. But, this study showed that, 129 (33.6%) of the respondents heard about TB from television and only 5 (1.3%) of them heard from religious leaders.

The majority, (64.6%) correctly mentioned that TB is transmitted through coughing droplets. The study conducted in Nigeria indicated that 77.2% of patients have knowledge about the transmission of TB through air during coughing (Tobisn, *et al*., 2013). These results were lower than the study conducted in South West Ethiopia indicated that about 83.8% of individuals had knowledge about the route of transmission.

With regard to attitude, the majority, (65.9%) of the participants believed that TB is a very serious disease. In other study (Arwa, *et al*., 2017), 38.4% of the participants replied that TB is a very serious disease. This result was in line with the previous study from Eastern Ethiopian prisons (Abebe Dawit, *et al*., 2011) and reports from the general population in Tigray (Mesfin Mengiste, *et al*., 2009) and Amhara (Esmael Ali, *et al*., 2013) regions.

Concerning practice, with regard to the time for seeking health care facilities, 307 (79.9%) of them visit the health centers after 3-4 weeks of symptoms. In other study (Arwa, *et al*., 2017), 27.2% of the participants visit the health centers after 3-4 weeks of symptoms. One of the limitations of this study was that participants were not given qualitative type questions so that we might not include their deep insight about their knowledge, attitude and practices on tuberculosis. The samples are also taken only from one health center.

6. CONCLUSION AND RECOMMENDATION

Based on the finding, we have reached at the following conclusion ideas:

1. All of the outpatients have heard about TB.
2. Sixty four percent of the participants knew the methods of transmission of TB.
3. There was significant association between being a college student and knowledge score at the 25^{th}, 50^{th} and 75^{th} quantile with *p*-values (< 0.05).
4. Majority of the outpatients agreed that TB is curable and willing to diagnosis if they had the symptoms.
5. Majority of outpatients did not have awareness towards the prevention and control of TB
6. The participants who live far from the health center had low knowledge.
7. The overall practice of the outpatients towards TB was not satisfactory.
8. Majority of the respondents looking health care facilities after 3-4 weeks of having the symptoms of TB.

The following recommendations emanate from the study:

1. Adequate information is better to be passed on to the patients to avoid wrong perceptions towards TB.
2. It is necessary to enhance outpatients' knowledge, attitude and practices using trainings as basic requirement.
3. Continuous training of the health care providers to upgrade their scientific knowledge is vital for educating patients and community.
4. The design of health education program to increase patients' general awareness about the disease is crucial to the control of the infection.

REFERENCES

Abebe Dawit**,** Biffa Demelash, Bjune G, Ameni Gobena, Abebe Fekadu. (2011). Assessment of knowledge and practice about tuberculosis among eastern Ethiopian prisoners. *Int. J. Tuberc. Lung Dis*. **15**(2):228-233.

Abebe Merchew Faris**,** Gugsa Nemera Germossa and Desalew Tilahun. (2018). Knowledge, Attitude and Practice on Prevention and Control of Tuberculosis among Bilida Kebele Residents, Mana Woreda, Jimma Zone, Oromia Region, South West Ethiopia. *HSJ*. **12**(5):12-15

Adane Kelemework, Spigt M**,** Ferede Semaw, Asmelash Tsehaye, Abebe Markos, Dinant G-J. (2016) Half of Pulmonary Tuberculosis Cases Were Left Undiagnosed in prisons of the Tigray Region of Ethiopia: Implications for Tuberculosis Control. PLoS ONE **11**(2): e0149453.

Ali, F. Rabbani, U. N. Siddiqui, A. H. Zaidi, A. Sophie, S. J. Virani, N. A. Younus, (2003). Tuberculosis: do we know enough? A study of patients and their families in an out-patient hospital setting in Karachi, Pakistan, *Int J Tuberclung Dis* **7**(11):1052–1058

Alotaibi Badriah, YassinYara, Mushi Abdulaziz, Maashi Fuad, Thomas Abin, Mohamed Gamal, Hassan Amir and Yezli Saber. (2019). tuberculosis knowledge, attitude and practice among healthcare workers during the 2016 Hajj. *PLoS ONE* **14**(1): e0210913.

Alsdurf H, Hill PC, Matteelli A, Getahun H, Menzies D, Cain K. The cascade of care in diagnosis and treatment of latent tuberculosis infection: a systematic review and meta-analysis. Lancet Infect Dis. Elsevier; 2016; 0: 75-79.

Amare Deribew, Kebede Deribe, Tariku Dejene, *et al.* Tuberculosis Burden in Ethiopia from 1990 to 2016: Evidence from the Global Burden of Diseases 2016 Study**.** Ethiop J Health Sci.2018; **28** (5):519.

Amo-Adjei J**,** Kumi- Kyereme A. (2013) Myths and misconceptions about tuberculosis transmission in Ghana. BMC Int Health Hum Rights.**13** (1):1.

Arwa A, Raghad A , Mohammed A, Ghadah A, Saif A, Zohair Radi A, Asma M, Wala'a A, Maram A, Sultan Hassan A. (2017). Assessment of Knowledge, Attitudes and Practices Regarding Pulmonary Tuberculosis among Saudi Arabia Community. **69** (5), 2421-2425

Bacay-Domingo, M. C. N. & Ong-Lim, A. L. (2009). A descriptive study of the knowledge, attitude and practices on tuberculosis (TB) among treatment partners of pediatric patients in Tarlac city. Pediatric Infectious Disease Society of the Philippines,**10** (1).

Baker L, Wagner TH, Singer S, Bundorf MK. (2003) Use of the Internet and e-mail for health care information: results from a national survey. JAMA.**289** (18):2400-2406.

Barter DM, Agoboola SO, Murray MB, Barnighausen T. Tuberculosis and poverty: the contribution of patient costs in sub-Saharan Africa: a systematic review. *BMC Public Health.* 2012, 12:980.

Baussano I, Williams BG, Nunn P, Beggiato M, Fedeli U, Scano F.(2010) Tuberculosis incidence in prisons: a systematic review. *PLoS Med*. **7**(12):e1000381.

Carter DJ, Glaziou P, Lonnroth K, Siroka A, Floyd k, Weil D, et al (2018). The impact of social protection and poverty elimination on global tuberculosis incidence: a statistical modeling analysis of Sustainable Development Goal 1. **6**(5):514-522.

Centers for Disease Control and Prevention. Reported Tuberculosis in the United States, 2012.U.S. Department of Health and Human Services, CDC; Atlanta, GA: 2013.

Cramm JM, Finkenflugel HJ, Moller V, Nieboer AP. TB treatment initiation and adherence in a South Africa community influenced more by perceptions than by knowledge of tuberculosis. BMC Public Health. 2010, **10**(1):72.

Esmael Ahmed, Ali Ibrahim, Agonafir Mulualem, Desale Adino, Yaregal Zelalem, Desta Kassu. (2013). Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in eastern Amhara regional state, Ethiopia: cross-sectional study. Am. J. Trop. Med. Hyg. **88**(4):785-788.

Eshetie Setegn, Gizachew Mucheye, Dagnew Mulat, Kumera Gemechu, Woldie Haile, Ambaw Fekadu, Belay Tessema, Feleke Moges. Multidrug resistant tuberculosis in

Ethiopian settings and its association with previous history of anti-tuberculosis treatment: a systematic review and meta-analysis. BMC Infect Dis. 2017;17: 219.

Farhanah AW, Sarimah A, Jafri Malin A, Hasnan J, Siti Suraiya MN, Wan Mohd Zahiruddin WM, et al. Updates on knowledge, attitude and preventive practices on Tuberculosis among healthcare workers. *Malays JMed Sci*. 2016; **23**(6):25–34.

FMOH. Health Sector Transformation plan 2015/16-2019/20.Federal Democratic Republic of Ethiopia, 2015.

Fraenkel, J. R., Wallen, N.E (2000). Relationship between Parental Involvement and Academic Performance of Senior High School Students: The case of Ashanti Mampong Municipality of Ghana. American Journal of Educational Research. 2018, **6**(1):1-8.

Global tuberculosis report 2012. Geneva: World Health Organization.

Global tuberculosis report 2019. Geneva: World Health Organization.

Hashim, W. Al Kubaisy and A. Al Dulayme (2003).Knowledge, attitudes and practices survey among health care workers and tuberculosis patients in Iraq. *East Mediterr Health J.* **9**(4):718–731.

Hibstu DT, Bago BJ (2016) Knowledge, Attitude and Practice of Tuberculosis and its Transmission among High School Students in Yirgacheffe Town, Gedeo Zone, Southern Ethiopia. J Infect Dis Preve Med, **4**(2):142.

Hoa NP, Chuc NT, Thorson A. Knowledge, attitudes, and practices about tuberculosis and choice of communication channels in a rural community in Vietnam. Health policy (Amsterdam, Netherlands). 2009, **90**(1):8-12.

Hoa NP,Thorson AE, Long NH, Diwan VK. Knowledge of tuberculosis and associated health-seeking behavior among rural Vietnamese adults with a cough for at least three weeks. *Scand. J. of Public Health*. 2003, **31**(62):59-65.

Houben RM, Dodd PJ. The global burden of latent tuberculosis infection: a re-estimation using mathematical modelling. PLoS Med. 2016; 13 (10):e1002152

Jackson S, Sleigh AC, Wang GJ, Liu XL. Poverty and the economic effect of TB in rural China. *Int. J Tuberc Lung Dis*. 2006, **10**(10):1104-1110.

Johnston JC, Shahidi NC, Sadatsafavi M, Fitzgerald JM. (2009). Treatment outcomes of multidrug-resistant tuberculosis: a systematic review and meta-analysis. PLoS ONE, 4, e6914.

Kiazyk S, Ball TB. Latent tuberculosis infection: An overview. Can Commun Dis Rep. 2017; 43(3):62-66.

Koay TK. Knowledge and attitudes towards tuberculosis among the people living in Kudat District, Sabah, Malaysia. Med J Malaysia. 2004, **59**(4):502-511.

Lonnroth K., B. G. Williams, S. Stadlin, E. Jaramillo, and C. Dye, "Alcohol use as a risk factor for tuberculosis-a systematic review," *BMC Public Health*, 2008. **45**(4):928-952.

Luca S,Mihaescu T. (2013). History of BCG vaccine. Maedica. **8** (1):53-58.

Mangesho**.**P .E., Shayo, E., Makunde, W. H., Keto, G. B. S., Mandara, C. I, Kamugisha, M. L., Kilale, A. M. & Ishengoma, D. R. S. (2007). Community knowledge, attitudes and practices towards tuberculosis and its treatment in Mpwapwa District, central Tanzania. *Tanzania Health Research Bulletin*, ***9***(1), 38-43

Marais and P. R. Donald, "The natural history of tuberculosis infection and disease in children," in *Tuberculosis: A Comprehensive Clinical Reference*, H. S. Schaaf and A. Zumla, Eds., Elsevier Health Sciences, 2009.

Marais, R. P. Gie, H. S. Schaaf et al., "The clinical epidemiology of childhood pulmonary tuberculosis: a critical review of literature from the pre-chemotherapy era," *International Journal of Tuberculosis and Lung Disease*. 2004, **8**(3):278–285.

Meron Mehari, Nahom Kiros, Almaz Yemane, Mr Nahom Asghedom, Simon Debesay, Tsega Tekeste. Factors affecting treatment adherence among HIV-positive patients in Eritrea. IBBJ. 2017; **3** (3):150–156.

Mesfin Mengiste, Newell JN. Walley JD, Gessessew Amanuel, Tesfaye Tassew, Lemma Frew, et al. (2009). Quality of tuberculosis care and its association with patient

adherence to treatment in eight Ethiopian districts. Helath policy plan. **24** (6):457-466.

Minaleshewa Biruk, Belay Yimam, Hailay Abrha, Senafekesh Biruk, Fisseha Zewdu Amdie, "Treatment Outcomes of Tuberculosis and Associated Factors in an Ethiopian University Hospital", *Advances in Public Health*.2016; **9**(10):1155-2016.

Mohamed, A.I., Yousif, M.A., Ottoa P & Bayoumi, A. (2007) Knowledge of tuberculosis: a survey among tuberculosis patients in Omdurman, Sudan. *Sudanese Journal of Public Health* 2, 21-28.

Moore DA, Evans CA, Gilman RH, et al. Microscopic-observation drug-susceptibility assay for the diagnosis of TB. N Engl J Med 2006; 355:1539-50.

Mudenda V, Lucas S, Shibemba A. Tuberculosis and tuberculosis/HIV/ AIDS-associated mortality in Africa: the urgent need to expand and invest in routine and research autopsies. J Infect Dis 2012; **205** (2):340-346.

Mushtaq, M. U., Majrooh, M. A., Ahmad, W., Rizwan, M., Luqman, M. Q., Aslam, M. J., Siddiqui, A. M., Akram, J., Shad, M. A. (2010).Knowledge, attitudes and practices regarding tuberculosis in two districts of Punjab, Pakistan. *International Journal of Tuberculosis Lung Disease*, ***14***(3), 303-310.

Mushtaq, M. U., Shahid, U., Abdullah, H. M., Saeed, A., Omer, F., Shad, M. A., Siddiqui, A. M., & Akram, J. (2011).Urban-rural inequities in knowledge, attitudes and practices regarding tuberculosis in two districts of Pakistan's Punjab province. *International Journal for Equity in Health*, ***10***(8), 1186-1475.

Olusola H Ajayi and Ahmadu Isiyaku. (2019). "Knowledge and Practice of TB infection Control by Health Care Workers at National Tuberculosis and Leprosy Training Centre, Zaria, North Western Nigeria". *Acta Scientific Medical Sciences.* **3**(1), 38-46.

Ottmani S, Obermeyer Z, Bencheikh N, Mahjour J. Knowledge, attitudes and beliefs about tuberculosis in urban Morocco. East Mediterr Health J. 2008. **14**(2):298-304.

Process overview: development of a global strategy for TB research and innovation Geneva: World Health Organization, 2019.

Sacchi FP, PracËa RM, Tatara MB, Simonsen V, Ferrazoli L, Croda MG, et al.(2015) Prisons as reservoir for community transmission of tuberculosis, Brazil. Emerg Infect Dis. **21**(3):452-455.

Saifodine A,Gudo PS, Sidat M, Black J.(2013) Patient and health system delay among patients with pulmonary tuberculosis in Beira city, Mozambique.BMC public health. **13**(1):1.

Salame FM, Ferreira MD, Belo MT, Teixeira EG, Cordeiro-Santos M, Ximenes RA, et al. (2017) Knowledge about tuberculosis transmission and prevention and perceptions of health service utilization among index cases and contacts in Brazil: Understanding losses in the latent tuberculosis cascade of care. PLoS ONE 12(9): e0184061.

Samandari T, Agizew TB, Nyirenda S, Tedla Z, Sibanda T, Motsamai O. (2011). 6-Month versus 36-month isoniazid preventive treatment for tuberculosis in adults with HIV infection in Botswana: a randomized, double-blind, placebo-controlled trial. *Lancet*, **29**(35):351-359.

Shallo Daba Hamusse, Dejene Teshome, Mohammed Suaudi Hussen, Meaza Demissie & Bernt Lindtjørn (2016). Primary and secondary anti-tuberculosis drug resistance in Hitossa District of Arsi Zone, Oromia Regional State, Central Ethiopia. *BMC Public Health.* **16** (10): 593.

SinshawYenework, Alemu Shitaye, Fekadu Abel, Gizachew Mucheye. Successful TB treatment outcome and its associated factors among HIV /TB co-infected patients attending at Gondar University Referral Hospital, Northwest Ethiopia: an institution based cross –sectional study. BMC infect Dis.2017; **17** (1):132.

Stephen D Lawn, Andrew D Kerkhoff, Monica Vogt, Robin Wood. HIV –associated tuberculosis: relationship between disease severity and the sensitivity of new sputum-based and urine-based diagnostic assays. 2013. **11**(231):1741-7015.

Summerland N, Wouters E, Mitchell EMH, Ngicho M, Redwood L, Masquillier C, et al. Evidence-based interventions to reduce tuberculosis stigma: a systematic review of. *Int j Tuberc Lung Dis*. 2017, **12**(11):81-86

Tobisn EA**,** Okojie PW, Isah EC (2013) Community knowledge and attitude to pulmonary tuberculosis in rural Edo state, Nigeria. Ann Afr Me 12: 14854

US Agency for International Development (USAID), KNCV Tuberculosis Foundation and Challenge TB. Challenge TB year 2 annual report, October 1st, 2015-September 30th, 2016. The Hague: KNCV Tuberculosis Foundation; 2017.

World Health Organization. (2005). Guidelines for the programmatic management of drug resistant tuberculosis.

World Health Organization. (2011). Consolidated action plan to prevent and combat multidrug- and extensively drug-resistant tuberculosis in the WHO European Region 2011–2015

World Health Organization. Global Tuberculosis Report 2017. World health organization (WHO), Geneva; 2017.

World Health Organization. What is TB? How is it treated? 2015.

World Health Organization: Global tuberculosis report. Geneva, Switzerland: WHO: 2014.

World Health Organization: a global emergency, WHO report on the TB epidemic, Geneva: WHO; 2018.

Zumla, A., Atun, R., Maeurer, M., Mwaba, P., O'Grady, J. et al. View point: scientific dogmas, paradoxes and mysteries of latent Mycobacterium tuberculosis infection. *Trop Med Int Health*.2011; **378**(9785):57-72.

ANNEX

Informed consent form

Introduction

This study was anticipated to assess problems and coping mechanisms of people with diabetes. You are invited to participate in this study. If you are willing to participate, you need to understand and sign the agreement form. Subsequently, you are interviewed by the data collector. You do not need to write your name or to tell your name to the data collector and all your response and the results obtained are kept confidential by using coding system.

Risk/Discomfort

You may feel discomfort while you sit for interview. I hope you will participate in the study for the sake of the benefit of the research result. There is no risk in walk through of participation.

Benefits:

If you participate in this research, there may not be direct benefit to you but your participation will likely help us to meet the research objective. Ultimately, this will help us to improve services for the community.

Incentives

You will not be provided any incentive or payment to take part in this study.

Confidentiality

The information collected from this research will be kept confidential. Information will be filled, without your name, only code number is used. All the information you provide is confidential and is used only for the purpose of this study.

Right to refuse or withdraw

You have full right to refuse from participating in the research. You can choose not to respond to some or all questions if you do not want to give your response. You have also full right to withdraw from this study at any time you wish without losing any of your right.

Person to contact

If you have any question you can contact the researcher and you may ask any time you want.

Contact address of investigator: -

Tee: 0921223149

Email: chale65a@gmail.com

If you agree to participate in this study, please sign below

Signature_____

Date_____

Code of respondent:-_____

Thank you in advance for your cooperation

Self-administered structure questionnaire (Arwa, *et al*., 2017)

Addis Ababa University

College of Natural and Computational Sciences

Department of Zoological Sciences

The aim of this questionnaire is to gather information which would help to assessing the knowledge, attitude and practices of outpatients on TB. So, you are kindly requested to answer the following questions putting 'X' by listening when I read or by reading on yourself in the space provided accordingly.

Part I. Socio-demographic status

1. Age: A. 18-30 □ B.31-40 □ C. 41-50 □ D.>50 □

2. Sex: A. Male □ B. Female □

3. Marital Status: A. Single □ B. Married/Divorced □ C. Widow□

4. Occupational: A. Housewife □ B. Merchant □

C. Farmer □ D. Government/private employee □ E. private worker □

5. Educational status:

A. Illiterate □ B. primary □ C. secondary □ D. college/university □

6. Monthly Income: A. <1000 □ B.1000-2000 □ C. 2000-3000 □ D.>3000 □

7. Residence: A. Urban □ B. rural □

8. How far is your home from Selam Health Center?

A. <5km □ B. 5-10km □ C. 10-15km □ D. >15km □

Part II. Knowledge associated factors

9. Where did you first learn about TB?

A. Radio □ D. family, friends, neighbours & colleagues □

B. TV □ E. Religious leaders □

C. health workers □ F. teachers □

10. In your opinion, how serious is TB?

A. somewhat serious □ C. not very serious □

B. very serious □ D. not serious □

11. TB is caused by: A. virus □ B. bacteria □ C. fungi □ D. protozoa□

12. Do you know how TB is transmitted? A. Yes □ B. No □

13. If your answer for question number '12' is 'yes', what are the methods of transmission?

A. coldness□ B .Cough□ C. direct contact □ D. shaking hand to hand □

14. TB can be transmitted from person to person by blood contact.

A. Yes □ B. No □ C. Don't Know □

15. Body parts affected by TB. A. any part mainly lung □ B. Don't know □

16. Is inadequate diet factor favoring TB disease?

A. I don't know □ B. not sure □ C. yes, I know □

17. What are the symptoms of TB?

A. cough □ E. nausea□

B. headache □ F. weight loss □

C. fever □ G. do not know □

D. chest pain□

18. Sputum test can diagnose TB. A. Yes □ B. No □

19. Is TB curable? A. I don't know □ B. not sure □ C. yes, I know □

20. How can someone with TB be cured?

A. taking prescribed drugs □ C. taking rest without medication □

B. taking herbal medicines □ D. prying □

Part III. Attitudes associated factors

21. Did you take any training on TB? A. Yes □ B. No □

22. If your answer for question number '21' is 'no', what is the reason not to get the training?

A. distance from the health center □ C. the problem of the health professionals □

B. lack of interest to get information about TB □ D. no reasons □

23. Who would talk to about your illness if you had TB?

A. physician □ B. spouse/parents □ C. close friends □ D. no one □

24. If I were to develop symptoms of TB, I would feel comfortable requesting TB diagnosis.

A. Agree □ B. Disagree □ C. Neutral □

25. If I am diagnosed with TB, I am worried that my whole life will be changed.

A. Yes □ B. No □

26. What is your attitude toward TB patients? A. Help them□ B. Avoid them □ C. Fear from them □

27. In your opinion, who can be infected with TB?

A. poor people only □ D. only people living with HIV/AIDS □

B. anybody □E. only people who are in prison □

C. alcoholics only □

Part IV. Practice associated factors

28. How often do you seek healthcare at a clinic or hospital?

A. once per year □ C. twice a year or more □

B. once in the past 5 years □ D. never in the past 5 years □

29. How can you prevent getting TB?

A. closing windows and doors □ E. covering mouth and nose when coughing □

B. avoiding shaking hands □ F. through good nutrition □

C. by praying □ G. do not know □

D. avoiding sharing dishes □

30. Having been in contact with TB patients, would you test for TB in case you have cough?

A. Always □ B. Sometimes □ C. Never □

31. When you will visit the health care facility?

A. After realizing the TB symptoms □

B. After 3-4 weeks of symptoms □

C. I will not go to a physician □

32. What would you do if you thought you had symptoms of TB?

A. going to pharmacy □ C. using other treatment options □

B. going to health centers □ D. going to traditional healers □

33. If you would not go to the health centers, what is the reason?

A. because of cost □ D. difficulties with transportation □

B. do not trust medical workers □ E. can't leave the work □

C. not sure where to go □ F. do not like the attitude of the medical workers □

COLLEGE OF NATURAL & COMPUTATIONAL SCIENCES
Addis Ababa University
OFFICE OF THE DEAN
የዲን ጽ/ቤት

የተፈጥሮና ኮምፒቴሽናል ሣይንስ ኮሌጅ
አዲስ አበባ ዩኒቨርሲቲ

Ref. No. ቁጥር CNSDO/185/12/19
Date: ቀን፡ November 13, 2019

To Whom It may Concern

The College of Natural & Computational Science Institutional Review Board (CNS-IRB) Committee in its meeting held on October 24, /2019 Minute No. IRB 40/2019 has examined the project proposal entitled **"A Study on Knowledge, Attitude and Practices of Tunerculosis among Selam Health Center Attendants, Gulele Sub City, Addis Ababa University , by Chalachew Ayel from** the Addis Ababa University.

The proposal is approved for implementation.

With regards,

Addisalem Abathun (PhD
Dean, College of Natural & Computational Science

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ማጠይቅ በአማርኛ ቋንቋ (ምንጭ ቻላቸዉ አያል)

በአዲስ አበባ ዩኒቨርሲቲ በስነ-ህይወት የት/ት ክፍል የድህረ-ምረቃ ፕሮግራም የመመረቂያ ጽሑፍ መረጃ መሰብሰቢያ ማጠይቅ፡ ፡ የሚከተሉትን ጥያቄዎች በማንበብ ወይም ሲነበብልዎት በሚዳመጥ የ'X' ምልክት በሚድረግ ይመልሱ፡ ፡ ስለትብብርዎ በቅድሚያ አመሰግናለሁ፡ ፡

ክፍል 1፡ የግል ሁኔታን የሚመለከቱ ማጠይቆች

1. እድሜ ሀ. 18-30 □ ለ. 31-40 □ ሐ. 41-50 □ መ. ከ50 በላይ □
2. ፆታ፡ ሀ. ወንድ □ ለ. ሴት □
3. የጋብቻ ሁኔታ፡ ሀ. ያላገባ/ች □ ለ. ያገባ/ች /የፈታ/ች □ ሐ. ሴተኛ አዳሪ □
4. የስራ ፡ ሀ. የቤት እመቤት □ ለ. ነጋዴ□ ሐ. አርሶ አደር□ መ. ተቀጣሪ□ ሠ. የግል□
5. የት/ት ደረጃ፡ ሀ. ያልተማረ□ ለ. የመጀመሪያ ደረጃ ት/ቤት□ ሐ. ሁለተኛ ደረጃ ት/ቤት□ መ. ኮሌጅ/ዩኒቨርስቲ □
6. የገቢ ማጠን፡ ሀ. ከ1000 በታች□ ለ. 1000-2000 □ ሐ. 2000-3000 □ መ.ከ3000 በላይ □
7. የመኖሪያ ቦታ፡ ሀ. ከተማ□ ለ. ገጠር □
8. የመኖሪያ ቤትዎ ከሰላምጠፍ ጣቢያ ምን ያህል ይርቃል? ሀ. <5ኪ.ሜ□ ለ. 5-10ኪ.ሜ□ ሐ. 10-15ኪ.ሜ□ መ. ከ15 ኪ.ሜበላይ □

ክፍል 2፡ ከእዉቀት ጋር የተያያዙ ማጠይቆች

9. ለመጀመሪያ ጊዜ ስለሳንባ ነቀርሳ መረጃ ከየት አገኙ?

   ሀ. ከሬዲዮ□ መ. ከቤተሰብ፣ ከጎደኛ፣ ከጎረቤት፣ ከስራባልደረቦች□

   ለ. ከቴሌቪዥን □ ሠ. ከሀይማኖት መሪዎች□

   ሐ. ከጠፍ ባለሙያዎች□ ረ. ከአስተማሪዎች□

10. በእርስዎ አመለካከት የሳንባ ነቀርሳ ምን ያህል አስከፊ ነዉለዉያምናሉ?

    ሀ. ማከሰ ኛ□ ሐ. በጣምአስከፊ አይደለም□

    ለ. በጣምአስከፊ□ መ. አስከፊ አይደለም□

11. የሳንባ ነቀርሳ ሊመጣየሚችለዉ፡ ሀ. በቫይረስ□ ለ. በባክቴሪያ□ ሐ. በፈንገስ□ መ. በፕሮቶዞዋ□

12. የሳንባ ነቀርሳ እንዴት እንደሚተላለፍ ያውቃሉ? ሀ. አዎ□ ለ. አላወቅም□

13. ለ12ኛዉጥያቄ መልስዎ 'አዎ' ከሆነ የመተላለፊያ መንገዶች ምን ምን ናቸዉ?

ሀ. በቅዝቃዜ □ ሐ. በቀጥታ ንክኪ□

ለ. በሚያስልበት ወቅት□ መ. እጅ ለእጅ በሜጨበጥ□

14. የሳንባ ነቀርሳ በደምንክኪ ከሰዉወደ ሰዉይተላለፋል፣ ፣

ሀ. አዎ□ ለ. አይተላለፍም□ ሐ. አላወቅም□

15. የሳንባ ነቀርሳ የሚያጠቃዉየአካል ክፍል ፣

ሀ. የትኛዉንምየአካል ክፍል በዋናነት ሳንባን □ ለ. አላወቅም□

16. በቂ ያልሆነ ምግብለሳንባ ነቀርሳ መጣ ሪሆን ይችላል፣ ፣

ሀ. አላወቅም□ ለ. እርግጠኛ አይደለሁም□ ሐ. አዎ□

17. የሳንባ ነቀርሳ ምልክቶች ምን ምን ናቸዉ?

ሀ. ሳል□ ሐ. ትኩሳት□ ሠ. ማቅለሽለሽ□ ሰ. አላወቅም□

ለ. የራስ ምታት□ መ. የደረት ዉጋት□ ረ. የክብደት መቀነስ□

18. የአክታ ምርመራ የሳንባ ነቀርሳን መኖር ያሳያል፣ ፣ ሀ.ትክክል ነዉ□ ለ. ትክክል አይደለም□

19. የሳንባ ነቀርሳ ሊድን ይችላል? ሀ. አላወቅም□ ለ. እርግጠኛ አይደለሁም□ ሐ. አዎ□

20. በሳንባ ነቀርሳ የተጠቃሰዉበምን ሊድን ይችላል?

ሀ. ያለምንምመድሃኒት ረፍት በሚድረግ□ ሐ. ባህላዊ መድሃኒት በመመሰድ□

ለ. ከጠፍ ተቋማት የሚሰጡመድሃኒቶችን በመመሰድ□ መ. በማለይ□

ክፍል 3፣ ከአመለካከት ጋር የተያያዙ ጣይቆች

21. ስለሳንባ ነቀርሳ ስልጠና ወስደዉያዉቃሉ? ሀ. አዎ□ ለ. ወስጄ አላወቅም□

22. ለ21ኛዉጥያቄ መልስዎ 'አልወሰድሁም' ከሆነ ለምን አልወሰዱም?

ሀ. የቦታ ርቀት□ ሐ. በጠፍ ባለሞያዎች ችግር ምክንያት□

ለ. የፍላጎት ማጣት□ መ. ምንምምክንያት የለኝም□

23. የሳንባ ነቀርሳ ቢኖርብህ/ሽ/ ስለበሽታዉለማን ታማክራለህ/ሽ?

ሀ. ለዶክተሮች□ ለ. ለቤተሰቦቼ□ ሐ. ለቅርብ ጓደኞቼ□ መ. ለማንምአላማክርም□

24. የሳንባ ነቀርሳ ምልክቶች በእኔ ላይ ቢታዩ በጥሩ ስሜት ለምርመራ እዘጋጃለሁ፣ ፣

ሀ. እስማማለሁ□ ለ. አልስማማም□ መ. ምንምአላደርግም□

25. የሳንባ ነቀርሳ እንዳለብኝ ካወቅሁ ቀሪዉየ ህይወት ዘመ ይበላሻል ብየ እጨነቃለሁ፡ ፡

ሀ. ትክክል ነዉ□ ለ. ትክክል አይደለም□

26. ስለሳንባ ነቀርሳ ታማሚዎች ምን አይነት አሚላካከት አለህ?

ሀ. እረዳቸዋለሁ□ ለ. አልቀርባቸዉም□ ሐ. እፈራቸዋለሁ□

27. በእርስዎ አሚላካከት በሳንባ ነቀርሳ ሊጠቃየ ሚቻለዉ ማን ነዉ?

ሀ. ድሃ ሰዎች ብቻ□ መ. በደሞዙዉስጥ ኤች አይ ቪ ኤድስ ያለባቸዉ ሰዎች ብቻ□

ለ. ማንኛዉም ሰዉ□ ሠ. ሚረሚየ ቤት ያሉ ሰዎች ብቻ□

ሐ. ማጨስ የሚወዱ ሰዎች ብቻ□

ክፍል 4፡ ከልምድ ጋር የተያያዙ ማህይቆች

28. ምን ያህል የጠፍ ክትትል ያደረጋሉ?

ሀ. በዓመት አንድ ጊዜ□ ሐ. በአመት ሁለት ጊዜና ከዚያ በላይ□

ለ.ባለፉት አምስት አመታት አንድ ጊዜ□ መ.ባለፉት አምስት አመታት ምንም ክትትል አላደረግሁም□

29. የሳንባ ነቀርሳን እንዴት መከላከል ይቻላል?

ሀ.የቤት በርና መስኮቶችን በመዘጋት□ ሠ.በሚያስነጥስበትና በሚያስልበት ጊዜ አፍና

አፍንጫ በሻፈን □

ለ. እጅ ለእጅ ባለመጨበጥ□ ረ. አመጋገብን በማስተካከል□

ሐ. ፀሎት በሚድረግ□ ሰ. አላወቅም□

መ. ምግብ አብሮ ባለመመገብ□

30. በሳንባ ነቀርሳ ከታመመሰዎች ጋር ንክኪ ቢኖርዎትና ቢያስልዎት ምርመራ ያደርጋሉ?

ሀ. ሁልጊዜ□ ለ. አልፎአልፎ□ ሐ. አላደርግም□

31. ወደ ጠፍ ተቋማት የምትሄደዉመቼ ነዉ?

ሀ. የበሽታዉን መኖር ካወቅሁ በኋላ □

ለ. ምልክቶች ከታዩ ከ3-4 ሳምንታት በኋላ □

ሐ. ወደ ባለሞያ አልሄድም□

32. የሳንባ ነቀርሳ ምልክቶች በእርስዎ ላይ ቢታዩ ምን ያደርጋሉ?

ሀ. ወደ መድሃኒት መሸጫመደብሮች እሄዳለሁ□ ሐ.ሌሎች አማራጭመንገዶችን እጠቀማለሁ□

ለ. ወደ ጠፍ ተቋማት እሄዳለሁ□ መ. ወደ ባህላዊ መድሃኒት ቤቶች እሄዳለሁ□

33. ወደ ጠፍ ተቋማት ካልሄዱእንዳይሄዱያደረገዎት ምክንያት ምንድን ነው?

ሀ. ገንዘብ ስለሌለኝ□ መ. በትራንስፖርት ምክንያት□

ለ. የጠፍ ባለሙያዎችን ስለማላምናቸው□ ሠ. ስራ ትቼ መሄድ ስለሚልችል□

ሐ.ወደየት መሄድእንዳለብኝ ባለማወቄ□ ረ.የጠፍ ባለሙያዎች አመለካከት ስለሚይመቸኝ□