RISK FACTORS ASSOCIATED WITH TB CO-INFECTION IN HIV/AIDS PATIENTS TAKING ANTIRETROVIRAL THERAPY (ART) IN ONE OF THE PUBLIC HEALTH FACILITIES IN ETHIOPIA

by

OBSA AMENTE MEGERSA

Submitted in accordance with the requirements

For the degree of

MASTER OF PUBLIC HEALTH

In the subject

Public Health

At the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF. NA PHALADZE

July 2013

D E D I C A T I O N

To all people who lost their lives because of HIV and Aids.

Student number: **4716-409-3**

D E C L A R A T I O N

I declare that **RISK FACTORS ASSOCIATED WITH TB CO-INFECTION IN HIV and Aids PATIENTS TAKING ANTIRETROVIRAL THERAPY (ART) IN ONE OF THE PUBLIC HEALTH FACILITIES IN ETHIOPIA** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

07/20/2013

SIGNATURE DATE

(MEGERSA OA)

ACKNOWLEDGEMENTS

First of all, I would like to thank Almighty God for giving me the patience, wisdom, knowledge and strength I needed to complete this study and for always guiding me in every phase of the work.

I would like to express my sincere and heartfelt gratitude to my advisor Prof. NA Phaladze for her superb guidance and helpful feedback despite her demanding schedule.

My deep gratitude also goes to Ms Selamawit Adnew for her help at various level, great ideas and ever growing kindness for me and who has been positive for me all the time in my study.

I am also grateful to Nekemte Health Science College staff, Nekemte Hospital staff and Nekemte City health bureau staff for their invaluable help in my study.

Last but not least, my special thanks go to my beloved families (Mom, Dad, Brothers and Sisters) who were always there supporting and encouraging me to complete my study.

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STUDENT NUMBER: 4716-409-3

STUDENT: MEGERSA OA

DEGREE: MASTER OF PUBLIC HEALTH

DEPARTMENT: HEALTH STUDIES, UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF. NA PHALADZE

ABSTRACT

Purpose: The purpose of this study is to assess risk factors associated with TB co-infection in HIV/AIDS patients taking antiretroviral therapy (ART).

Methodology: An observational, analytic, case-control and quantitative study was conducted on a randomly selected 367 HIV and AIDS patients of whom 92 of them were TB co-infected. Data collection was done by using self-structured questionnaire.

Result: In this study, educational status, waste disposal system, monthly income, contact history with a patient of active tuberculosis or presence of a family member with active tuberculosis, drug adherence, knowledge on tuberculosis prevention and history of exposure to substance were factors independently associated with the occurrence of active tuberculosis among HIV and Aids patients taking ART.

Conclusion: The findings highlight the need for on-going educational, informational and other interventions to address the risk factors of tuberculosis in HIV and Aids patients in order to decrease the rate of TB co-infection.

KEY TERMS:

Antiretroviral therapy, Cases, Case-control study, Controls, Drug adherence, HIV/AIDS, Risk factors, Public health facility, Tuberculosis, TB/HIV co-infection

ABBREVATIONS USED IN THIS STUDY

AIDS = Acquired Immune Deficiency Syndrome

ARV = Anti-retroviral

ART = Anti-retroviral Therapy

CPT= Cotrimoxazole Prophylaxis Therapy

DOTS= Direct Observed Treatment Short course

FHAPCO= Federal HIV/AIDS Prevention and Control Office

FMOH = Federal Ministry of Health

HCT= HIV Counselling and Testing

HIV = Human Immunodeficiency Virus

IPT= Isoniazid Preventive therapy

TB = Tuberculosis

TB/HIV= Tuberculosis and HIV co-infection

PLWHIV= People Living with HIV

PMTCT= Prevention of Mother to Child Transmission

UNAIDS = The Joint United Nations Programs on HIV/AIDS

UNISA = University of South Africa

VHCT= Voluntary HIV Counselling and Testing

WHO = World Health Organization

Table of contents

Contents **Page**

List of Tables **Page**

List of Figures **Page**

Annexure

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

The global impact of the converging dual epidemics of tuberculosis (TB) and human immunodeficiency virus (HIV) are major public health challenges of our time. Tuberculosis is the most common opportunistic infection and leading cause of death in HIV-infected patients (Swaminathan and Narendran 2008: 527). Tuberculosis and HIV combined are responsible for the deaths of over 4 million people annually. TB is one of the most common infections that threaten people living with HIV in the developing world. The World Health Organization (WHO) reports that from 9.2 million new cases of TB in 2006, 7.7% were HIV infected and of the 1.7 million deaths from TB in 2008, almost one third were people co-infected with HIV or AIDS (WHO, 2009: 2).

There were an estimated 1.1 million HIV positive TB patients globally in 2009. Around 80% of these patients live in sub Saharan Africa. In 2009, 380,000 people died of HIV associated Tuberculosis. It is the most common presenting illness among people living with HIV including those who are taking antiretroviral therapy (ART). At least one third of the 33.3 million people living with HIV worldwide are infected with Tuberculosis. (WHO 2011: 1-3).

Infection with Human Immunodeficiency Virus (HIV) is an established risk factor for acquiring and developing infection with tuberculosis, and the recent increase in the worldwide prevalence of HIV infection has contributed to the rising global incidence of TB (Corbett et al 2003:1009-1021; Dye et al 1999: 677-686). Over two-thirds of the 15 million cases of dual-HIV/TB infection reported reside in sub-Saharan Africa. However, as HIV expands in other parts of the world, such as in South-east Asia, the interaction between these two pathogens will continue to expand and compound the health issues related to both infections (Kumar 1999:1010-1011).

HIV infected patients on antiretroviral therapy (ART) have a Tuberculosis incidence rate of 5.4 cases/100 patient-years, approximately 10-fold higher than tuberculosis incidence rates in HIV negative patients in the same community. Contact with infectious person, lack of knowledge on how to prevent Tuberculosis, environmental factors like poor ventilation, residence area, gender, and previous history of Tuberculosis are among the risk factors associated with the occurrence of Tuberculosis in HIV and Aids patients on ART (Nicholas et al 2008:1).

Ethiopia is one of the sub-Saharan African countries most severely affected by TB and HIV and Aids epidemic. The national single HIV and Aids prevalence rate among adults was estimated to be 2.4% for the year 2010. The country is one of the top ten high TB burden countries with an incidence rate of 341/100,000 of which 31% of TB patients are HIV positive (Federal HIV and Aids Prevention and Control Office, 2010). The distribution of TB/HIV co-infection by region shows there is greater prevalence in Oromia region of Ethiopia and Nekemte town, where this study was conducted, is one of the largest towns in Oromia region located to the west part of the country about 331km away from Addis Ababa.(FMOH, Health and Health related Indicators, 2007/8: 33).

1.2 BACKGROUND INFORMATION

The effect of HIV on TB is better understood as it is more straightforward than the effect of Tuberculosis on HIV disease progression. The immune system uses CD4 cells to defend the body against tuberculosis, and a decline in CD4 cells (due to HIV) thus lessens the immune system's ability to prevent the growth and spread of Mycobacterium tuberculosis. Additionally, a weakened immune system allows the dissemination of the bacteria to areas other than the lungs, which explains the increased likelihood of extra pulmonary TB among HIV positive individuals (WHO 2004:36-39).

TB has a more technical interaction with HIV and is thought to increase HIV replication and viral load, thus worsening the course of HIV related immunodeficiency. Much research has been done to reveal the mechanisms by which these interactions occur and the general consensus is that both promoter enhancement and cytokine activity play key roles in the heightened HIV activity seen in the presence of Mycobacterium tuberculosis. (Subramanyam et al 2004: 101-106). Research also shows that TB may reactivate latent

HIV in monocytes recruited to sites of Mycobacterium Tuberculosis infection via a stimulatory transcription factor and that latent HIV reservoirs are established at sites of mycobacterium tuberculosis infection (Weiden et al 2000: 2028-2039). There is also evidence that TB increases systemic HIV heterogeneity which could have future implications for resistance to antiretroviral (ARV) drugs (Collins et al 2001: 233-238).

TB and HIV co-infected patients have a lower quality of life in all domains as compared to HIV infected patients without active TB. In co-infected patients, individuals who had depression were 8.8 times more likely to have poor physical health as compared to individuals who had no depression (Deribew et al 2009:105).

1.3 RESEARCH PROBLEM

A comprehensive strategy focusing on major risk factors of TB is essential to achieve the 'Stop TB' partnership targets (Dye et al 2006: 460-462). Risk factors of TB can be categorized as distal or proximate. Distal risk factors such as socio-economic status contribute to the development of TB indirectly whereas proximate determinants include those that increase exposure to the infectious agent such as crowding and that impair the host immune system. Assessment of proximate determinants of TB which are amenable to interventions such as the host and environmental factors help to target strategies (Lonnroth et al 2009: 2240-2246). Several studies on risk factors of TB were conducted in the general population but the proximate determinants of active TB among HIV patients are not well elucidated in countries with limited resources (Lienhardt et al 2005: 914-923).

A recent review of tuberculosis in Ethiopia noted that 'existing information on the association between HIV and TB in Ethiopia is limited'. Although hospital-based cross sectional studies in Ethiopia have reported that most of tuberculosis patients were co-infected with HIV (Kassu et al 2007: 116-122), with recent estimates ranging from 46% to 65%, no analyses have assessed the risk factors of TB in HIV and Aids patients on ART in Ethiopia both at a national and regional level.

1.4 RESEARCH PURPOSE

The aim of the study was to assess risk factors associated with tuberculosis co-infection among HIV and Aids patients taking ART.

1.5 RESEARCH OBJECTIVES

The objectives of this research were to:

- Determine the socio demographic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.
- Identify behavioural and economic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.
- Assess knowledge on TB co-infection among HIV/Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.

1.6 FOUNDATION OF THE STUDY

The theoretical framework of the study is based on the assumption that the possibility of individuals infected with HIV and Aids to get infected with tuberculosis is highly dependent on their knowledge of TB and HIV co-infection, their socio-economic status, risk behaviours such as exposure to substances, the frequency of regular monitoring CD4 level, and their level of drug adherence. Prevention of TB co-infection can also decrease morbidity and mortality rate among patients on ART, and this in turn would increase their productivity. This also indicates that when individuals are aware of the overall aspect of TB co-morbidity, their health service seeking behaviour will positively change. Therefore, the framework shows that it is the responsibility of health care delivery institutions, health professionals, government bodies, and different stakeholders to tackle the problem by taking different measures such as poverty reduction, equipping the health facilities with equipment and supplies, increasing awareness of the community on the problem, and formulating appropriate policy.

1.7 SIGNIFICANCE OF THE STUDY

Despite the increasing number of TB/HIV co-infection in Ethiopia, little is known about what predisposes patients on antiretroviral therapy (ART) to TB co-infection. Therefore, the findings of this study provide information about risk factors to improve areas of health care services regarding the prevention and TB/HIV management. The study also serves as a baseline for further studies. The study findings also directly or indirectly could benefit the policy makers, researcher, participants, and the community in general.

1.8 ETHICAL CONSIDERATIONS

Before conducting the study, ethical clearance was obtained from Higher Degrees Committee of the Department of Health Studies of the University of South Africa. Institutional consent was obtained from Nekemte city health bureau and Nekemte hospital. The ethical protection of respondents was maintained throughout this study.

1.9 RESEARCH METHODOLOGY

1.9.1 Research Design

A case control study design was used to assess the risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy (ART) in Nekemte Hospital, Western Ethiopia.

1.9.2 Research Setting

The research was conducted in Nekemte town, in the Western part of Ethiopia which has six sub cities. According to Nekemte town municipality statistics office, the total population of the town in 2008/9 was 90,605. Among these 44,396 are males and 46,209 are females. There are five governmental health institutions (One hospital, two health centres, and two pharmacies) in the city.

1.9.3 Population and Sample

The research population consisted of all HIV and Aids patients who are both co infected and non co infected with Tuberculosis who have access to ART service in public health facilities in Nekemte town.

1.10 DEFINITIONS OF KEY CONCEPTS

Acquired immunodeficiency syndrome (AIDS)-is a disease of immune system caused by infection with a retro virus HIV.

Active Tuberculosis-TB that has been confirmed by clinical and positive sputum smear or chest x-ray result suggestive of TB

Antiretroviral therapy(ART) - A name given to treatment regimens recommended by leading HIV experts to aggressively suppress viral replication and progress of HIV disease.

CD4 count- a way of measuring immune-competency by counting the lymphocyte that carries the CD4 molecules

Co-infection -The existence of two or more disease at a time.

Human immunodeficiency virus (HIV)-is a virus that attacks the CD4 cells or T cells that are responsible for the body's defence system.

Public health facility- Is a Government owned health service delivery institution serving the community at a reasonable cost.

Risk Factor- A feature of somebody's habits, socio-economic, environmental, genetic makeup or personal history that increases the probability of disease or harm to health.

Tuberculosis- is an infectious disease that causes small rounded Tubercles to form on mucous membranes, especially pulmonary tuberculosis that affects the lungs.

1.11 ORGANISATION OF THE DISSERTATION

The Research has the following Chapters:

Chapter 1: Orientation to the study

Chapter 2: Literature review

Chapter 3: Research methodology

Chapter 4: Presentation and discussion of research results

Chapter 5: Conclusions, limitations and recommendations

1.12 CONCLUSION

This chapter presented an introduction, background of the research problem both globally and in Ethiopian context, research purpose, research objectives, foundations of the study, significance of the study, ethical considerations, research methodology, and definitions of key concepts.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents the Global situation of TB, TB and HIV, HIV and AIDS, and the situation in sub-Saharan Africa and lastly the situation in Ethiopia. Secondary sources such as books, policy documents, electronic resources, and journal articles on risk factors on TB/HIV co-infection were used in the literature review.

Volmink (2007: 66) states that a literature review is indispensable if one wants to know

1) The current state of knowledge about any given subject,
2) What still needs to be studied so that the direction of future research can be efficiently determined, and
3) How available resources should be optimally allocated and distributed.

The outline of the literature review is:

- Global HIV and Aids
- HIV and Aids in sub Saharan Africa
- HIV and Aids in Ethiopia
- Global TB infection
- TB in Africa
- TB in Ethiopia
- TB/HIV co-infection

2.2 GLOBAL HIV and AIDS

Since its detection in 1981, HIV and Aids has become one of the most challenging problems of our age. There are 34.2 million people living with HIV, 2.5 million new HIV infections and 1.7 million deaths due to AIDS worldwide in 2011. From the total number of people living with HIV in 2011, 30.7 million are adults, 16.7 million are women and about 3.4 million are children below the age of 15. From these 2.2 million Adults and 330,000 under 15 age group are people newly infected with HIV in 2011. In addition, out of the total 1.7 million deaths in 2011, 230,000 are children below 15 years of age while the rest are adults (UNAIDS/WHO, 2012: 2-3).

At the end of 2010, an estimated 34 million people were living with HIV worldwide, a 17% increase from 2001. This reflects the continued large number of new HIV infections and a significant expansion of access to antiretroviral therapy, which has helped reduce AIDS-related deaths, especially in more recent years. The number of people dying of AIDS-related causes fell to 1.8 million in 2010, down from a peak of 2.2 million in the mid-2000s. A total of 2.5 million deaths have been averted in low- and middle-income countries since 1995 due to antiretroviral therapy being introduced, according to new calculations by UNAIDS. Much of that success has come in the past two years when rapid scale-up of access to treatment occurred; in 2010 alone, 700, 000 AIDS related deaths were averted. The proportion of women living with HIV has remained stable at 50% globally. There were 2.7 million new HIV infections in 2010, including an estimated 390, 000 among children. This was 15% less than in 2001, and 21% below the number of new infections at the peak of the epidemic in 1997. The number of people becoming infected with HIV is continuing to fall, in some countries more rapidly than others. HIV incidence has fallen in 33 countries, 22 of them in sub-Saharan Africa, the region most affected by the AIDS epidemic. The number of new infections has been falling worldwide yet the prevalence rate of HIV is still high. During this same time, the availability of antiretroviral drug therapy has increased the survival rate of people living with HIV (UNAIDS 2010: 22).

2.3 HIV AND AIDS IN SUB SAHARAN AFRICA

Sub-Saharan Africa remains the region most heavily affected by HIV. In 2010, about 68% of all people living with HIV resided in sub-Saharan Africa, a region with only 12% of the global population. Sub-Saharan Africa also accounted for 70% of new HIV infections in 2010, although there was a notable decline in the regional rate of new infections. The epidemic continues to be most severe in southern Africa, with South Africa having more people living with HIV (an estimated 5.6 million) than any other country in the world. Almost half of the deaths from AIDS-related illnesses in 2010 occurred in southern Africa. AIDS has claimed at least one million lives annually in sub-Saharan Africa since 1998. Since then, however, AIDS-related deaths have steadily decreased, as free antiretroviral therapy has become more widely available in the region. The total number of new HIV infections in

sub-Saharan Africa has dropped by more than 26%, down to 1.9 million from the estimated 2.6 million at the height of the epidemic in 1997. In 22 sub-Saharan countries, research shows HIV incidence declined by more than 25% between 2001 and 2009 (UNAIDS 2011: 7).

The recent regional HIV and Aids statistics shows that there are 23.5 million (22.2 million-24.7 million) adults and children living with HIV, 1.7 million adults and children newly infected with HIV, 1.2 million adult and child death due to AIDS and 4.8% adult prevalence of HIV in sub Saharan Africa in 2011 (UNAIDS 2012: 2-4).

2.4 HIV AND AIDS IN ETHIOPIA

In Ethiopia the first two AIDS cases were reported in 1986. Since then, the prevalence rate has continuously increased until the year 2000 when it begun to show some decline (Merso 2007/8: 36). According to Ethiopia's 2007 single point estimates, the national adult (ages 15-49 years) HIV prevalence for 2008 is 2.2% (male 1.8% and female 2.6%), with an urban and rural HIV prevalence of 7.7 percent and 0.9 percent, respectively. Since the first two reported AIDS cases in 1986, deaths have spread at an alarming rate throughout the country (FMOH/FHAPCO, 2007: 44). As the single point estimate shows, HIV prevalence in urban Ethiopia is nearly nine times higher than in rural areas. This finding is consistent with 2006 antenatal surveillance (FMOH and FHAPCO 2006 and 2007) and the 2005 Ethiopia Demographic and Health Survey (Central Statistical Agency and Macro International 2006: 238). In terms of current HIV epidemiology, prevalence data indicate a far less generalized epidemic in Ethiopia than previously believed. The epidemic is concentrated in urban and peri-urban areas and more prevalent among women than men. The nature of the epidemic in Ethiopia, therefore, calls for targeted HIV and Aids interventions (FHAPCO and World Bank 2008: 29). The same report estimated that there are 1,037,267 people living with HIV (PLHIV) in the country, of which 289,734 are in need of antiretroviral treatment (ART). In 2008, 886,820 children below the age of 17 have lost one or both of their parents to HIV and Aids.

The HIV epidemic in Ethiopia is generally considered to be high, with increasing levels of economic hardship, expanding urbanisation, increased mobility due to labour migration, a history of conflicts and civil disruption, and better educational and trading opportunities facilitating the spread. Conducting research and disaggregating data to the district level in order to identify population groups at higher risk are mandatory to expand services such as VHCT, treatment of sexually transmitted infections, antenatal and postnatal prevention of mother to child transmission (PMTCT), TB/HIV integration, and services targeted to specific populations, including youth, students, sex workers, migrants, refugees and other displaced populations, and the uniformed services (The World Bank 2008: 49).

2.5 GLOBAL TB INFECTION

One third of the world's population is infected by *Mycobacterium tuberculosis*, the bacterium that causes TB. There were an estimated 9.2 million new TB cases and 1.5 million TB deaths in 2006, including 0.2 million deaths among people infected with HIV. TB remains a major cause of morbidity and mortality in many countries and a significant public health problem worldwide. The global incidence of TB was estimated to be 139 cases per 100,000 in 2006. Ninety-five percent of these cases and 98 percent of TB deaths occur in developing countries, affecting mostly (75 percent) persons in the economically productive age group (15–50 years) (Dara et al 2009:13).

In 2008, there were an estimated 9.4 (range, 8.9-9.9 million) million incident cases (equivalent to 139 cases per 100,000 population) of tuberculosis (TB) globally. This is an increase from the 9.3 million TB cases estimated to have occurred in 2007, as slow reductions in incidence rates per capita continue to be outweighed by increases in population. Most of the estimated number of cases in 2008 occurred in Asia (55%) and Africa (30%), with small proportions of cases in the Eastern Mediterranean Region (7%), the European Region (5%) and the Region of the Americas (3%). The 22 high-burden countries (High-Burden Countries, defined as the countries that rank first to 22nd in terms of absolute numbers of cases and which have received particular attention at the global level since 2000) account for 80% of all estimated cases worldwide (Nigatu & Abraha 2010:376).

TB is the leading cause of death among people living with HIV. Almost one in four deaths among people with HIV is due to TB. In 2009, 380,000 people died of HIV-associated TB worldwide. It is also the most common presenting illness among people living with HIV, including those who are taking antiretroviral treatment. There was an estimated 1.1 million HIV positive TB patients globally in 2009 and 80% of the patients live in sub-Saharan Africa. At least one-third of the 33.3 million people living with HIV worldwide are infected with TB. Persons co-infected with TB and HIV are 20-30 times more likely to develop active TB disease than persons without HIV (WHO 2010: 1).

According to WHO (2011: 1), the number of people who fell ill with TB dropped to 8.8 million in 2010, including 1.1 million cases among people with HIV. The number has been falling since 2005. The estimated global incidence rate fell to 128 cases per 100,000 populations in 2010, after an increase in 2002 at 141 cases per 100,000. The rate is falling but very slowly. The number of people who died from TB fell to 1.4 million in 2010.

2.6 TB IN AFRICA

The burden of TB in sub-Saharan Africa is far greater today. Continuing poverty and political instability in parts of the continent has inhibited the progress in implementing effective TB control measures. Southeast Asia has the highest number of new Tuberculosis (TB) infection annually, but sub Saharan Africa has a TB incidence rate double that of Southeast Asia and the highest number of TB related deaths in the world as well as the highest per capita TB mortality. South Africa and Nigeria have the fourth and fifth largest numbers of new TB cases annually; however, South Africa, has the highest prevalence, incidence, and death rate per capita worldwide (Jennifer 2009: 4-5).

In sub-Saharan Africa, the number of new TB cases continues to rise at 3–5 percent per year despite the DOTS program until around 2005, and the efforts to control the disease are challenged by the problem of co-infection with HIV. In 2003, 33 percent of new TB cases in this region were adults who were also infected with HIV, that is approximately 12 million adults co-infected with TB and HIV (World Bank 2008: 28-29).

2.7 TB IN ETHIOPIA

Ethiopia has a total population of above 80 million with 86.2% living in the agrarian regions [Oromiya, Amhara, Southern Nations Nationalities and Peoples Region (SNNR) and Tigray regions]. The rest 9.2% and 4.6% live in the pastoral areas of Gambella, Somali, Benshangul-Gumuz and Afar regions, and urban Addis Ababa, Diredawa and Hareri (Central statistical authority, 2007). Ethiopia ranks seventh among the world's 22 high-burden TB countries. The country had an estimated 306,330 TB cases in 2006, with an estimated incidence rate of 379 cases per 100,000 population. The Stop TB Strategy is the approach recommended by WHO to reduce the burden of TB in line with global targets set for 2015 (WHO 2008: 105-108).

2.8 TB/HIV COINFECTION

Worldwide, tuberculosis is the most common cause of death among patients with AIDS, killing 1 of every 3 patients (Raviglione et al 1995: 220-226). The lifetime risk of tuberculosis in immune competent persons is 5% to 10%, but in HIV positive individuals, there is a 5% to 15% annual risk of developing active TB. Tuberculosis is the leading cause of death in HIV positive individuals accounting for approximately one-third of AIDS deaths in the developing world and 11% of AIDS deaths worldwide (Swaminathan et al 2000: 839-844).

Ethiopia was among the first few African countries to introduce ART in 2003, in selected health facilities following the issuance of the national antiretroviral drugs (ARVs) supply and use policy in 2002. The Ethiopian free ART scheme was launched in 2005 (FMOH 2007: 14).

The introduction of provider initiated testing and counselling in most public health facilities has improved HIV screening among TB patients from 16% in 2007 to 38% in 2009. A total of 56,040 TB patients were tested for HIV, of which 11,118 (20%) were found to be HIV positive. In addition, a total of 24,112 HIV-positive people were referred from HCT, chronic HIV and ART clinics for TB screening out of which 4,154 (17.2%) were found to have active TB and 2,403 (10%) with latent TB, and hence put on IPT. The proportion of HIV-positive

patients who were screened for TB increased from 25% in 2007 to 55% in 2009. Furthermore, in the fiscal year July 2008 through June 2009, 68% of HIV-positive patients with TB were put on Cotrimoxazole prophylaxis therapy (CPT) and 41% had started ART (FHAPCO 2010: 49-50)

The Ethiopian Federal HIV/AIDS Prevent ion and Control Office (FHAPCO 2010: 53-54) reports that TB indicators remained stable between 2008 and 2009, with TB case detection rate at 34% (below the national target of 67.8%). TB treatment success rate was at 84% and those successfully treated were 67% in the year 2008. These indicators have shown a gradual increase over the past ten years. In 2009, 33,069 new sputum smear positive TB cases were detected. The report also showed that the number of TB cases detected were way below the planned target, which was due to a combination of factors that includes lack of integration of TB case finding in all out patient departments (OPDs) of health facilities as part of PICT, the lack of stronger involvement of Health Extension Workers (HEWs), lack of provision of services by some health facilities, inadequate training and supervision on improvement of TB success rate with less emphasis on detection rate, lack of functional laboratories in many health facilities, and inadequate skill of some laboratory technicians on how to do proper microscopic examination using the Acid Fast Bacilli (AFB) staining.

Unfortunately, knowledge of the real extent of TB/HIV co-infection is limited due to insufficient surveillance data. However, there are a lot of risk factors contributing for the occurrence of TB co-infection in HIV and Aids patients including contact with active cases of pulmonary TB, coexisting risk factors and vulnerability factors such as injecting drug use, alcohol abuse and incarceration (WHO 2006:136-137).

According to Mohammed et al (2011:131-139), determinants of active Tuberculosis in HIV/AIDS patients include factors such as socio-economic status which include ownership of house, income, residence, marital status, occupation and education. There are also proximate determinants which include the age, sex, previous history of TB, WHO staging, infection with helminthes and Body Mass Index (BMI). Environmental factors like number of rooms, crowding, waste disposal, type of house, and presence of separate kitchen also contribute to the occurrence of TB co-infection in HIV and Aids patients. However, this study was not able to differentiate the risk factors among HIV and Aids patients who were on ART and those who were not.

2.9 CONCLUSION

The chapter on literature review presented and discussed HIV and Aids, TB, and TB/HIV in global, sub Saharan Africa and Ethiopian context. It also presented and discussed risk factors causing TB co-infection among HIV and Aids patients on antiretroviral therapy (ART). The study tried to explore different socioeconomic, demographic, environmental, and behavioral factors related to TB and HIV co-infection.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes research methods, research design, population and sample selection, data collection, data collection tools and procedures, reliability of the research instrument, criterion-related validity, data entry and analysis. The chapter also discusses ethical considerations and provides conclusions.

3.2 RESEARCH DESIGN

The research design is an overall plan for addressing a research question, including specifications for enhancing the study's integrity (Polit & Beck 2008: 765). The research design involves a plan, structure and strategy of the study. These three research design concepts guide a researcher in writing the research questions, conducting the project, and in analysing and evaluating the data (Haber & Lobiondo-Wood 2006:202).

Research design is the structured approach followed by researchers to answer a particular research question. It is also the architecture of the study, because the choice of the study design determines how we sample the population, collect measurements and analyze the data (Joubert & Ehrlich 2007:77). The quantitative approach provides a method to collect statistical data for analysis and reporting. The main purpose of a scientific research is to explore the association among primary variables in an effort to gain a better understanding of the phenomena under study (Haber & Lobiondo-Wood 2006: 206).

This study employs an observational analytic case control study design to assess risk factors associated with TB co-infection in HIV and Aids patients taking ART in Nekemte hospital, Western Ethiopia.

3.2.1 Rationale for choosing quantitative paradigm

This design was chosen because quantitative paradigm tends to measure numeric information using structured questionnaire. It emphasizes objectivity in the collection of data and analysis of information. Data will be analysed through statistical procedures (Polit and Beck 2008: 14-17; Burns and Groves 2005: 23-24).

3.2.2 Observational Study Design

Observational study design is a kind of research design that does not involve experimental intervention. It is a study in which data are collected through direct observation (Polit & Beck 2008: 760). In an observational study, the researcher measures exposures and outcomes without any personal intervention or manipulation of the research context so that the outcomes that occur are actually a product of the natural setting in which the phenomena are located (Morroni & Myer 2007: 77).

3.2.3 Analytic research Design

A study design in which the association between two variables is studied is called an analytical research design (Morroni & Myer 2007: 78).The purpose of an analytical research design is therefore to identify the factors that predict or cause a disease or a predetermined condition by examining the relationships that obtain between independent and dependent variables (Morroni & Myer 2007: 78).

3.2.4 Case control research design

A case control study design is a non-experimental study design involving the comparison of a case, that is, (a person with the condition under scrutiny) and a control (a person without a condition) (Polit & Beck 2008: 748).

3.3 RESEARCH METHODS

Research methods are techniques researchers use to structure a study and to gather and analyze information relevant to a research question (Polit & Beck 2008: 15).This section describes the study setting, population, sample and sample size, method of data collection, and data analysis.

3.3.1 Study Setting and Period

The study was carried out in one of the public health facilities in Nekemte town, East Wollega Zone Oromia region, West Ethiopia.

Nekemte town is found in Western part of Oromia which is 331kilometers away from Addis Ababa. The town has six sub cities. According to Nekemte town municipality statistics office, the total population of the town in 2008/9 was 90,605. Among these 44,396 are males and 46,209 are females. There are 5 governmental health institutions (1 hospital, 2 health centres, and 2 pharmacy), 8 nongovernmental (1 health centre, 2 medium and 2 junior clinics, 1 eye clinic, and 1 drug store), and about 44 private owned health institutions (4 higher, 7 medium, and 14 junior clinics, 1 dental clinic, 3 pharmacies, 6 drug stores, 3 wholesalers, and 5 rural drug vendors).

Nekemte Hospital serves more than 2 million people as a referral hospital in the Western Oromia providing the community with different preventive, curative and rehabilitative health service. The duration of the study was from June 2012 to September 2012.

3.3.2 Target (Study) Population

Polit and Beck (2008:767) describes target population as the entire population in which a researcher is interested and to which he or she would like to generalize the study results. The target population of this study are all adults above 18 years of age who are: (i) infected with HIV and Aids, (ii) HIV positive patients co infected with TB and (iii) HIV positive patients not co infected with tuberculosis but are currently taking antiretroviral therapy from Nekemte hospital.

3.3.3. Sample

Polit and Beck (2008: 765) pointed out that a sample is a subset of a population selected to participate in a study. Selecting a sample from total population has many reasons such as economy, timeliness, the large size of many populations, inaccessibility of some of the population, destructiveness of the observation and accuracy.

3.3.3.1 Sampling procedure

According to Polit and Beck (2008: 765), sampling is a procedure of selecting a portion of the population to represent the entire population. Simple random sampling is, a basic probability sampling technique which involves random selection of participants from a sampling frame. In this study simple random sampling was used to select the total number of patients/participants that were required for the study. This sampling technique allows the researcher to generalize the results of the study to the target population and each individual in the population has equal an chance of being included in the sample. Sampling frame is a list or some representation of a study population, either of individuals or of groups of individuals (Joubert & Ehrlich 2007: 95). For this study, the sampling frame was obtained from the database of Nekemte hospital registration book for all patients who are on antiretroviral therapy.

3.3.3.2 Sampling Criteria

In this study, the following inclusion criteria were used/applied:

- Participants who were 18 years of age and above
- Participants who have been on antiretroviral therapy for at least one year.
- Participants who were either co infected or not co infected with TB.
- Participants who were willing to give their informed consent to participate in the study.

The exclusion criteria include participants:

- Less than 18 years
- Mentally disabled
- Who had opportunistic infection (other than TB) or known chronic illness like diabetes mellitus, cardiovascular disease or hypertension.
- Had prior history of TB (who are currently not active TB patient)

3.3.3.3 Sample Size

Sample size is the number of respondents who are necessary for the achievement of a statistically valid conclusion (Polit & Beck 2008: 348). This requirement dictates the minimum number of participants who have to be included in the sample. The sample size was calculated by Epi-Info 2 using two sample proportion formulae. The calculation is based on the 0.05 alpha level, 80% statistical power, 3:1 ratio of controls to cases, and 2.0 desired OR level and 5% non-response rate. Therefore, 92 cases and 275 controls will be included in the study with a total sample size of 367.

3.4 DATA COLLECTION

Data collection was carried out in the health institution by training nurses who work in ART and TB clinics using a standard questionnaire after obtaining informed consent from each participant. The objective of the study was explained to each participant and the data collection was conducted in a private room up on client exit. Data collection was supervised by the investigator on a regular basis. The participants did not need to be literate. In addition, personal contact can facilitate the response and quality information (Joubert & Ehrlich 2007:108).

3.4.1 Data collection instrument

A structured questionnaire was used to gather information concerning risk factors of tuberculosis co-infection among HIV and Aids patients who are taking antiretroviral therapy. The questionnaire was designed to gather socio demographic characteristics, social conditions, health seeking behaviour, knowledge about TB/HIV and risk behaviours among research participants.

3.4.2 Reliability of data collection instrument

Reliability refers to the degree to which a data collection instrument provides consistent information. It is also concerned with the instrument’s stability and accuracy (Polit and Beck 2008: 416-420). The reliability of a research instrument refers to the precision and accuracy with which a test is able to obtain the data for which it was designed even if the research instrument is used again and again (Myer & Karim 2007: 155).

In order to keep the reliability of data collection instrument, the researcher carefully designed the questionnaire and trained the field workers about data collection instrument and process. The research instrument was tested in a health facility where the study was not conducted and necessary adjustments were made in the data collection instrument. The researcher was supervising the data collection process and was correcting any issues that raised during the data collection period.

3.4.3 Validity of data collection instrument

Validity refers to the certainty of a data collection instrument to measure what it is supposed to measure in the context it is used. The validity of research instrument refers to how accurate a research instrument measures what it is supposed to measure (Myer & Karim 2007: 156). In this study, a questionnaire was designed to measure the risk factors associated with TB co-infection. After pre-test of the data collection instrument, the feedback from the pre-test is incorporated to the actual data collection instrument. In addition, to address the issue of face and content validity, the researcher has attempted to determine whether the content of the questionnaire has adequately addressed the research topic.

3.4.4 Pre testing of data collection instrument

After translating the data collection instrument in to the local language, the researcher undertook pre test on 30 respondents; that is 20 patients not co infected with TB and 10 patients co infected with TB in a health centre which provides ART service and which was not part of the study. During pre-test the questionnaire was checked for its clarity, simplicity, comprehensiveness and coherence. Based on the results obtained from the pre-test, corrections were made to the questionnaire. The comments raised as limitations and wording problems during the pre-test were corrected and incorporated to the final questionnaire in addition to the comments given by the researcher’s colleague. Finally there was little change on part three of the questionnaire.

3.4.5 Data Collection Procedure

Training was given to all field workers (nurses working in the TB/HIV clinic) before the start of data collection process. The questionnaire was prepared in English then translated to local language (Afan Oromo) and again back to English to check for its consistency. Before the actual data collection process took place, the data collection instrument was pre-tested in another health institution. The data collectors read the consent to the respondents and after signing the consent the respondents were asked questions to respond to the questionnaire by field workers.

3.5 ETHICAL CONSIDERATION

Joubert and Ehrlich (2007: 30) define ethics as a theory or a system of moral values and rules or standards governing the conduct of a person or the members of a profession.

3.5.1 Ethical clearance and Informed Consent

Ethical clearance was obtained from Higher Degrees Committee of the Department of Health Studies of the University of South Africa with a certificate no. HSHDC/62/2012. Institutional consent was gained from East Wollega zone Health Bureau and Nekemte city health office (Ref: 19102/WEFN/2004) to conduct the study and to seek support of health professionals of the selected health facility where the study was conducted.

The Belmont Report articulated three main ethical principles on which standards of ethical conduct in research are based: beneficence, respect for human dignity, and justice (Polit& Beck 2008: 170). In addition to this, main ethical principles that were adopted in this study are discussed below.

3.5.2 Specific Ethical Issues

In relation to the research topic (Risk Factors associated with TB co-infection in HIV and Aids patients on antiretroviral therapy (ART), research methodology and the design), the ethical issues addressed in this study are presented as follows.

Autonomy: Is negotiating and acting under the direction of the negotiation (Joubert & Ehrlich 2007: 32). Individuals have the right to choose and thus the right to know about the personal consequences of joining a study. In this study, participants were informed about the right to decide voluntarily whether to participate in a study or not and were informed that there will not be any risk or penalty prior to the data collection.

Informed consent: Involves giving participants adequate information regarding the research to enable them to comprehend the information, and have the power of free choice, enabling them to voluntarily consent to or decline participation (Polit & Beck 2008: 176). Both verbal and written informed consent were obtained from the study participants before they were interviewed by the data collectors.

Beneficence: Is the ethical obligation to maximize benefits of the study participants and to prevent harm (Polit & Beck 2008: 170). Participants in this research were treated well, the research was aimed at producing results beneficial to humankind; in this case HIV positive patients. The interview was scheduled and designed carefully to prevent any psychological discomfort.

Confidentiality: confidentiality is a pledge that any information obtained from participants will not be publicly reported in a manner that identifies them and will not be made accessible to others (Polit & Beck 2008: 180). Confidentiality and anonymity of the participants and their information was secured by using codes and not the patient's names throughout the study, so that the respondents would not be identifiable. The questionnaires were also kept in a secure place where only the researcher could access them.

Non-maleficence: participating in the study did not cause any harm to the participants because the data collection instrument was carefully designed and data collectors were health professionals who were trained (Joubert & Ehrlich 2007: 32-33).

Justice: Is the right to fair treatment and the right to privacy (Polit & Beck 2008: 173). Simple random sampling was used to select respondents so that they are selected fairly. Participant's privacy was ensured throughout the study by conducting the interview in a private room.

3.6 DATA ENTRY AND ANALYSIS

Data were entered and cleaned by running frequency of the variables using statistical package for social science (SPSS) for windows version 16.0. Frequency of dependent variables was illustrated by cross tabulation with the outcome variable. A 2x2 table was constructed and an odds ratio of 95% confidence interval was calculated to measure the association and test statistical significance. The results are illustrated in the form of frequency tables and depicted graphically in order to provide an overview of the findings.

3.7 LIMITATIONS OF THE STUDY

Since the exposure status of patients are assessed after occurrence of disease in a case control studies, case control studies that rely on interview such as this study are vulnerable to recall bias. This means that, even though the questionnaire was structured, the actual risk factors that the respondents reported might have been different if the questionnaire was self-administered. In this case the questionnaire was read to participants by their health care providers. Therefore, one cannot know if risk factors might vary among different patients in a different situation.

3.8 CONCLUSION

This chapter described the research methodology used in this study. It discussed the research design, sample, sampling procedure, data collection and its procedures, ethical consideration, data entry and analysis, and limitations of the study.

CHAPTER 4

PRESENTATION AND DISCUSSION OF RESEARCH RESULTS

4.1 INTRODUCTION

This Chapter discusses the results that emerged from the data analysis and interpretation of those results. Literature that support these findings are also included in this Chapter. The findings are presented according to the sequence in the questionnaire and are presented according to the following sub-headings: socio-demographic characteristics, social conditions, health seeking behaviour, knowledge and risky behaviour.

The purpose of this study was to assess risk factors associated with TB co-infection among HIV and Aids patients taking ART in randomly selected cases (patients who are confirmed of having tuberculosis) and controls (patients who do not have tuberculosis) in Nekemte hospital of Oromia region, Western Ethiopia.

The Objectives of the study were:

- To determine the socio demographic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.
- To identify behavioural and economic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.
- To assess knowledge on TB co-infection among HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.

In this study, data were collected from all 367 respondents (92 cases and 275 controls) were analysed using a Microsoft Software Package called the Statistical Package for Social Science (SPSS) version 16.0.

4.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS

This section presents data on the age, sex, religion, ethnicity, marital status, educational status, occupational status and residence of respondents.

Based on the result gained from the respondents during the time of interview, Table 1 below depicts the summary of the socio-demographic variables of all 367 respondents which include age, sex, religion, ethnicity, marital status, educational status, occupational status, and residence.

Table 4.1: Socio-demographic characteristics and TB co-infection in HIV and Aids patients taking ART, Western Ethiopia, 2012 (N=367).

Variables	Cases N (%)	Controls N (%)	P- Value
Age			
18-22	6 (6.5)	10 (3.6)	0.14
23-27	10 (10.9)	42 (15.3)	
28-32	26 (28.3)	76 (27.6)	
33-37	14 (15.2)	68 (24.7)	
38-42	18 (19.6)	46 (16.7)	
43-47	18 (19.6)	33 (12.0)	
Total	92 (100)	275 (100)	
Sex			
Male	44 (47.8)	132 (48.0)	0.97
Female	48 (52.2)	143 (52.0)	
Total	92 (100)	275 (100)	
Religion			
Orthodox	47 (51.1)	131 (47.6)	0.04
Muslim	12 (13.0)	27 (9.8)	
Protestant	28 (30.4)	114 (41.5)	
Others	5 (5.4)	3 (1.1)	
Total	92 (100)	275 (100)	
Ethnicity			
Oromo	61 (66.3)	222 (80.7)	<0.001
Amhara	18 (19.6)	47 (17.1)	
Others	13 (14.2)	6 (2.3))	
Total	92 (100)	275 (100)	
Marital Status			
Single	14 (15.2)	33 (12.0)	0.32
Married	44 (47.8)	155 (56.4)	
Divorced	18 (19.6)	36 (13.1)	
Widowed	16 (17.4)	51 (18.5)	
Total	92 (100)	275 (100)	

Educational Status			
No formal education	16 (17.4)	24 (8.7)	0.02
Formal education	76 (82.7)	251 (91.3)	
Total	92 (100)	275 (100)	
Occupational Status			
Unemployed	9 (9.8)	13 (4.7)	0.07
Employed	83 (90.4)	262 (95.3)	
Total	92 (100)	275 (100)	
Residence			
Urban	81 (88.0)	238 (86.5)	0.71
Rural	11 (12.0)	37 (13.5)	
Total	92 (100)	275 (100)	

There were 6.5% of cases and 3.6% of controls who were between 18 and 22 years old; 10.9% of cases and 15.3% of controls were between 23 and 27 years old; 28.3% of cases and 27.6% of controls were between 28 and 32 years old; 15.2% of cases and 24.7% of controls were between 33 and 37 years old; 19.6% of cases and 16.7% of controls were between 38 and 42 years old; 19.6% of cases and 12.0% of controls were between 43 and 47 years of age. The figure shows that 80.4% of cases and 88.0% of controls between 18 and 42 years of age. The mean age of respondents is 33.76. This implies that HIV affects mainly those who are most in a productive age group, however; TB co-infection is much higher in old age than lower age group.

The gender distribution of the respondents was 52.2% (n=48) of cases and 52.0% (n=143) of controls were Female respondents. This shows that almost equal proportion of Male and Female respondents were included in the study.

Regarding their religious affiliation, 51.1% of cases and 47.6% of controls were Orthodox Christians; 13.0% of cases and 9.8% of controls were Muslims; 30.4% of cases and 41.5% of controls were Protestants; and 5.4% of cases and 1.1% of controls belonged to the category of ‘others’. The majority of respondents in this study were Christians.

In describing ethnicity of respondents, Oromo consists of 66.3% of cases and 80.7% of controls; Amhara contributes to 19.6% of cases and 17.1% of controls; 14.2% of cases and 2.3% of controls claimed that they belong to the ethnic group categorized as ‘others’.

Out of the total number of respondents, 15.2% of cases and 12.0% of controls were single (never married); 47.8% of cases and 56.4% of controls were married; 19.6% of cases and

13.1% of controls were divorced; while 17.4% of cases and 18.5% of controls were widowed.

Respondents disclosed their highest education level they had attained prior to the interview as 17.4% of cases and 8.7% of controls had no formal education; and the rest 82.7% of cases and 91.3% of controls had formal education of which 45.7% of cases and 38.2% of controls had primary (1-8 grade) education; 27.2% of cases and 34.2% of controls had secondary (9-12 grade) education; and 9.8% of cases and 16.0% of controls had tertiary (12+) education level. These result shows the number of cases who had no formal education (17.4%) were twice as the number of controls who had no any formal education (8.7%).

During the time of interview, out of the total number of respondents 9.8% of cases and 4.7% of controls were unemployed; the rest 90.4% of cases and 95.3% of controls were employed of which 33.7% of cases and 16.4% of controls were day labourers (temporary employment); 12.0% of cases and 12.7% of controls were housemaid (temporary employment); 3.3% of cases and 10.9% of controls were farmers; 28.3% of cases and 31.3% of controls were private employees; 12.0% of cases and 17.5% of controls were government employees; and only 1.1% of cases and 6.5% of controls were NGO employees.

About 88.0% of cases and 86.5% of controls live in urban area while only 12.0% of cases and 13.5% of controls were from rural area.

Figure 4.1 below shows the age category of cases and controls and their TB status.

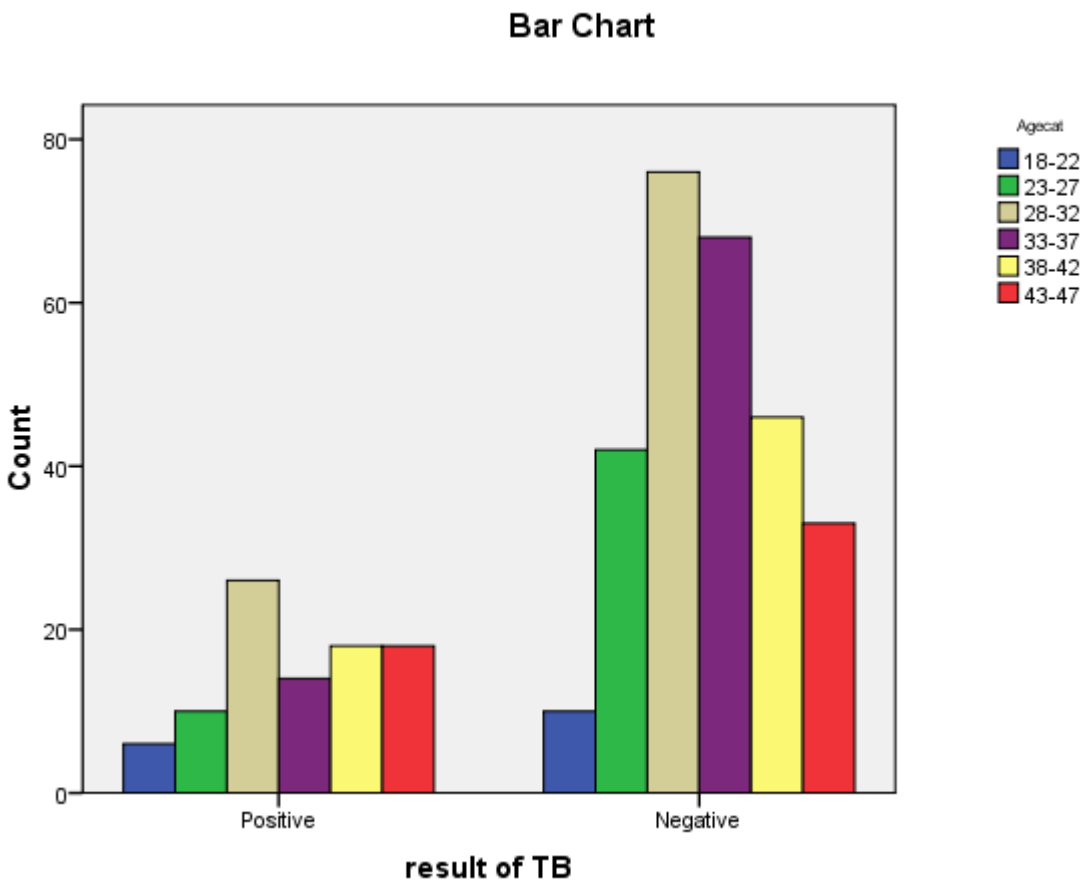

Figure 4.1 Age category and TB result of respondents (N=367)

Similarly, Figure 4.2 shows the marital status of both co infected and not co infected patients whether or not their tuberculosis result is affected by the factor.

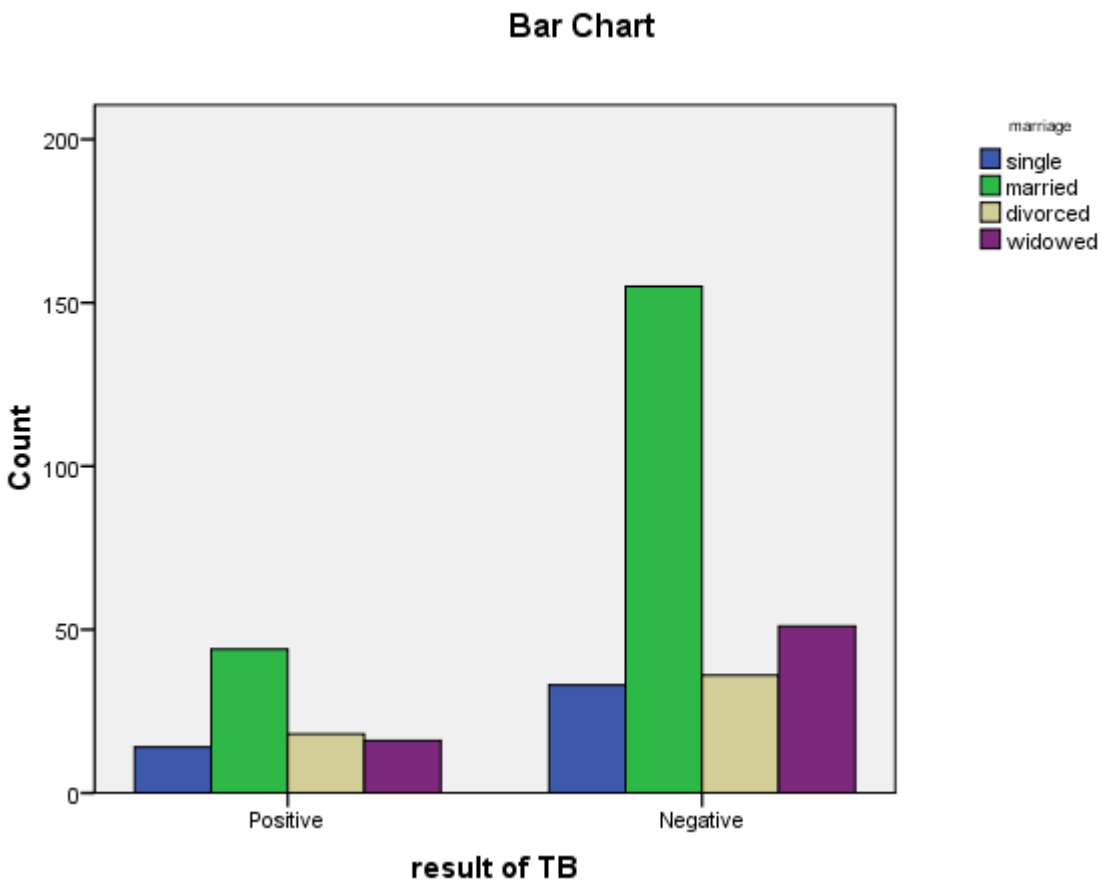

Figure 4.2 Marital status and TB result of respondents (N=367)

4.3 SOCIO-ECONOMIC CONDITIONS

This section assessed the socio-economic conditions of respondents which include housing, income, waste disposal and other socio-economic conditions.

In the analysis of the socio-economic conditions of respondents, there were no significant differences between cases and controls concerning most of socio-economic factors such as housing conditions, availability of electricity, presence of animals in the house, and also occupation.

Out of the total number of respondents, 75% of cases and 81.8% of controls live in houses with 1-3 rooms; 25% of cases and 18.2% of controls live in houses consisting of 4-6 rooms. The walls of houses in which 92.4% of cases and 88.4% of controls live were made from mud or mud bricks; while 7.6% of cases and 11.6% of controls live in the house made of

cement walls. Regarding the availability of a separate kitchen, 15.2% of cases and 18.5% of controls had no separate kitchen; the rest 84.8% of cases and 81.5% of controls had a separate kitchen. The number of respondents who had no electric service was 15 (16.3%) for cases and 44 (16.0%) for controls; while 83.7% of cases and 84% of controls had electric service.

During the time of interview 50% of cases and 26.5% of controls responded that they dispose waste inside their own compounds; and the rest 50% of cases and 73.5% of controls dispose waste outside their own compound. In describing their income, 72.8% of cases and 50.2% of controls reported that their monthly income was below 30USD (US Dollar); while the other 27.2% of cases and 49.8% of controls reported that they get a monthly income of ≥30USD (US Dollar).

Table 4.2 below gives summary of socio-economic conditions of all 367 respondents.

Table 4.2: Socio-economic characteristics and TB co-infection in HIV and Aids patients taking ART, Western Ethiopia, 2012 (N=367).

Variable	Case N (%)	Control N (%)	P-Value
Number of rooms			
1-3 rooms	69 (75.0)	225 (81.8)	0.35
4-6 rooms	23 (25.0)	50 (18.2)	
Total	92 (100)	275 (100)	
People in the room			
1-5 people	71 (77.2)	222 (80.7)	0.46
6-11 people	21 (22.8)	53 (19.3)	
Total	92 (100)	275 (100)	
Walls of the house			
Mud/Mud bricks	85 (92.4)	243 (88.4)	0.27
Cement	7 (7.6)	32 (11.6)	
Total	92 (100)	275 (100)	
Floor of the house			
Mud	58 (63.0)	173 (62.9)	0.98
Cement	34 (37.0)	102 (37.1)	
Total	92 (100)	275 (100)	
Availability of separate kitchen			
Yes	78 (84.8)	224 (81.5)	0.46
No	14 (15.2)	51 (18.5)	
Total	92 (100)	275 (100)	
Availability of Electricity			
Yes	77 (83.7)	231 (84.0)	0.94
No	15 (16.3)	44 (16.0)	

Total	92 (100)	275 (100)	
Do animals in the house			
Yes	26 (28.3)	60 (21.8)	0.20
No	66 (71.7)	215 (78.2)	
Total	92 (100)	275 (100)	
Waste disposal system			
In the compound	46 (50.0)	73 (26.5)	<0.001
Outside the compound	46 (50.0)	202 (73.5)	
Total	92 (100)	275 (100)	
Monthly income			
<30 USD	67 (72.8)	138 (50.2)	<0.001
≥30 USD	25 (27.2)	137 (49.8)	
Total	92 (100)	275 (100)	
Meals a day			
1-2	22 (23.9)	49 (17.8)	0.2
≥3	70 (76.1)	226 (82.2)	
Total	92 (100)	275 (100)	
How long to health facility			
<30 minute	39 (42.4)	142 (51.6)	0.08
30min-1hr	29 (31.5)	66 (24.0)	
Half a day	13 (14.1)	50 (18.2)	
One day	11 (12.0)	15 (5.5)	
>one day	0 (0.0)	2 (0.7)	
Total	92 (100)	275 (100)	
How much it costs you to reach this health facility			
<1 USD	69 (75.0)	194 (70.5)	0.65
1-2 USD	11 (12.0)	43 (15.6)	
>2 USD	12 (13.0)	38 (13.8)	
Total	92 (100)	275 (100)	
Anyone infected with TB living in your house			
Yes	19 (20.7)	5 (1.8)	<0.001
No	73 (79.3)	270 (98.2)	
Total	92 (100)	275 (100)	

Figure 4.3 below shows the income of both cases and controls and whether it affected the tuberculosis result of the respondents

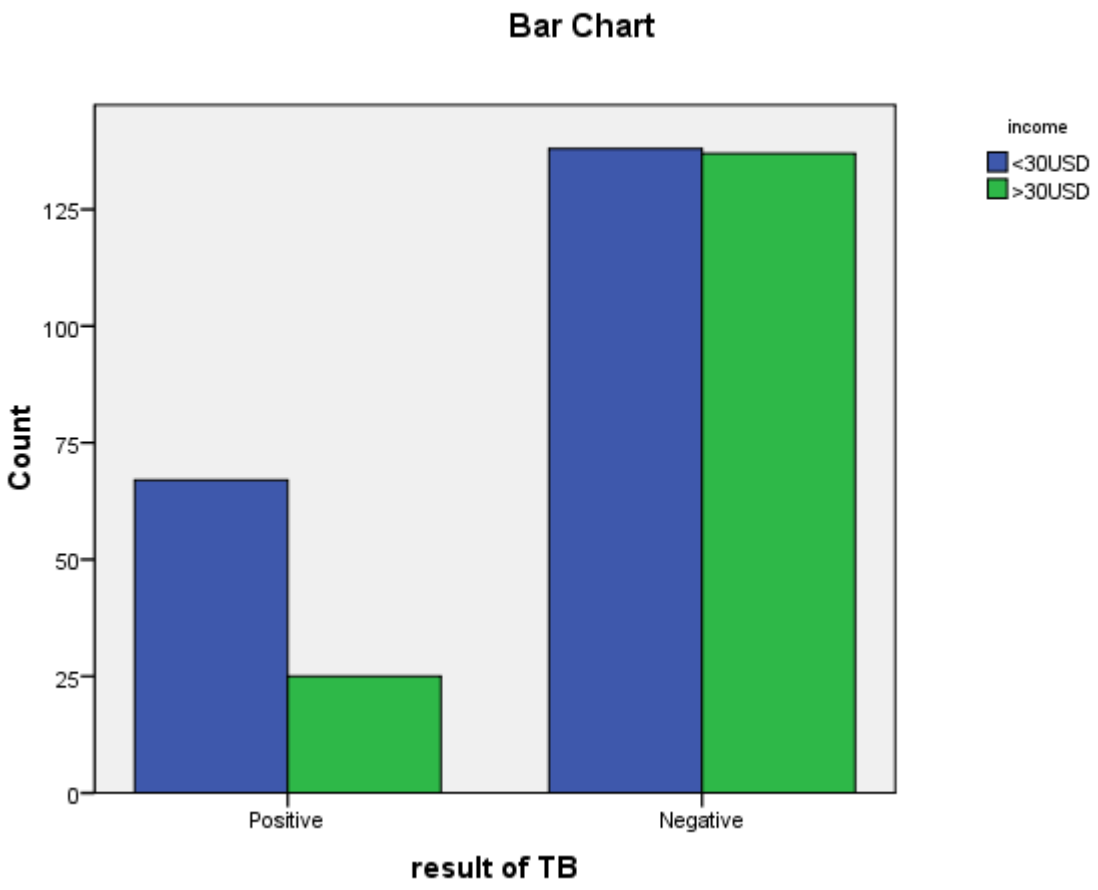

Figure 4.3 Income and tuberculosis result of respondents (N=367)

On the other hand, the bar chart below depicts the presence of active tuberculosis patient in the house of the respondents and whether this had impact on the tuberculosis result of both cases and controls.

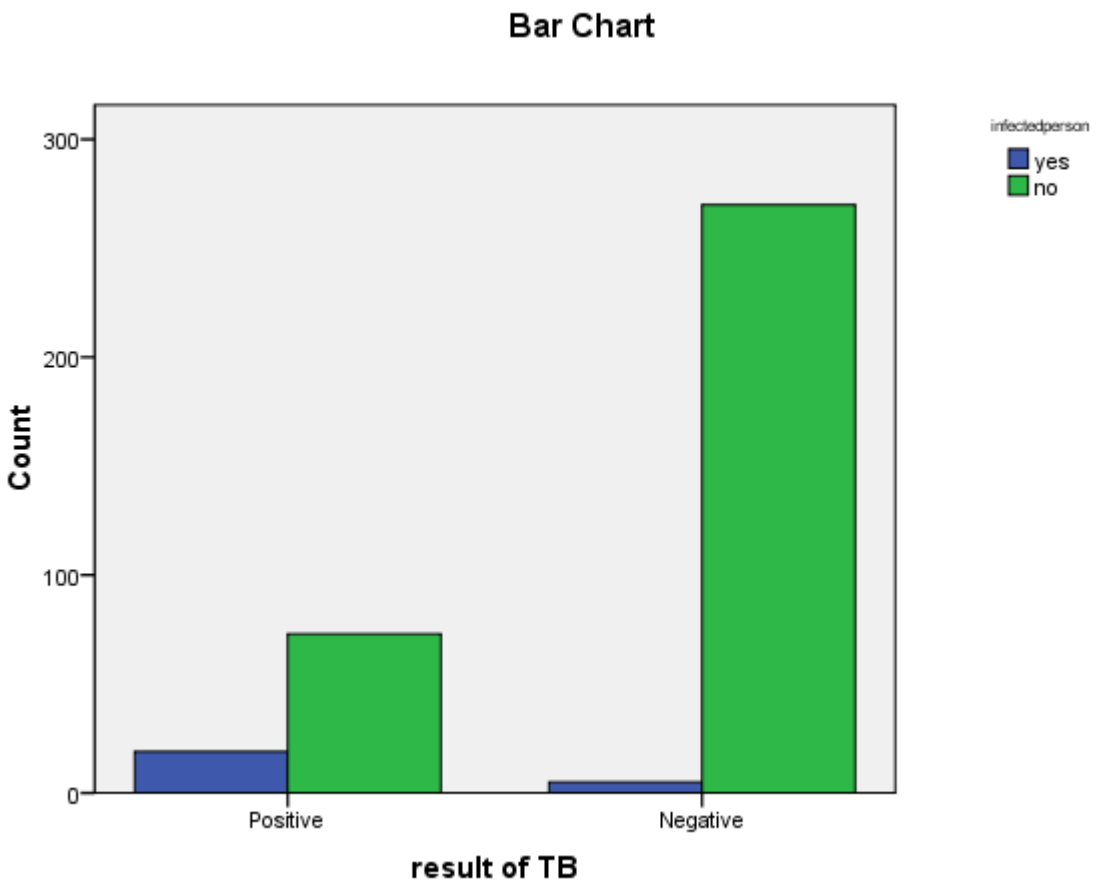

Figure 4.4 History of contact with active tuberculosis patient and their results of TB (N=367)

4.4 HEALTH SEEKING BEHAVIOUR, KNOWLEDGE AND RISKY BEHAVIOURS

In describing where the respondent's seek medical care, 83.7% of cases and 81.1% of controls visit government institutions when they get sick; 7.6% of cases and 6.5% of controls seek health care services in private institutions when they get sick; 5.4% of cases and 12.0% of controls seek care at both government and private clinics and only 3.3% of cases and 0.4% of controls reported that they seek health service care in areas accorded under the heading of 'others'.

Out of the total respondents 27.2% of cases and 2.2% of controls do not take ART regularly as prescribed; the rest 72.8% of cases and 97.8% of controls take their drug on a regular basis. Sixteen percent of cases and 33.3% of controls disclosed the reasons for not taking their drugs on a regular basis as distance from the health facility and drug side

effect; while 52.0% of cases and 16.7% of controls gave side effect of the drug as a reason. About 4.0% of cases and 16.7% of controls reported other infections as the reason. The rest of them stated other reasons for not taking their medications.

Regarding their substance exposure, 34.8% of cases and 2.9% of controls were exposed to smoking; 26.1% of cases and 5.1% of controls were exposed to alcohol; 2.2% of cases and 1.1% of controls were exposed to khat chewing; and the rest 37.0% of cases and 90.9% of controls were never exposed to any type of substance. Out of the total respondents, 52.2% of cases and 60.4% of controls pointed out radio, television and health workers as a means of information to reach HIV patients.

Based on the results gained from the patients, the Table 4.3 below depicts the summary of health seeking behaviours, knowledge, and risky behaviours of the respondents.

Table 4.3 Health seeking behaviour, Knowledge and Risky behaviours and TB co-infection in HIV and Aids patients taking ART, Western Ethiopia, 2012 (N=367).

Variable	Case N (%)	Control N (%)	P-Value
Where you seek medical care			
Private clinic	7 (7.6)	18 (6.5)	0.09
Gov't institutions	77 (83.7)	223 (81.1)	
Private and Gov't clinic	5 (5.4)	33 (12.0)	
Others	3 (3.3)	1 (0.4)	
When did you begin ART			
1 year ago	26 (28.3)	59 (21.5)	0.28
2-5 years	56 (60.9)	173 (62.9)	
>5 years	10 (10.9)	43 (15.6)	
Take ART regularly			
Yes	67 (72.8)	269 (97.8)	<0.001
No	25 (27.2)	6 (2.2)	
Reasons for not taking ART regularly			
When caught a disease	1 (4.0)	1 (16.7)	0.06
Distance to health facility	6 (24.0)	0 (0.0)	
Side effect of drug	13 (52.0)	1 (16.7)	
Others	1 (4.0)	2 (33.3)	
Distance and drug side effect	4 (16.0)	2 (33.3)	
Seek care in past 5 years, not for ART			
Once a year	23 (25.0)	97 (35.3)	0.008
≥2 in a year	46 (50.0)	80 (29.1)	
Twice in past 5 years	3 (3.3)	22 (8.0)	
Once in past 5 years	2 (2.2)	10 (3.6)	
Never in past 5 years	18 (19.6)	66 (24.0)	

How can a person prevent TB?			
Drug/Prophylaxis	17 (18.5)	127 (46.2)	<0.001
Balanced diet	29 (31.5)	20 (7.3)	
Immunization	10 (10.9)	31 (11.3)	
Others	6 (6.5)	11 (4.0)	
Drug, diet and Immunization	5 (5.4)	42 (15.3)	
Drug and diet	20 (21.7)	36 (13.1)	
Diet and Immunization	5 (5.4)	8 (2.9)	
Can TB be cured?			
Yes	91 (98.8)	271 (98.5)	0.79
No	1 (1.1)	4 (1.5)	
Substance you exposed to			
Smoking	32 (34.8)	8 (2.9)	<0.001
Alcohol	24 (26.1)	14 (5.1)	
Khat Chewing	2 (2.2)	3 (1.1)	
Not exposed at all	34 (37.0)	250 (90.9)	
Knowledge of opportunistic infections			
Yes	67 (72.8)	208 (75.6)	0.59
No	25 (27.2)	67 (24.4)	
How does community treat HIV pts			
Most reject them	50 (54.3)	116 (42.5)	0.12
Most are friendly but suspicious	25 (27.2)	91 (33.1)	
Support them	17 (18.5)	68 (24.7)	
Should HIV pts be concerned about TB?			
Yes	90 (97.8)	262 (95.3)	0.28
No	2 (2.2)	13 (4.7)	

Figure 4.5 below presents data on how regular participants take their ART medication and its impact on tuberculosis result.

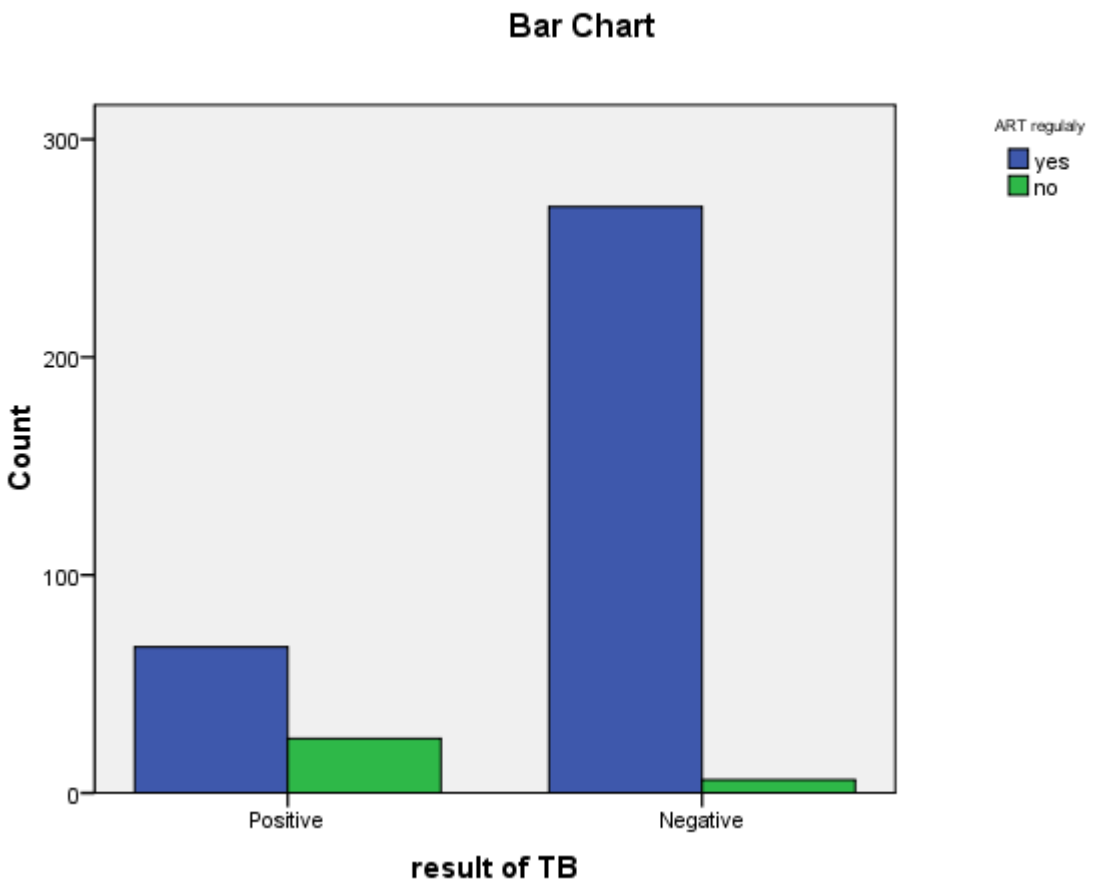

Figure 4.5 Taking ART on regular basis and tuberculosis result of respondents (N=367)

4.5 UNIVARIATE ANALYSIS OF FACTORS ASSOCIATED WITH TB CO-INFECTION

As presented above in the tables, there was no significant difference between cases and controls concerning socio-demographic variables, socio-economic status, health seeking behaviour, knowledge and risky behaviours. However, a higher proportion of Orthodox Christians and Muslims (p=0.04) had developed tuberculosis compared to other religious groups. Oromo and Amhara ethnic groups (p<0.001) were more likely to have tuberculosis than the rest of other ethnic groups. A higher proportion of illiterate people (p=0.02) had active TB compared to those who attended formal education. Waste disposal inside the compound was more common among cases than controls (p<0.001). Individuals whose monthly income was less than 30USD are more likely to develop tuberculosis than individuals whose monthly income is more than 30USD (p<0.001). A higher proportion of

cases lived with a patient infected with active tuberculosis together in the same house or had a contact history with a patient of active tuberculosis than those control groups (p<0.001). More cases do not take their ART drug as prescribed by a physician on a regular basis compared to the control groups (p<0.001). Similarly a larger number of cases has visited or sought health care services two or more times in the past five years for a reason of different infections other than taking ART when compared with a control groups (p=0.008). A higher proportion of cases reported a balanced diet as the only measure to prevent tuberculosis compared to the control group (p<0.001). In addition a large number of cases had a history of substance exposure including smoking, alcohol, and khat compared to the control group (p<0.001). However, there was no significance difference between cases and controls concerning gender, marital status, residence, walls of the house, floor of the house, availability of electricity, presence of animals in the house, distance from the health facility, the time they began ART, and their knowledge of opportunistic infections (Tables 4.1-4.3).

4.6 FACTORS INDEPENDENTLY ASSOCIATED WITH TB CO-INFECTION

The final model was constructed using forward stepwise logistic regression. Variables with a significant association in the analysis (p<0.05) and those related to the objectives of the study such as educational status, waste disposal, monthly income, presence of TB infected person in the house or contact with active TB patient, taking ART regularly, knowledge of how to prevent tuberculosis and substance exposure were included in the final logistic regression.

After adjustment for potential confounders Educational status, waste disposal, monthly income, history of contact with infected TB patient, taking ART regularly, knowledge how to prevent TB and exposure to substance were independently associated with the occurrence of TB co-infection in HIV and Aids patients taking ART. As presented in a table below, having formal education (OR=2.61; 95%CI: 1.13, 5.22), waste disposal outside the compound (OR=2.75; 95%CI: 1.61, 4.69), monthly income >30USD (OR=2.09; 95%CI: 1.20, 3.64), no contact history of TB patient in a family (OR=15.31; 95%CI: 5.28, 44.37), taking ART on a regular basis as prescribed (OR=24.84; 95%CI: 7.32, 84.22), knowing how to prevent TB with a drug or prophylaxis (OR=6.07; 95%CI: 1.04, 35.37), and no

exposure to substance like smoking (OR=36.80; 95%CI: 12.88, 105.13) were independently protective of the development of active tuberculosis in HIV and Aids patients taking ART.

Table 4.4: Factors associated with TB co-infection in HIV and Aids patients taking ART (N=367).

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Educational status		
No formal education	1	1
Formal education (1-12+)	2.20 (1.1,4.3)	2.6 (1.3,5.2)
Waste disposal		
In the compound	1	1
Outside the compound	2.76 (1.6,4.5)	2.75 (1.6,4.6)
Monthly Income		
<30USD	1	1
≥30USD	2.66 (1.5,4.4)	2.0 (1.2,3.6)
Presence of TB infected patient in the family		
Yes	1	1
No	14.05 (5.0,38.9)	15.3 (5.2,44.3)
Taking ART regularly		
Yes	16.72 (6.5,42.4)	24.84 (7.3,84.2)
No	1	1
How can a person prevent TB		
Drug/Prophylaxis	4.66 (1.3,15.3)	6.07 (1.0,35.3)
Balance diet	0.43 (0.1,1.5)	0.39 (0.0,2.2)
Immunization	1.93 (0.5,7.2)	1.69 (0.2,10.7)
Others	1.14 (0.2,5.1)	0.82 (0.1,6.4)
Drug, balanced diet and immunization	5.29 (1.2,22.4)	4.99 (0.6,36.2)
Drug and diet	1.12 (0.3,3.9)	1.42 (0.2,8.4)
Diet and Immunization	1	1

Substance exposure		
Smoking	1	1
Alcohol	2.33 (0.8,6.4)	2.47 (0.7,8.3)
Khat	6.00 (0.8,42.1)	25.7 (1.4,47.5)
No exposure to substance	29.41 (12.5,69.05)	36.8 (12.8,105,1)

In this study, several risk factors of TB co-infection in HIV and Aids patients taking ART were investigated in the selected health institution in West Ethiopia. Among these determinants, educational status was significantly associated with the development of active TB which is consistent with reports in Pakistan (Hussain et al 2003: 794-799). The findings of this study also showed that those individuals with formal education were highly protected from the development of active tuberculosis than those patients with no formal education or illiterate and this is also consistent with a study in India (Shetty et al 2006: 80-86).

Several studies have shown that socio-economic status is a strong risk factor for the occurrence of tuberculosis like Lopez De Fede et al (2008: 1425-1430) and Muniyandi & Ramachandran (2008:9(10):1623-1628). In this study, waste disposal and monthly income are socio-economic risk factors that are associated with the development of tuberculosis in HIV and Aids patients. However, in Ethiopia, the estimation of income based on salaries may not reflect the actual income of individuals. The result on the socio-economic risk factors was again in support of Mackenbach et al (2008: 2468-2481). There are several reasons as to why patients taking ART are more protected from developing active tuberculosis such as the increase in body defence mechanism.

Being in contact with an active TB patient was one of the most important predictors of active TB. This shows that people who had no contact history with active TB patients were more protected from developing active TB than those who had a contact history. This result is consistent with Lienhardt et al (2003: 448-455) and Hill et al (2006: 156).

The role of smoking in the development of active tuberculosis is well established. Individuals who had no history of smoking were much safer than those who had a history of smoking. However, there is a social desirability bias whereby smokers deny their smoking status, the result of this study is consistent with Ariyothai et al (2004: 219-227) and Lin et al (2009: 475-480).

4.7 CONCLUSION

This Chapter discussed the results and interpretation of data analysis with reference to the literature review. The results were presented in the form of tables and charts.

The next Chapter present conclusions, discuss limitations, and make certain recommendations for further research.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIIONS

5.1 INTRODUCTION

The aim of the study was to investigate risk factors associated with tuberculosis co-infection among HIV and Aids patients taking ART from Nekemte Hospital, Western Ethiopia.

The objectives of the study were to:

- Determine the socio demographic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital.

- Identify behavioural and economic risk factors associated with TB co-infection in HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.

- Assess the knowledge on TB co-infection among HIV and Aids patients taking antiretroviral therapy in Nekemte Hospital, Western Ethiopia.

5.2 THE MAIN FINDINGS OF THE STUDY

- ❖ Educational status was one of the main socio-demographic variables that predisposes or protects HIV and Aids patients on ART from tuberculosis co-infection in Western Ethiopia. Patients who had formal education were protected from contracting tuberculosis co-infection than those without formal education. This implies that knowledge of the cause, mode of transmission, prevention and treatment of TB is key to the prevention of tuberculosis infection.

- ❖ Findings from this study indicate that waste disposal, monthly income and history of contact with active tuberculosis patient or presence of persons with active tuberculosis in the house were major socio-economic conditions that were associated with the occurrence of active tuberculosis in HIV and Aids patients on ART in Western Ethiopia. Appropriate waste disposal outside the compound, having

a good monthly income and not being in contact with patients who have active tuberculosis were associated with protection from contracting active TB.

- Respondents identified that knowledge of how to prevent tuberculosis, adherence to ART, and abstaining from any exposure to substance abuse has prevented them from developing active tuberculosis. This in turn means that those patients who do not adhere to ART treatment and do not know how to prevent tuberculosis, and were exposed to substance abuse had a high risk of contracting active tuberculosis.

5.3 LIMITATIONS OF THE STUDY

Possible limitations of the study:

- A case control study can only identify associations
- Recall bias might affect the accuracy of the information related to some of the risk factors; and even though the data were collected through use of a structured questionnaire, one cannot discount the existence of social desirability bias; therefore, it may limit the generalizability of the results.
- Because the study was conducted in only one health facility in Ethiopia, it would be difficult to attempt to generalize the results of this research to the whole country.
- The study did not include patients under the age of 18 since the Ethiopian law do not allow consent for children less than 18 years and cannot be generalized to these group of population.

5.4 RECOMMENDATIONS

Based on the study findings the following recommendations are made to address risk factors associated with tuberculosis co-infection in HIV and Aids patients and a variety of other factors that might be useful for further research.

5.4.1 Recommendations on improving health, social, and economic advantage

- Patients with HIV and Aids should be provided with health education on opportunistic infections like tuberculosis in every health facility, and even in the community by health care professionals especially by trained health extension workers.
- The quality of counselling should be considered when counselling patients who have just begun ART. Lack of ART adherence is noted as one of the risk factors predisposing patients to tuberculosis.
- The government should focus on improving the educational status of the community as a whole and increasing their income as it would be greatly helpful in decreasing the emergence of active tuberculosis in HIV and Aids patients.

5.4.2 Recommendations for further research

- Replicating this study in other provinces of the country so as to ensure representativeness would allow generalizability of the findings.
- Further study on the patients not included in this study group is helpful.
- An investigation on medication adherence and development of active tuberculosis in HIV and Aids patients should be pursued.

5.5 CONCLUSION

This Chapter concluded the study by discussing its limitations and by making a variety of recommendations on the basis of the result obtained from the study. The results of this study imply there is a lot to do from health workers, researchers and policy makers concerning the TB/HIV co-infection. These can be used to address the risk factors in the development of active tuberculosis in HIV and Aids patients and can also be used for further study that addresses risk factors of active tuberculosis while taking ART treatment.

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ANNEXURE A: Questionnaire

QUESTIONNAIRE

UNIVERSITY OF SOUTH AFRICA

DEPARTMENT OF HEALTH STUDIES

QUESTIONNAIRE FOR THE ASSESSMENT OF RISK FACTORS ASSOCIATED WITH TB CO-INFECTION IN HIV/AIDS PATIENTS ON ANTIRETROVIRAL THERAPY (ART) IN ONE OF PUBLIC HEALTH INSTITUTIONS IN NEKEMTE TOWN, WESTERN ETHIOPIA.

The purpose of this study is to assess risk factors associated with TB co-infection in HIV/AIDS patients. Your participation in this study is important and is completely voluntary. The information requested from you will be used only for the study purpose. If you agree to complete the questionnaire, you will answer questions regarding yourself, your knowledge, and health seeking behaviour regarding different aspects of TB, HIV and TB/HIV co-infection. Your answers will be kept confidential and only the investigator and data collectors will have access to this information. Your name will not be written on the questionnaire or be kept in any other records. Your participation is voluntary and you may choose to stop the interview at any time. Completing the questionnaire will take about 30 minutes.

If you have anything unclear you can contact the researcher by:-

Phone: - +251-91-105-3417

E-mail: Obsa_2007@yahoo.com

Thank you for your assistance. Code_____

SECTION1. SOCIO DEMOGRAPHIC CHARACTERSTICS

NO.	QUESTIONNAIRE	CATEGORY	CODE
101	Age	Write in Numbers_____	
102	Sex	1 Male 2. Female	
103	Religion	1.Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other(specify)_____	
104	Ethnicity	1.Oromo 2.Amhara 3.Tigre 4.Guraghe 5.Other(specify)_____	
105	Marital Status	1.Single 2.Married 3.Divorced 4.Widowed 5.Other(specify)_____	
106	Educational Status	1.No education 2.Religious Schooling 2. Primary education(1-8) 4.Secondary Education(9-12) 5.Tertiary Education(12^{+})	

107	Occupational Status	1.Unemployed 2.Day laborer 3. Housemaid 4.Farmer 5.Private employee 6.Government employee 7.NGO employee 8.Other(Specify)_____	
108	Residence	1.Urban 2.Rural	

SECTION 2 SOCIAL CONDITIONS

NO.	QUESTIONNAIRE	CATEGORY	CODE
201	Living room	1.Number of rooms_____ 2. Number of people in the household____	
202	Walls of your house made of	1.Mud/Mud bricks 2.Cement 3.Other(Please specify)_____	
203	The floor of your house is made of	1.Mud 2.Cement	
204	Do you have a separate kitchen?	1.Yes 2.No	
205	Is there electricity in your house?	1.Yes 2.No	
206	Do animals (cattle's and/or pets) live together with the people in the house in the same room?	1.Yes 2.No	

207	Where do you dispose wastes from your house?	1.Inside the compound 2.Outside my compound	
208	What is your monthly income?	1.<30USD 2.≥30USD	
209	How many meals do you eat a day?	1.One to two times 2.Three times 3.Four to Five times	
210	How long does it takes you to reach this health institution?	1. Less than 30 minutes 2. Less than an hour 3. Half a day 4. One day 5. More than one day	
211	How much does it costs you to reach this health institution by car?	1.Less than 17Birr(1USD) 2. 17 to 34 Birr (1-2USD) 3. >35 Birr(>2USD)	
212	Is there anyone living in your home infected with TB?	1.Yes 2.No	
213	If 'Yes' to 212 is he/she taking anti TB treatment?	1.Yes 2.No	

SECTION 3: HEALTH SEEKING BEHAVIOUR, KNOWLEDGE, AND RISK BEHAVIOURS

NO.	QUESTIONNAIRE	CATEGORY	CODE
301	Where do you usually go for medical care when you are sick, or for treatment of a general health problem?	1.Private clinic 2.Government clinic or hospital 3.Traditional healer 4.Clinic run by a NGO or church 5.Other (specify)_____	
302	When did you begin taking ART?	1.One year ago 2. Within the past 2-5 years 3.More than 5 years	
303	Do you take ART on a regular basis?	1.Yes 2.No	
304	If your answer is No for Q 303, why did you take irregularly/why did you interrupt?	1.I caught a disease 2.Distance to this health institution 3.Side effects of the drugs 4.Other (specify)_____	
305	In the past 5 years how often did you generally seek health care in a health institution EXCEPT when you go for ART?	1. Once per year 2. Twice a year or more 3. Less than once a yr but at least twice in the past 5 yrs 4.Once in the past 5 years 5. Never in the past 5 years 6.Other (specify) _____	

306	Where did you first learn about TB? (Tick all that applies)	1.Newspapers and magazines 2.Radio 3. TV. 4.Billboards 5.Brochures, posters etc 6. Health workers 7.Family, friends, and/or neighbors 8.Religious leaders 9.Teachers 10.Other(specify) _____	
307	How can a person get TB?	1.Eating together 2.Cough from infected individual 3.Infected raw milk 4.Transplacental 5.Other(specify)_____	
308	How can a person prevent TB?	1.Only by drug(prophylaxis) 2.Balanced diet 3.Immunization 4.Other(specify)_____	
309	In your opinion, who can be infected with TB? (Tick all that applies)	1.Anybody 2.Poor people 3.Homeless people 4.Alcoholics 5.Drug users 6.People living with HIV/AIDS 7.People who have been in prison 8.Other (specify)_____	

310	Can TB be cured?	1.Yes 2.No 3.I don't know	
311	Which of the following substances have you been exposed to?	1. Smoking 2.Drinking alcohol 3.Chewing chat 4.Not exposed at all 5.Other (specify)_____	
312	Do you know about opportunistic infections related to HIV/AIDS?	1.Yes 2.No	
313	Were you screened for Tb?	1.Yes 2.No	
314	If your answer for Q 311 is Yes, What were the results?	1.Positive 2.Negative	
315	Are you taking anti Tb drug currently?	1.Yes 2.No	
316	If your answer to Q 313 is Yes, when did you begin anti TB treatment?	1.Since the past 3 months 2.Since the past 2 months 3.Since the past 1 month 4.Since the past 2 weeks	
317	In your opinion, what type of change have you observed on your health after you started taking anti TB and ART?	1.No change 2.Improved 3.Got severely ill	
318	Do you know of any HIV/AIDS patients who are co-infected with TB?	1.Yes 2.No	

319	In your community, how is a person who has HIV infection usually regarded/treated?	1.Most people reject him or her 2.Most people are friendly, but they generally try to avoid him or her 3.The community mostly supports and helps him or her 4.Other (specify) _____	
320	Do you think that HIV positive people should be concerned about TB?	1.Yes 2.No	
321	What sources of information do you think can most effectively reach people like you with information on TB and HIV?	1.Newspapers and magazines 2.Radio 3.TV 4.Billboards 5.Brochures, posters etc 6.Health workers 7.Family, friends, and neighbors 8.Religious leaders 9.Teachers 10.Other(specify)_____	

Thank you for your assistance.

ANNEXURE B: Afan Oromo translated questionnaire

Unka Odeeffannoon Itti Sassaabamu

Yuunvarsiitii *Afrikaa Kibbaa*tti

Muummee Qorannoo Fayyaa

Unka Odeeffannoo mata duree 'Hospitaala Naqamteetti namoota qoricha farra dhukkuba HIV/AIDS osoo fudhatanii wantoota dhukkuba maddeessaa TBf isaan saaxilan' jedhu irratti qophaa'e.

Kaayyoon qo'annoo kanaa sababoota (risk factors) namoota qoricha farra dhukkuba HIV/AIDS osoo fudhatanii dhukkuba maddeessaa TBf saaxilan adda baasuudha. Qo'annaa kana keessatti hirmaachuun keessan guutummaatti fedhii keessan irratti kan hundaa'eefi odeeffannoon isinirraa argamus dhimma qo'annaaf qofa kan ooludha. Hirmaannaa keessaniin gaaffiiwwan haala jiraeenyaa, beekumsa waa'ee TB, HIV fi kanneen kana fakkaatan deebisuun itti hirmaattu. Deebii keessan hunda nama odeeffannoo kana sassaabu irraa kan hafe eenyuyyuu arguu hin danda'u. Maqaa keessan unka kana irratti galmeessuunis nu hin barbaachisu.Yeroo barbaachisaa ta'ettis deebii kennuu keessan addaan kutuun mirga keessani. Walumaagalatti, gaaffiiwwan kana xumuruuf daqiiqaa 30 fudhata.

Fedhii keessan yoo ta'e maaloo nuu mallatteessaa.

_____ _____

Mallattoo Guyyaa

Wanta ifa isiniif hin taane hunda nama qo'annaa kana gaggeessu teessoo kanaan argachuu dandeessu. Bilbila: - +251-91-105-3417

E-mail: Obsa_2007@yahoo.com

47164093@mylife.unisa.ac.za

Galatoomaa. Koodii_____

KUTAA 1. ODEEFFANNOO DHUUNFAA FI HAWAASUMMAA

Lakk.	Odeeffannoo	Garee	Koodii
101	Umurii	Lakkoofsaan_____	
102	Saala	1.Dhiira 2.Dhalaa	
103	Amantaa	1.Ortodoksii 2.Musliima 3.Pirotestaantii 4.Kaatoolikii 5.Gara biraa (kaa'i)_____	
104	Qomoo	1.Oromoo 2.Amaara 3.Tigiree 4.Guraagee 5.Gara biraa (kaa'i)_____	
105	Haala fuudhaa fi Heerumaa	1.Kan hin fuune 2.Kan fuudhe 3.Kan hiike 4.Kan irraa du'e/duute 5.Gara biraa (kaa'i)_____	
106	Haala barumsaa	1.Hin baranne 2.Mana barnoota amantaa 3.Sadarkaa 1ffaa (1-8) 4.Sadarkaa 2ffaa(9-12) 5.Sadarkaa Olaanaa(12+)	
107	Haala hojii	1.Hojii kan hin qabne 2.Dafqaan bulaa 3.Hojjettuu manaa 4.Qotee bulaa 5.Hojii dhuunfaa 6.Hojjetaa Mootummaa 7.Hojjetaa Miti mootummaa(NGO) 8.Gara biraa (kaa'i)_____	
108	Bakka jireenyaa	1.Magaala 2.Baadiyyaa	

KUTAA 2. HAALA HAWAASUMMAA

Lakk.	Odeeffannoo	Garee	Koodii
201	Mana Jireenyaa	1.Baay'ina kutaa_____ 2.Baay'ina nama mana keessa jiraatuu_____	
202	Ijaarri/Gidgiddaan mana keessanii maal irraa hojjetame?	1.Dhoqqee fi muka 2.Simintoo/Bilookeetii	

		3.Gara biraa (kaa'i)_____	
203	Lafti mana keessanii	1.Biyyoo 2.Simintoo/Liishoo	
204	Manni itti nyaata bilcheessan /Kushinaan qofaatti jiraa?	1.Eeyyee 2.Lakki	
205	Tajaajila Elektirikii/ibsaa qabduu?	1.Eeyyee 2.Lakki	
206	Saawwanii fi bineensonni manaa(saree, adurree) nama waliin mana keessa jiraatuu?	1.Eeyyee 2.Lakki	
207	Kosii mana keessaa eessatti gattu?	1.Dallaa/axira manaa keessatti 2.Dallaa manaan alatti	
208	Galiin isin ji'aan argattan meeqa?	1.<30USD 2.≥30USD	
209	Guyyaatti nyaata/soorata al-meeqa nyaattu/soorattu?	1.Tokkoo hanga Lamaa 2.Al Sadii 3.Afurii hanga Shanii	
210	Mana keessanii Hospitaala/Buufata Fayyaa kana ga'uuf sa'a meeqa isinitti fudhata?	1.Daqiiqaa 30 gad 2.Sa'a tokkoo gad 3.Walakkaa guyyaa/Sa'a 6 4.Guyyaa tokko 5.Guyya tokkoo ol	
211	Konkolaataadhaan as gahuuf qarshii meeqa isin gaafata?	1.Hanga Qarshii 17 (1USD) 2.Qarshii 17-34 (1-2USD) 3.Qarshii 35 fi ol (>2USD)	
212	Namni dhukkuba TB'n qabame mana keessan keessa jiraa?	1.Eeyyee 2.Lakki	
213	Deebiin Gaaffii Lakk.212 Eeyyee yoo ta'e, Namni kun dawaa farra dhukkuba TB fudhachaa jiraa?	1.Eeyyee 2.Lakki	

KUTAA 3. BEEKUMSA, BARSIIFATA YAALA FAYYAA FI AMALOOTA FAYYAA NAMAA HUBAN

Lakk	Odeeffannoo	Garee	Koodii
301	Yoo dhukkubsattan eessa deemuun yaalamtu?	1.Kilinika dhuunfaa 2.Hospitaala/kilinika Mootummaa 3.Mana yaala Aadaa 4.Kilinika NGO'n ykn Waldaa amantaan gaggeeffamu. 5.Gara biraa(kaa'i)_____	

302	Qoricha farra HIV/AIDS fudhachuu yoom jalqabdan?	1.Waggaa tokkoo as 2.Waggaa 2-5 gidduu 3.Waggaa 5 dura	
303	Qoricha farra HIV/AIDS yeroo hunda osoo walirraa hin kutiin fudhattuu?	1.Eeyyee 2.Lakki	
304	Deebiin gaaffii 303 Lakki yoo ta'e, sababni addaan kutuu keessanii maali?	1.Dhukkuba maddeessaan qabamuu 2.Fageenya karaa 3.Miidhaa qorichaarraa/side effects 4.Gara biraa (kaa'i)_____	
305	Qoricha farra HIV/AIDS barbaacha malee, waggoota shan(5) darban keessatti al meeqa mana yaalaa dhuftanii beektu?	1.Waggaatti al tokko 2.Waggaatti al lamaafi ol 3.Waggoota shanan darban Keessatti al lama 4.Waggoota shaman darban keessatti al tokko 5.Tasuma dhufee hin beeku 6.Gara biraa(kaa'i)_____	
306	Waa'ee dhukkuba TB jalqaba eessaa dhageessan/bartan? (Deebiin lamaa fi isaa ol ni danda'ama)	1.Gaazexaa 2.Raadiyoo 3.TV 4.Beeksisa karaarraa/billboard 5.Poosterii adda addaa 6.Ogeessota Fayyaa 7.Maatii, hiriyyaafi Ollaa irraa 8.Abbootii Amantaa irraa 9.Barsiisota irraa 10.Gara biraa (kaa'i)_____	
307	Namni tokko TB dhaan akkamitti qabama?	1.NamaTB qabu waliin yoo nyaate 2.Qufaa nama TB qabamerraan 3.Aannan seeraan hin danfinerraa 4.Haadhaa gara mucaatti	

		5.Gara biraa(kaa'i)_____	
308	Dhukkuba TB akkamitti ofirraa dhowwuun danda'ama?	1.Qorichaan qofa/prophylaxis 2.Nyaata madaalamaa nyaachuun 3.Talaallii fudhachuun 4.Gara biraa (kaa'i)_____	
309	Akka ilaalcha keessaniitti nama kamtu TBf saaxilamuu danda'a?(Deebiin lamaa ol ni danda'ama)	1.Namni kamiyyuu ni saaxilama 2.Nama hiyyeessa ta'e 3.Nama mana jireenyaa hin qabne 4.Nama dhugaatii dhugu 5.Nama araada adda addaa qabu 6.Dhukkubsattoota HIV/AIDS 7.Nama mana sirreessaa ture 8.Gara biraa (kaa'i)_____	
310	Namni TBn qabame fayyuu ni danda'aa?	1.Eeyyee 2.Lakki	
311	Araada kamiif saaxilamtanii beektu?	1.Sigaaraa xuuxuu 2.Dhugaatii alkoolii 3.Jimaa 4.Gara biraa (kaa'i)_____	
312	Waa'ee dhukkuboota maddeessaa HIV/AIDS waliin wal qabatanii beektuu?	1.Eeyyee 2.Lakki	
313	Dhukkuba TB qoratamtanii beektuu?	1.Eeyyee 2.Lakki	
314	Deebiin gaaffii 313 Eeyyee yoo ta'e, firiin qorannoo keessanii maali?	1.TB qaba (positive) 2.TB hin qabu (negative)	
315	Qoricha farra dhukkuba TB amma fudhachaa jirtuu?	1.Eeyyee 2.Lakki	
316	Deebiin Lakk.315 Eeyyee yoo ta'e, yoom fudhachuu eegaltan?	1.Ji'a 3 kaasee 2.Ji'a 2 kaasee 3.Ji'a 1 kaasee	

		4.Torban 2 kaasee	
317	Akka ilaalcha keessaniitti, erga qoricha farra TB fi farra HIV/AIDS waliin fudhachuu jalqabdanii fayyummaa keessan irratti jijjiirama maalii argitani?	1.Homayyuu hin agarre 2.Fooyya'aa dhufeera 3.Baayyee na dhukkubaa dhufe	
318	Dhukkubsataa HIV/AIDS kan dhukkuba maddeessaa TBn qabame beektuu?	1.Eeyyee 2.Lakki	
319	Uummata keessatti namni dhukkuba HIV/AIDSn qabame ilaalcha akkamii qaba/kennamaaf?	1.Namni baay'een loogii irratti geessisa 2.Namni baay'een ofitti butu garuu badaa hin amanan 3.Uummanni isa gargaaru 4.Gara biraa(kaa'i)_____	
320	Dhukkubsattootni HIV/AIDS waa'een TB isaan ilaallata jettee yaaddaa?	1.Eeyyee 2.Lakki	
321	Namoonni akka kee waa'ee TB fi HIV/AIDS odeeffannoo gahaa karaa kam argachuu danda'u jettee yaadda?	1.Gaazexaa 2.Raadiyoo 3.TV 4.Beeksisa karaarraa/billboard 5.Poosterii adda addaa 6.Ogeessota Fayyaa 7.Maatii, hiriyyaa fi Ollaa irraa 8.Abbootii Amantaa irraa 9.Barsiisota irraa 10.Gara biraa (kaa'i)_____	

Galatoomaa!

ANNEXURE C: UNISA Ethical clearance letter

UNISA university of south africa

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

HSHDC/62/2012

Date of meeting: 6 June 2012 Student No: 4716-409-3

Project Title: Risk factors associated with TB co-infection in HIV/AIDS patients on antiretroviral therapy (ART) in one of the public health facilities in Nekemte, Town, Western Ethiopia

Researcher: Obsa Amente Megersa

Degree: Masters in Public Health (MPH) Code: DLMPH95

Supervisor: Prof NA Phaladze
Qualification: PhD
Joint Supervisor: Mrs ND Ndou

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof E Potgieter
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

Dr MM Moleki
ACTING ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

ANNEXURE D: Nekemte city administration ethical clearance letter

Bulchiinsa Naannoo Magaala Naqamteettii
Waajira Begumsa Fayyaa Naqamtee
በነቀምቴ ከተማ አስተዳደር
የጉቶምቴ ጤና ጥበቃ ጽ/ቤት

Date 19/02/2004
Ref. No 20/10/2004

To _ Nekemte Hospital

_ Nekemte Health Center

Subject : Requesting Data for Research.

It is an academic practice for post graduate students to prepare thesis as a partial fulfillment for the completion of their course studies.

Accordingly , Mr. Obsa Amente Merga is a student in Master of public health program at University of South Africa (UNISA) and he has selected your esteemed organization to conduct a research titled, " Risk factors associated with TB co-infection on HIV/AIDS patients on antiretro viral therapy (ART) in one of the public health facilities in Nekemte town, Western Ethiopia " for his graduation . the study is meant only for academic purposes and has no any negative impact . therefore , we request you to provide the student with all necessary data and other information .

We would like to thank you in advance for your cooperation & consideration.

With Regards ,

Solomoon Haayiluu Barihee
ሰለሞን ኃይሉ በርሄ
R/H/T/Qul/Tajaajila Fayyaa, Fayyaan Walqabatanii fi Omishtootaa
የጤና እና ጤና ነክ ጉዳዮች ቁጥጥር ፈ.ግ.ሚ.