FACTORS INFLUENCING ANTI-RETROVIRAL THERAPY ADHERENCE IN ETHIOPIA

by

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for the degree of

MASTER OF PUBLIC HEALTH

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SUPERVISOR: PROF S P HATTINGH

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Student number: 4193-046-0

Declaration

I declare that **FACTORS INFLUENCING ANTI-RETROVIRAL THERAPY ADHERENCE 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.

_____ _____

SIGNATURE DATE

(DR YW DAGNEW)

FACTORS INFLUENCING ANTI-RETROVIRAL THERAPY ADHERENCE IN ETHIOPIA

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ABSTRACT

The objective of this study was to assess levels of HAART adherence and factors affecting it. An observational, analytic, cross-sectional and quantitative study using IMB model was conducted on a randomly selected 349 HIV/AIDS patients on a HAART regimen. Data collection was done by interviewing respondents using a structured questionnaire.

Both descriptive and inferential statistics used in the study. Only 80.2% of the total sample population reported a HAART adherence rate of more than or equal to 95% in this study. The findings highlight the need for on-going educational, informational and other interventions to address the knowledge, motivation and adherence behavioural skills of patients in order to improve the current levels of HAART adherence behaviour.

The study also suggested the need for research into objective measures of adherence as well as longitudinal studies on adherence behaviour because strict adherence to treatment is a long-term process and not a one-time activity.

KEY TERMS

HIV/AIDS, antiretroviral drugs, adherence to HAART, IMB model, optimal adherence, sub-optimal adherence.

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Dedication

I dedicate this study to my parents whose esteem for the value for education and whose willingness to sacrifice for their children always remains fresh in my memory.

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And to all those who lost their lives before they were able to gain free access to HAART and to those who have died throughout the world after accessing HAART because of sub-optimal HAART adherence.

And, above all, to GOD who opened the life-gate for all sinners to be saved through Jesus Christ, His Son.

ABBREVIATIONS USED IN THIS STUDY

AIDS	=	Acquired Immune Deficiency Syndrome
ARV	=	Anti-retro viral
ART	=	Anti-retroviral Therapy
HIV	=	Human Immunodeficiency Virus
HAART	=	Highly Active Antiretroviral Therapy
IMB	=	Information Motivation Behaviour skills
FMOH	=	Federal Ministry of Health
MEMS	=	Medication Event Monitoring System
PEPFAR	=	President’s Emergency Plan for AIDS Relief
UNAIDS	=	The Joint United Nations Programs on HIV/AIDS
UNISA	=	University of South Africa
WHO	=	World Health Organization

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CHAPTER 1

Orientation to the study

1.1 INTRODUCTION

Because the human immunodeficiency virus (HIV) depletes the number of cells that defend the body from infection, a patient infected with HIV will, unless treated in time, develop the full acquired immune deficiency syndrome (AIDS) that eventually results in death from a number of causes because of repeated infections(Fauci & Lane 2005: 1086). But the increasing use of anti-retroviral therapy (ART) has dramatically changed the prognosis for HIV/AIDS patients and has resulted in a significant decrease in the morbidity and mortality rates of these patients (Jerene, Næss & Lindtjørn 2006: [3]; Joint United Nations Program on HIV/AIDS (UNAIDS) 2008: 132). In fact, HIV/AIDS has come to be considered to be a chronic but serious illness that requires life-long treatment (Chesney 2003: 169; Bangsberg 2008: 276).

According to UNAIDS (2008: 130), the number of people taking HAART ("highly active antiretroviral therapy") in low- and middle-income countries increased more than ten times since 2007, and reached 3 million by the end of 2007. (HAART, which means "highly active antiretroviral therapy", refers specifically to a "cocktail" or combination of non-nucleoside reverse transcriptase inhibitors (NNRTI's)/protease inhibitors (PI's) that are taken together with nucleoside reverse transcriptase inhibitors (NRTI's) to treat patients with AIDS and HIV.) The number of patients who are on a regimen of HAART increased in Ethiopia from 900 at the beginning of 2005 to more than 150, 000 by June 2008. But by the end of June 2008, only 110,116 (75%) of the patients who were being treated with HAART were alive and in a follow-up phase of treatment (Ethiopian Federal Ministry of Health HIV/AIDS Prevention and Control Office (EFMOHHAPCO) 2009: [1]). This indicates that while the campaign to increase the number of HIV patients who are regularly taking HAART is obviously highly important and desirable, the high mortality rate among such patients and the extent to which they adhere meticulously to their HAART regimen, should also be concurrently addressed. Optimal adherence to the HAART regimen, i.e. an adherence rate of greater than 95%, is an indispensable

requirement for patients receiving HAART if they hope to reap the benefits of long-term treatment (Chesney 2003: 169).

The purpose of this study therefore is to identify and assess the factors that lead to different levels of adherence to anti-retro viral (ARV) drug programmes in Ethiopia because meticulous conformity to the ARV medication routine is indispensable for patients who hope to obtain the long-term benefits of ARV medications.

1.1.1 Background to HIV

The human immunodeficiency virus (HIV) is transmitted through bodily fluids as semen, blood, the milk of breast-feeding mothers who are already infected with HIV. The transmission of the HIV virus from one person to another therefore takes place in situations in which the virus finds an opportunity to enter the bloodstream. Such situations include sexual intercourse and the sharing of needles contaminated with infected blood among drug addicts. It is not transmitted by means of kissing or through the air (as are influenza viruses). Although HIV/AIDS was originally called the “gay plague” when it was first identified in the United States in 1981 because it seemed to affect mostly homosexual men, by far the largest number of infections are currently recorded among heterosexuals. In this epidemic that continues to rage throughout the world, heterosexual intercourse is the most common medium for the transmission of the HIV virus, especially in sub-Saharan Africa (UNAIDS 2008: 43; Hardon, Davey, Gerrits, Hodgkin, Irunde, Kgatlwane, Kinsman, Nakiyemba & Laing 2006: 23). The virus operates by invading the white cells of the body and transforming them into factories to manufacture more viruses which then sprayed exponentially throughout the human body. This effective neutralisation of the white cells compromises the normal immunity of an infected person, and makes them particularly susceptible to all kinds of opportunistic infections including life-threatening conditions such as tuberculosis (TB). If the spread of the virus throughout the body remains unchecked, the patient will eventually develop what is called “full-blown AIDS” – the state in which the body is unable to resist even minor infections. This eventually results in the death of the patient through repeated infections and their consequences for the health status of the patient (Fauci & Lane 2005: 1086).

Although it is now more than twenty eight years since the HIV was identified, there were an estimated 33 million people in 2008 who were infected with HIV worldwide – 25% of whom live in sub-Saharan Africa (UNAIDS 2008: 32). HIV has decreased the average life expectancy of citizens by more than 20 years in those countries that are most affected by it. One of the most unfortunate side-effects of the epidemic is that the virus tends to infect and kill people from the most economically active sector of the population. This adversely affects the growth and development of the countries (and especially the countries of sub-Saharan Africa) that are most affected by it (UNAIDS 2008: 13). It also means that there will be an acute shortage in many counties of highly qualified personnel in those sectors of the economy where they are most needed. More than 25 million people have died since the beginning of the AIDS epidemic. In 2007 alone, approximately two million people died from AIDS while an estimated 2.7 new cases of HIV infection occurred worldwide (UNAIDS 2008: 32).

1.1.2 HIV in Africa

According to UNAIDS (2008: 32), sub-Saharan African countries (including Ethiopia) are amongst the countries most affected by HIV/AIDS in the world since they account for 67% of all people living with HIV infection and 75% of all AIDS deaths in 2007 – even though Africa only accounts for 11% of the world's total population. Even though the prevalence of HIV seems to be stabilizing in most countries of the world outside, the total number of people infected with HIV throughout the world continues to increase. In 2007, for example, the number of people newly infected with HIV in Africa was estimated to be 1.9 million (UNAIDS 2008: 39).

1.1.3 HIV in Ethiopia as a whole and its individual regions

In Ethiopia, the first cases of AIDS were reported in 1986 (EFMOHHAPCO 2007a: 8). While Ethiopia has a single-digit HIV infection rate of 2.1%, an estimated 977,394 people were infected with HIV in 2007 alone (EFMOHHAPCO 2007b: [4]).
The graph below shows the regional and the average countrywide prevalence of HIV in 2007 in terms of the average percentage of the population who were infected in the different regions of the country, and the average percentage of infections among the population of the country as a whole ("Ethiopia").

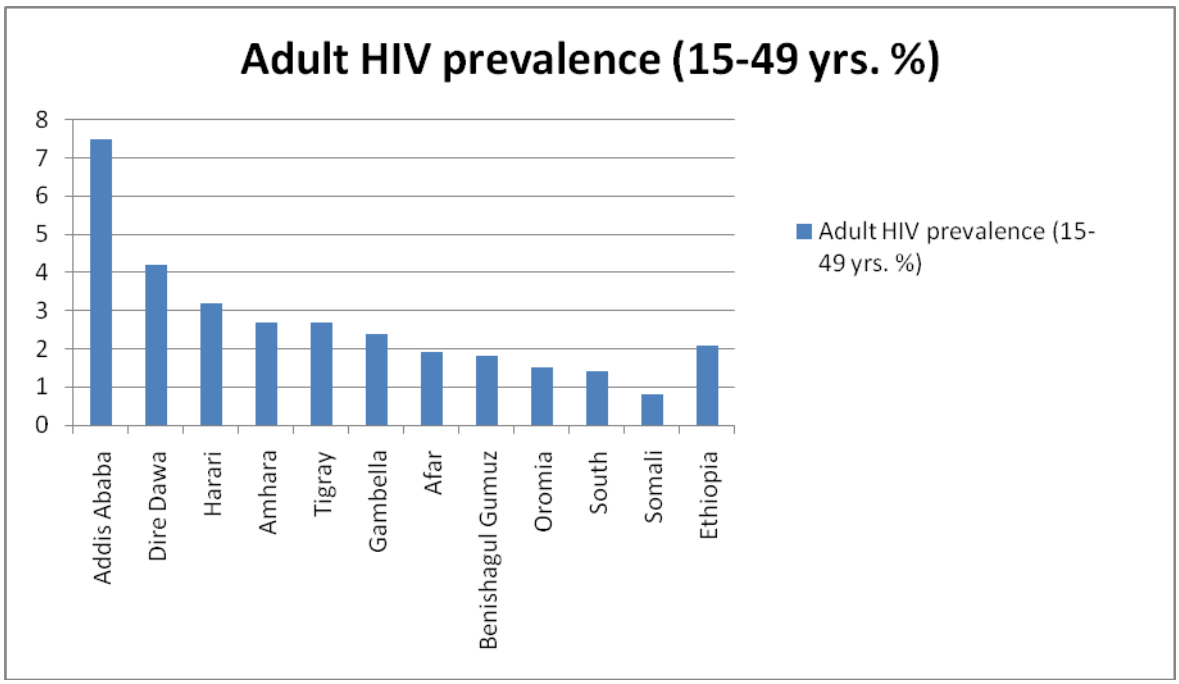

Figure 1.1 The prevalence of HIV infections in the regional states of Ethiopia and in various town administrative areas
(Source: EFMOHHAPCO 2007b)

The figures in figure 1.1 show that the prevalence of HIV is highest in the capital city (Addis Ababa) and lowest in the Somali regional state of Ethiopia.

1.2 BACKGROUND TO THE STUDY

This study was undertaken in Ethiopia, a country in East Africa whose capital city is on latitude 8^{o} North and longitude 38^{o} East. Ethiopia shares common borders with Sudan, Eritrea, Djibouti, Somalia and Kenya (Ethiopia [n.d.]: [1]). The country has a total population of more than 77 million people, and the capital city is Addis Ababa (Ethiopia [n.d.]: [2]). More than 84% of the Ethiopian population live in rural areas, and 43% of the total population is under 15 years of age (EFMOHHAPCO 2007a: 8). Ethiopia is divided into nine regional states and two town administrative areas (see figure 1.2 below).

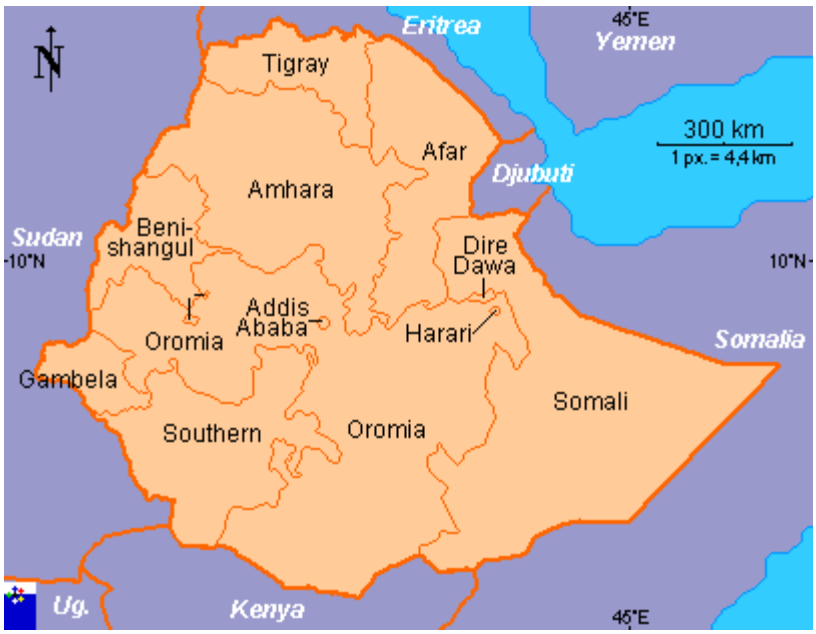

Figure 1.2 Map of Ethiopia and its regional states

(Source: Clickable [n.d.]: [1])

According to a single point estimate made in 2007, there are about 977,394 people living with HIV in Ethiopia out of a total population of more than seventy seven million people, with a point prevalence of 2.1% (EFMOHHAPCO 2007b: [4]). The single point estimate in 2007 estimated that the rural HIV prevalence was 0.9% (or 320,629 people living with HIV in the rural area) and 7.7% urban prevalence (or 518,383 people living with HIV in urban areas) (EFMOHHAPCO 2007b: [4]).

In Ethiopia, antiretroviral treatment (ART) first became available for those who could afford it in 2003. In 2005, a free ART service was launched with funds obtained from the Global Fund, the World Bank and the United States President's Emergency Plan for AIDS Relief (PEPFAR) (Assefa, Jerene, Lulseged, Ooms & Damme 2009: [2]). By 9 March 2009, there were 189,267 patients who had participated in an ART regimen. Of these, only 139,494 were still alive and continuing with their ART on a regular basis (EFMOHHAPCO 2009: [1]).

1.3 PROBLEM STATEMENT

Because of the wide availability and use of a free HAART service that began to operate in 2005 with the support of PEPFAR and other donor organizations, the HIV/AIDS-related morbidity and mortality has decreased significantly in Ethiopia (Jerene et al.

2006: [3]). These statistics have given hope to people who have to live with HIV because HAART has enabled them to improve the quality of their lives to a degree that was previously thought to be impossible. The problem, however, is that if a patient requires the optimum benefits that a long-term exposure to HAART confers in terms of suppression of the HIV, then that patient needs to comply with a near-perfect adherence to the clinical requirements of the HAART regimen (Chesney 2003: 169; Gifford, Bormann, Shively, Wright, Richman & Bozzette 2000: 387). Statistics from Ethiopia shows that the rate of adherence to ART ranges from between 74.2% (Markos, Worku & Davey 2008: 176) and 94.3% (Amberbir, Woldemichael, Getachew, Girma & Deribe 2008: [6]). In a study undertaken by Tadious and Davey (2006: 241), 81.2% of patients on ART took more than 95% of their prescribed ARV doses during the study period. In a similar study undertaken by Markos et al. (2008: 176), 74.2% of the patients on ART took more than 95% of their prescribed ARV medications in the week prior to assessment. In another study in the same year conducted by Amberbir et al. (2008: [6]), 94.3% of the patients in the sample adhered to the requirements of the therapy in the week prior to the study. In another study conducted among HIV-infected children in Ethiopia, the figures (as reported by their care givers) showed that 86.9% of children complied with a 95% adherence rate (Biadgilign, Deribew, Amberbir & Deribe 2008: [5]). These studies reveal that there are many people who are not optimally adherent to the requirements of HAART (a > 95% adherence rate). This problem requires urgent attention because the failure to adhere to the HAART regimen of regular daily dosages results in the development of drug resistance and therefore in the ultimate failure of the ARV drugs that have given infected people reasonable expectations of containing the multiplication of the HIV virus in their bodies.

It is therefore vitally important to appreciate the significance of these obstacles or barriers that affect adherence to the HAART regimen, and it is essential, in the light of such information, to develop interventions that will improve patient adherence to HAART. The problem that the researcher set himself was therefore to make an intensive study of those factors that affect levels of adherence in Ethiopia. Once these factors are known and understood, a coherent strategy can be implemented to address the problem.

1.4 PURPOSE OF THE STUDY

The purpose of this study was to assess the level of adherence to ART among a sample of adult HIV-infected patients in the Adama district of the Oromia region in Ethiopia, and to identify and assess the major factors that affect adherence (or non-adherence) to the ART regimen.

1.4.1 Research questions

In order to achieve the purpose of the study, the researcher devised the following research questions that would be answered during the course of the study:

- What is the level of self-reported adherence behaviour to ARV drugs in patients taking ART in the Adama district of Ethiopia?
- What is the effect of social and demographic variables on adherence behaviour to HAART in the Adama district of Ethiopia?
- What impact has having information about ART have on the adherence behaviour skill of patients to adhere to HAART?
- How does the possession of information about ART affect the adherence behaviour to HAART when one considers the self-reported adherence behaviour of HIV-infected patients in the Adama district of Ethiopia?
- What role does motivation play in the adherence behaviour skill of patients to adhere to the requirements of HAART?
- How important is motivation in the adherence behaviour to HAART in the estimation of patients who self-reported their adherence behaviour in the Adama district of Ethiopia?
- What does the possession of adherence behavioural skills affects self-reported adherence behaviour to HAART in this study in the Adama district of Ethiopia?

1.4.2 Research objectives

The objectives of the study were to:

- assess the level of HAART adherence behaviour among patients taking ARV drugs in the Adama district of Ethiopia

- assess the effect of social and demographic variables on HAART adherence behaviour in the Adama district of Ethiopia
- assess the impact of information about HAART on adherence behavioural skills of HIV-infected patients who were on the HAART regimen in the Adama district of Ethiopia
- assess the benefits that patients obtained from possessing information about ART in general and the importance of strict adherence to the HAART regimen on the self-reported adherence behaviour of HIV-infected patients in the Adama district of Ethiopia
- assess the impact of the motivation to comply with the HAART regimen on adherence behavioural skills that are needed in HAART in patients who are being treated in the Adama district of Ethiopia
- explore the impact of motivational factors that patients have to adhere to HAART on self-reported adherence behaviour among HAART patients in the Adama district of Ethiopia
- determine the impact of adherence behavioural skills among HAART patients on self-reported adherence behaviour of HIV-infected patients in the Adama district of Ethiopia

1.5 ASSUMPTIONS OF THE STUDY

The following assumptions on the part of the researcher guided this study:

- If patients have been given adequate information about how ARV drugs function and if they have had the importance of scrupulous adherence to the HAART regimen clearly explained to them, they will be far more likely to adhere to the requirements of the HAART regimen.
- If patients are highly motivated within their personal and social lives to take their anti-viral medications as regularly as they need to, they will be optimally adherent in the way that they take their ARV medications.
- If patients possess a high degree of the necessary behavioural skills that predispose patients to be meticulous in complying with dosage requirements of HAART, they will give evidence of optimal adherence to the requirements of HAART.

1.6 SIGNIFICANCE OF THE STUDY

Adherence to HAART has been described as the “Achilles heel” of HAART success by Amberbir et al. (2008: [1]). Optimal adherence is, of course, critical for the long-term benefit and success of ART. The failure to adhere to the dosage requirements of HAART causes the emergence of resistance to ART in patients and therefore the ultimate failure of the treatment in such patients. The development of this kind of drug resistance is dangerous both for individuals and for the community as a whole. Even though a number of research studies have been undertaken in Ethiopia that address the problem of ART adherence, no studies that address adherence behaviour in Ethiopia in terms of health behaviour theories and specifically in terms of the IMB model, have as yet been undertaken. The results of this study will be made available to guide the interventions that health care providers and policymakers apply to the HIV-infected population. The results of the study will make a vital contribution to research in this field and will result in considerable advantages for both the patients themselves and the community as a whole because it is only optimal adherence to the requirements of HAART that will ultimately minimize treatment failures and the interpersonal transmission of strains of HIV that have developed a strong resistance to HAART (Glass, Geest, Weber, Vernazza, Rickenbach, Furrer, Bernasconi, Cavassini, Hirschel, Battegay & Bucher 2006: 387; Arnsten, Demas, Farzadegan, Grant, Gourevitch, Chang, Buono, Eckholdt, Howard, & Schoenbaum 2001: 1421).

The researcher has made various recommendations that are based on the results of this study that can be used in HIV treatment interventions. The researcher has utilized the constructs of the core IMB model (namely, *adherence information, motivation* and *behavioural skills*) in the conduct of this research, and has evaluated the relations among these constructs and the self-reported rates of adherence in the sample of HIV-infected patients. This research was also used to test the hypothesis that a theory that was originally applied in Western countries was also applicable to developing countries like Ethiopia.

1.7 DEMARCATION OF THE STUDY FIELD

The study was conducted at a health facility in Adama district the Oromia region of Ethiopia. The Adama district is located 100 km southeast of the capital city, Addis

Ababa, and is one of the health facilities that is located in an urban area of Ethiopia (see figure 1.3 and figure 1.4 below). Figure 1.3 shows where the Oromia region is located in Ethiopia.

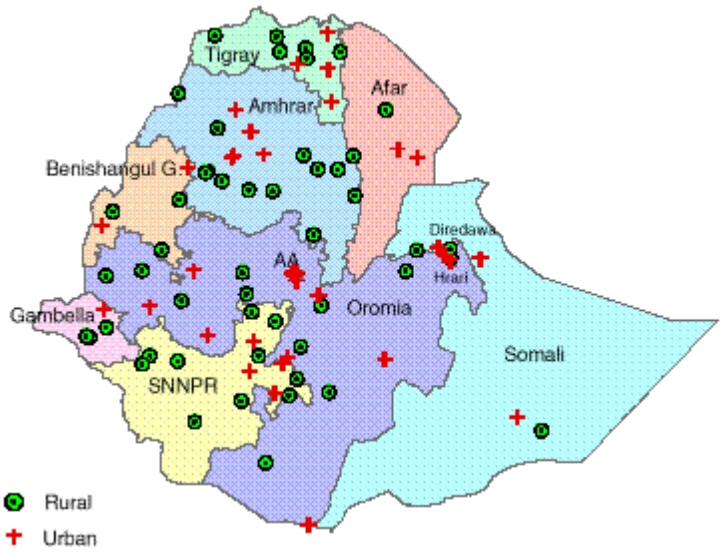

Figure 1.3 A map of Ethiopia that shows the rural and urban health facilities. These include those of the Adama district (indicated by a red cross southeast of the capital Addis Ababa (AA)) in the Oromia region.

(Source: EFMOHHAPCO 2007a: [1])

Figure 1.4 below shows the location of East Shoa and specifically of the Adama district in which the study was conducted.

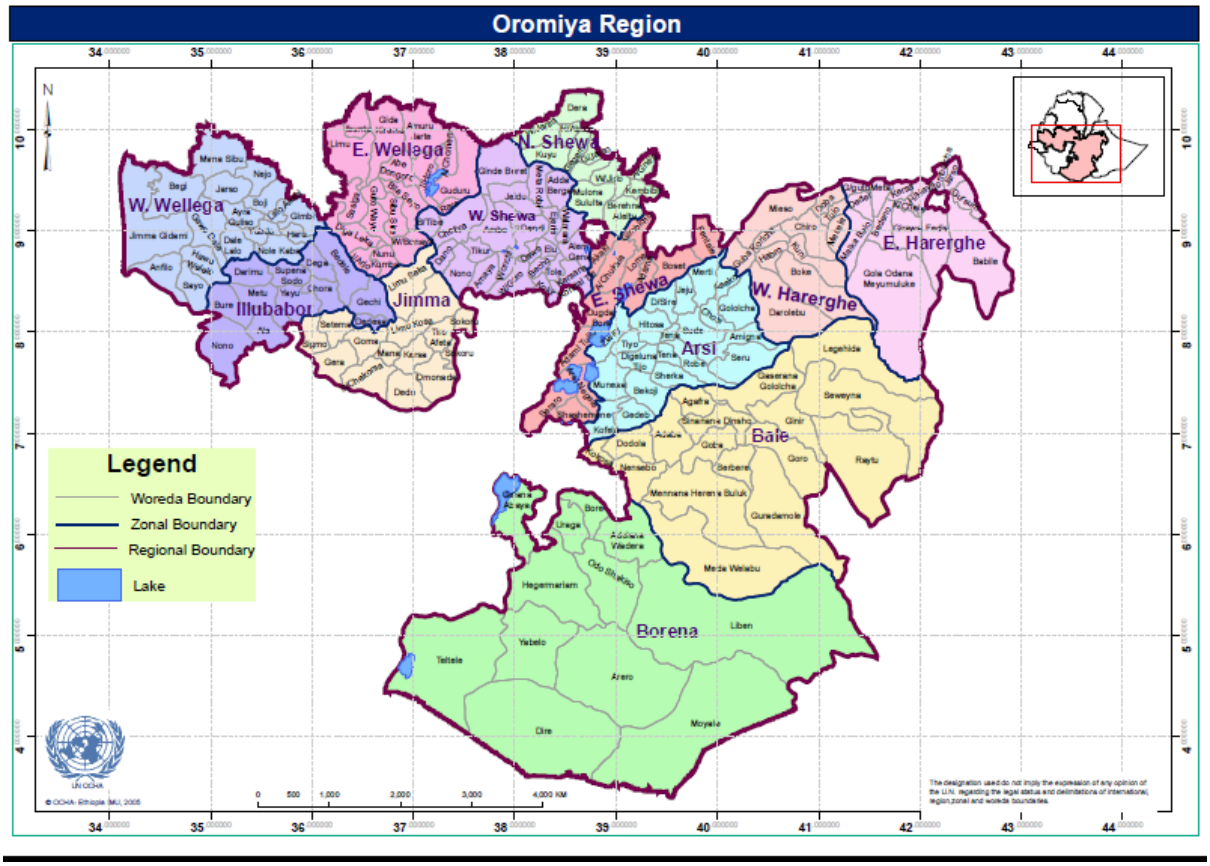

Figure 1.4 Map of the Oromia regional state of Ethiopia that shows where the Adama district is situated relative to Oromia and East Shoa

(Source: Oromia 2005: [1])

Oromia region is the largest Ethiopian regional state in terms of its size and population. The Adama zone is one of eighteen zones in the Oromia regional state, and Adam is its capital city. The Adama Hospital launched an ART service in 2003, and had a total of 7,062 patients on ART by March 2009 (EFMOHHAPCO 2009: [5]. As of March 2009, there were 130 hospitals that delivered HAART to those who required it, and a further 308 operational health centres in Ethiopia that also delivered HAART to patients who needed it (EFMOHHAPCO 2009: [15]).

1.8 CONCEPTUAL FRAMEWORK OF THE STUDY

A conceptual framework serves as an orientation for a study and enables a researcher to describe the research in an organized and logical fashion (Stommel & Wills 2004: 15). According to Munro, Lewin, Swart and Volmink (2007: [1]), health behaviour theories may be useful for the assessment of rates of adherence and the development

of interventions to promote more satisfactory rates of adherence to HAART. From among be available health behaviour theories, the researcher chose the Information-Motivation-Behavioural skill (IMB) model of adherence to assess adherence in the sample and to design suitable and effective interventions from the results of the research (Fisher, Fisher, Amico & Harman 2006b: 462; Amico, Barta, Konkle-Parker, Fisher, Cornman, Shuper & Fisher 2009: 73).

With background of both health sciences and in social psychology, the IMB model postulates that proper adherence to the requirements of the HAART regimen is a form of health behaviour that is mainly determined by how much an individual knows about HAART and the importance of adherence to the dosage schedule. The IMB model also enables a researcher to investigate the attitudes of patients in the sample toward the taking of ARV medications (their motivation) as well as the ability of patients to perform the necessary adherence-related tasks. It also enables the researcher to determine the extent of the sense of self-efficacy (behavioural skills) among the individuals in the sample (Ware, Wyatt & Bangsberg 2006: 19).

The literature on this topic shows that no studies that have used the IMB model as a conceptual framework to assess rates of adherence in Ethiopia, had ever been performed. Because of the vital importance of long-term medication adherence to ARV during treatment and because large numbers of patients still manifests suboptimal adherence behaviours, the need for research such as this was considered to be both justifiable and vitally important for the health prospects of numerous people who are infected with HIV.

1.9 RESEARCH METHODOLOGY

While the research methodology of this study will be discussed in the sections that follow, chapter 3 will provide a more detailed discussion of the research methodology that the researcher used.

1.9.1 Research design

A research design represents the “architecture” of the study or the structure of the approach that the researcher needs to follow in order to answer the questions that had

been raised in the delineation of the research objectives (Morroni & Myer 2007: 77). By making proper use of the research design, a researcher is able to maintain a tighter control of the various elements of the study in order to obtain the answer to the questions for that the research project was designed to answer.

In this study, the researcher used a number of observational, analytical, cross-sectional and quantitative research designs. Each of these will now be discussed below.

1.9.1.1 Observational study design

The kind of research design in which no clinical trials take place or which involves no experimental intervention, is called an observational study design (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).

1.9.1.2 Analytical 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).

1.9.1.3 Cross-sectional research design

A study design in which data are collected at one particular point in time is called a cross-sectional research design (Polit & Beck 2008: 751). A cross-sectional research design assesses and describes the prevalence of the outcome or the extent of the exposure of a population to a predetermined phenomenon. The sample in a cross-sectional study is assembled randomly without any reference to exposure or outcome. The researcher then compares the outcome with the exposure, and tries to determine whether there is a difference in the prevalence of the outcome when it is compared to the exposure of the population (Morroni & Myer 2007: 85).

1.9.1.4 Quantitative research design

Polit and Beck (2008: 763) describe a quantitative research design as an investigation of a phenomenon by means of precise measurements and quantification. This means that researchers who use quantitative research designs usually follow similar sequences in a highly structured and tightly controlled experimental environment in order to obtain the data in which they are interested (Polit & Beck 2008: 66).

1.9.2 Research method

The research method is the method that researchers use to structure their study in order to achieve their objectives (Polit & Beck 2008: 15). The research setting, the selection of participants, the sampling criteria, the process of data collection and the method for data analysis that were used in this study are described in the paragraphs that follow.

1.9.2.1 Population

Joubert and Katzenllenbogen (2007:94) describe the *target* population as the whole group about which we wish to gather information and draw conclusions. The *accessible* population is that part of the target population that is accessible to the researcher for the purposes of research (Polit & Beck 2008: 338).

1.9.2.2 Sample

A *sample* is subset of a population that has been selected by some other method to participate in the study (Polit & Beck 2008: 765). Sampling represents the process of selecting a certain portion of the population that accurately and characteristically represents the entire population (Joubert & Katzenllenbogen 2007: 94).

1.9.2.2.1 Sample size

The sample size is the number of respondents who are required in order to ensure statistical valid conclusions (Polit & Beck 2008: 348). The researcher determines the

sample size by deciding how many people need to be included in the research in order to produce statistically valid conclusions (Polit & Beck 2008: 413).

1.9.2.3 Data collection

The researcher connected the necessary data by means of an interview that was based on a structured questionnaire because such a method eliminates the possibility that participants will interpret the questions in their own particular way. By using this method of data collection, a researcher can maximise the reliability of the information that he or she has obtained from the sample (Katzenllenbogen & Joubert 2007: 107).

1.9.2.3.1 Data collection instrument

In order to assess and address the problems involved in adherence, it is preferable to use theory-based approaches that address multiple aspects of the factors that affect adherence – rather than to target only one aspect of the adherents phenomenon (Munro et al. 2007: [1], Ware et al. 2006: 18).

The researcher used a structured questionnaire in the study in order to obtain the following information:

1. demographic characteristics
2. adherence information
3. adherence motivation
4. adherence behavioural skills
5. adherence behaviour

(See Appendix B for a copy of the structured questionnaire.)

1.9.2.4 Data analysis

Before the researcher undertook any data analysis, the data was checked for any errors that might possibly have been inadvertently included in the original document during the processes of transcription or the entering of the data into the correct form fields (Katzenllenbogen & Joubert 2007: 107). After data was coded and entered into a

computer, analysis of the data was carried out by using the software called the Statistical Package for Social Sciences (SPSS) for Windows (version 14). The level of significance was set at 0.05. The part that is concerned with analysis consisted of both descriptive statistics that summarised the findings, and inferential statistics that included the Chi-square test and an analysis of variance (ANOVA) that assessed differences in outcome exposure in terms of outcome variables.

1.9.2.5 Validity and reliability of the instrument

If a phenomenon is to be accurately measured, the instrument that a researcher uses to measure needs to be both valid and reliable (Myer & Karim 2007: 155).

1.9.2.5.1 Validity of the research instrument

The validity of research instrument means the extent to which it is accurate and reliable for measuring what it is supposed to measure (Myer & Karim 2007: 156). The face validity and content validity of the instrument were both assessed by the experts in the field and by the supervisor of this research from the University of South Africa (UNISA) during the pre-test of the questionnaire.

1.9.2.5.2 Reliability of the research instrument

The reliability of a research instrument refers to the degree of precision that a research instrument is able to attain – even if the measuring process is repeated over and over again (Myer & Karim 2007: 155). The research instrument of this study was compiled and adapted by the researcher after reviewing the literature and consulting experts in the field.

1.10 DEFINITIONS OF KEY CONCEPTS

- **Adherence**

The *Oxford Advanced Learner's Dictionary* (1995: 14) defines *adherence* as the ability or determination "to hold or follow a set of principles, course of action, etc".

In this study, *adherence* refers to the act the daily dosage of ARV drugs as prescribed by the dosage administration protocol that is recommended by the manufacturer of the drugs concerned.

- **Information**

The *Oxford Advanced Learner's Dictionary* (1995: 611) defines *information* as "facts told, heard or discovered about something/somebody".

In this study, *information* refers to the facts about ARV drugs adherence and their relative importance for the purposes of this study.

- **Motivation**

The *Oxford Advanced Learner's Dictionary* (1995: 758) defines *motivation* as "the reason for somebody's action" or the reason why someone acts as they do.

In this study, *motivation* refers to the personal and social motivation that some people have to adhere to the dosage requirements of HAART.

- **Behaviour**

The *Oxford Advanced Learner's Dictionary* (1995: 96) defines *behaviour* as a way in which someone acts or reacts "in the specified way".

In this study, *behaviour* refers to act of the taking of ARV drugs in compliance with the prescription of the health care worker who administers them.

1.11 ETHICAL CONSIDERATIONS

Ethics deals with issues of morality and of the human ability to decide what is right and what is wrong (Stommel & Wills 2004: 373). In this study, ethical issues were taken into account right from the beginning: from the initial selection of the topic to the preparation of the final report. According to Polit and Beck (2008: 170), the three primary principles that are articulated in the Belmont Report constitute a standard for the ethical conduct

of research. These three principles are: *beneficence, respect for human dignity,* and *justice*. Each of these three principles are discussed below.

1.11.1 Beneficence

The principle of beneficence imposes a duty on researchers to minimize risks and to maximize benefits – both for the respondents and for the community as a whole (Polit & Beck 2008: 170). No degree of harm was generated by this study because the procedure of data collection procedure consisted only of the interviewing of patients by trained professionals who came for their routine treatments and for a general review of their health. None of the questions included any kind of allusion to any matter that might have induced any kind of negative emotion or psychological trauma. No risk was associated with this research during the data collection process, and the results obtained from this study might well be useful for addressing problems associated with adherence to the drug schedules among the whole population who use HAART in the Adama district. It is for this reason that one copy of the report of this study will be sent to the Adama health facility for their own use and information.

1.11.2 Respect for human dignity

The second principle to be addressed in this study – a respect for human dignity – includes a right to self-determination and the right of the participant to full disclosure of the facts (Polit & Beck 2008: 171). Self-determination in this context means that all the individuals who participate in the study have an absolute right to decide whether they want to participate or not – without the possibility of them being penalised or disadvantaged in any way whatsoever if they decide not to participate (Polit & Beck 2008: 171). In order to make this quite clear, all participants in this research were included only if they were prepared to give their informed written consent in the knowledge that they had the right to withdraw from the study at any time and without the need for any explanation or justification. An informed consent form was therefore completed by all participants *before* the interview began (see Appendix A for a copy of the informed consent form).

Full disclosure means that the researcher has fully and clearly described the nature of the study, including the potential harms and benefits associated with it. It also means

that the researcher has informed each participant of his or her right to withdraw from the study at any time without any explanation or justification (Polit & Beck 2008: 172). Although the informed consent form gives respondents enough information about the purpose of the study, the researcher made sure that all participants clearly understood the information that was given to them, and that each one knew that he or she had the right to make a free choice to be included in the study or not (Polit & Beck 2008: 176).

The informed consent form therefore supplies respondents with the following information: the purpose of the study, the procedure that will be followed, any potential harm that might be associated with the research, the benefits associated with the study, and the right of participants to withdraw from the study at any time whatsoever. The telephone number of the researcher was also included in the questionnaire in case anyone needed to contact him. All clients who refused to be involved in the study continued to be given their normal clinical care, advice and medications without any prejudice whatsoever.

The Ethics Committee of the Faculty of Health Science at the University of South Africa reviewed the researcher's proposals to protect the ethical rights of patients. The same kind of review was undertaken by the regional health bureau's Ethics Committee here in Ethiopia. Only after all these procedures had been completed, was the researcher allowed to proceed to collect the necessary data.

1.11.3 Justice

Justice means that respondents have an inalienable right to fair treatment and that the information that they impart for the purpose of research needs to be kept completely private (Polit & Beck 2008: 173). In order to assemble a completely unbiased sample, the researcher selected respondents in accordance with a series of random numbers that were generated by a computer. This meant that there was no bias or unfairness in the researcher's selection of the respondents who would participate in the interview. Researchers are obliged for ethical reasons to protect the identity of study participants (Katzenllenbogen & Joubert 2007: 121). All the data was collected in a private room. During the data collection process, the privacy of the participants was maintained because the questionnaires were anonymous and neither the researcher nor anyone else had any means of identifying the respondent. An assurance that the confidentiality

and anonymity of each respondent would be completely maintained was also included in the written information contained in the informed consent form.

In addition to this, all the text, ideas and data that have been obtained from other sources or researchers for the purpose of this research conform to the requirements of international copyright laws. All sources have been duly acknowledged and identified in the bibliography in order to avoid plagiarism.

1.12 SCOPE AND LIMITATIONS OF THE STUDY

The researcher acknowledges the following limitations of this study:

Because only one hospital was selected for this study, it would be problematic to generalize the findings of the study to other parts of the country.

The measurement of adherence to dosage schedules by means of self-reported data is not always entirely reliable because it has been established that respondents often tend to overestimate in the answers that they supply (Bell, Kapitao, Sikwese, van Oosterhout & Lalloo 2007: 562; Berg & Arnsten 2006: 80).

Because this is also a cross-sectional study, the data obtained from the results of the study are only able to identify associations rather than strict causality between independent and dependent variables. Since patterns of adherence may change over time, even in the case of a single individual, a prospective study rather than a cross-sectional study would have represented a more desirable research design had it not been for the constraints of time and budget under which the researcher had to work.

1.13 OUTLINE OF THE DISSERTATION

This dissertation is divided into the following chapters:

Chapter 1: Orientation to the study

Chapter 2: Literature review

Chapter 3: Research methodology

Chapter 4: Presentation and discussion of the results of the research

Chapter 5: Conclusions, limitations and recommendations

1.14 CONCLUSION

This chapter briefly highlighted the background of the research, the rationale for the study, its objectives and the content of the research questions. The researcher also used this chapter to describe the theoretical framework of the study, the design and methodology of the research that he used to collect the data, and the methods that he used to address the validity of the research design. In this chapter, the researcher also addressed the ethical principles that guided and informed the conduct of this research.

The researcher believes that it is of the utmost importance to identify levels of adherence and the factors that affect adherence among people who are receiving HAART. A sensitive appreciation of this information is vitally important both for the individual and for the community as a whole because improved levels of adherence among those who receive HAART can forestall the failure of available treatments and prevent the transmission of resistant strains of the HIV virus in the community.

The findings obtained from this study will be used by programme officials to: (1) understand and assess the situation that prevails at present, and (2) design suitable interventions that will improve rates of adherence to HAART dosage schedules.

Chapter 2 contains the literature review on which this study is based.

CHAPTER 2

Literature review

2.1 INTRODUCTION

Chapter 1 presented a brief discussion of HIV and ART, the prevalence of HIV in Ethiopia and in the Oromia region in particular, the problem and purpose of the study, the assumptions and significance of the study, the conceptual framework of the study, and the research methodology. It also gave definitions of the key concepts that are used in this study and discussed and reviewed the ethical considerations that guided the conduct of this study. This chapter will be devoted to a literature review of relevant aspects of HIV and AIDS, of current ARV drugs and recommended combinations ("cocktails") of such drugs, of patterns of adherence (and non-adherence) to the dosage schedules required for ART, as well as of the Information Motivation and Behavioural Skill (IMB) model on which was the conceptual framework of the study was based.

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.

Volmink (2007: 67) points out that a literature review can serve a number of different functions. These include:

- identifying justifications for future research
- the placing of new findings into the context of what is already known
- making sense of the research findings within the larger context
- the sifting of an excessive amount of information so that the researcher does not become overwhelmed by irrelevant and distracting subsidiary information
- the facilitation of access to further important research findings that will be able to contribute to the ultimate success of the project

The literature review made the researcher aware that a number of studies had already investigated the extent of adherence to ART both in Ethiopia and in other countries throughout the world, the current rates of adherence to the ART dosage schedules among patients in Ethiopia, and the various factors that affected levels of adherence to the required ART dosage schedules. In addition to this, the literature review provided the researcher with more information about how the Information-Motivation-Behavioural skill (IMB) model had been used in studies in developed countries – although it had never before been used in research in Ethiopia.

2.2 OVERVIEW OF HIV

The human immunodeficiency virus (HIV) virus is a ribonucleic acid (RNA) virus that belongs to the family of human retroviruses (the Retroviridae) and the subfamily of lentiviruses (Fauci & Lane 2005: 1076). HIV is a viral infective agent that is normally transmitted through unprotected sexual contact in which the male does not use a condom, through HIV-infected blood that somehow or other enters the bloodstream of the non-infected person, by means of an HIV-infected mother who gives birth to a baby, and through the sharing of non-sterile needles among people who are infected with HIV and those who are not. It is not transmitted by forms of casual contact such as hugging, shaking hands, kissing or by insects bite such as mosquitoes (Fauci & Lane 2005: 1079). Fortunately for the human race, it does not spread like the influenza virus which is present in the fine mist that is disbursed in a room when an influenza-infected person coughs or sneezes.

The HI virus has developed an ingenious mechanism that allows it to penetrate the defensive white corpuscles of the human body and transform them into highly efficient “factories” that manufacture new HIV viruses that are immediately sent out into the bloodstream of the newly infected person. These newly manufactured viruses begin to attack other uninfected white corpuscles in the same way as the original virus, and this process creates an exponential multiplication of the HIV in the body of the victim. What makes the virus so deadly is the fact that human white corpuscles are the body's first line of defense against infectious diseases such as bacteria’s and other viruses. The fairly rapid depletion of the body's normal number of white corpuscles renders the whole human organism vulnerable to a whole range of opportunistic infections. These infections eventually multiply the point where an HIV-infected person develops the full-

blown version of the acquired immunodeficiency syndrome (AIDS). If an infected person is not treated, their health will deteriorate to a point where the body will be unable to sustain the vital functions that enable it to remain alive. Thus, although the HIV itself does not *directly* kill its victim, it acts as a catalyst that enables a variety of pathological conditions to destroy the health (and eventually the life) of the infected person. Patients who remain untreated develop the characteristic symptoms of most or all of the diseases and conditions that characterise the acquired immune deficiency syndrome (AIDS), and some of these eventually undermine the defenses and integrity of the body to such an extent that mortality intervenes (Fauci & Lane 2005: 1086).

Two types of HIV viruses have been identified: HIV-1 and HIV-2. HIV-1 is the most common form of a virus that is found in most of the world and also in Ethiopia itself. HIV-1 is categorised into three groups: M (the most common type), O and N. The M group is divided into nine further sub-types that had been labeled A, B, C, D, F, G, H, J, and K and into major circulating recombinant forms (CRFs). The HIV-1 sub-type C of the M group is the most common form of a virus to be found in sub-Saharan African countries such as Ethiopia. The HIV-2 form of a virus is more commonly found in West African countries, and is less easily transmissible than the HIV-1 form (Fauci & Lane 2005: 1078).

2.2.1 Historical background of HIV

The first cases of AIDS were first identified and reported in 1981 in the United States (USA) by the United States Centre for Disease Control and Prevention (CDC) in Atlanta, Georgia. But it was only in 1984 that HIV was definitively proved to be the causative agent of AIDS. An antibody test was also first developed in 1985 that made it possible to diagnose HIV from a sample of human blood (Fauci & Lane 2005: 1076).

2.2.2 Epidemiology of HIV

It is now twenty nine years since the HIV was first identified. Statistics from 2007 show that an estimated 33 million people had been infected with HIV worldwide (UNAIDS 2008: 32).

Approximately 2 million people have already died from AIDS, and an estimated 2.7 million new HIV infections were reported in 2007 alone (UNAIDS 2008: 32).

2.2.2.1 The epidemiology of HIV in Africa

According to UNAIDS (2008: 32), the sub-Saharan African countries of Africa (which includes Ethiopia) are among those that are most affected by HIV/AIDS. The infection rate in sub-Saharan countries accounts for 67% of the total number of people throughout the world who have been infected by HIV. In some African countries such as Swaziland, a record high of 26% of the population was reported to be infected by HIV in 2006 (UNAIDS 2008: 40). This pandemic creates enormous stresses and strains in the economies of countries that are most seriously affected because the virus attacks and kills the demographic of the population that is most economically active. It also adds enormous burdens to the already underfunded, under-resourced and understaffed health care systems of countries in Africa by affecting working groups that should be the most productive and active in the economy.

2.2.2.2 The epidemiology of HIV in Ethiopia

The adjusted figure for the prevalence of HIV among Ethiopians in 2005 was 3.5% of the total population (10.5% in urban areas and 1.9% in rural areas). The unadjusted ANC HIV prevalence was reported as being 5.3% (EFMOHHAPCO 2007a: 20). According to the report of Ethiopian Federal Ministry of Health HIV/AIDS Control Office (EFMOHHAPCO) (2007a: 48), the four major regions (Amhara, Oromia, Addis Ababa and Southern regions) together accounted for 86.6% of all people living with HIV, 86.7% of estimated pregnancies, 85.3% of new infections, 87.9% of new AIDS cases, and 88.2% of deaths that occurred in Ethiopia in 2005.

According to a single point estimate that was made in 2007 in Ethiopia, out of a total population of more than seventy seven million people, approximately 977,394 people were living with HIV, with a point prevalence of 2.1%. Of the total number of people living with HIV in Ethiopia, 258,266 people were in need of ART (EFMOHHAPCO 2007b: [4]). The estimated mortality rates from HIV/AIDS in Ethiopia was an estimated 88,997 people who died from AIDS-related conditions in 2006, and 71,902 people who died in similar causes in 2007. These deaths have created (an estimated) 895,350

orphaned children who have lost either one or both of their parents – the familiar African problem of the “AIDS orphans” who are increasing year by year in all the countries of sub-Saharan Africa.

These figures show that even though the transmission rate may be stabilizing to some extent in some countries, there is still a long way to go before the HIV is no longer a major health problem in the communities of sub-Saharan Africa.

2.2.2.3 The epidemiology of HIV in Oromia

In 2007, Oromia regional state HIV prevalence was 1.5% with 6.1% in urban and 0.7% in rural areas. The overall incidence rate in 2007 in Oromia region was 0.18% with 1.63% in urban areas and 0.13% in rural areas. There were an estimated 20,798 pregnancies with 3992 HIV positive live births in the same year. A total of 236808 people (138286 in urban and 98521 in rural) were living with HIV in Oromia region of which 61795 people were in need of ART in 2007. The death report due to AIDS related illnesses in the same year was 17570 (10830 from urban and 6741 from rural areas) (EFMOHHAPCO 2007b: [20-22]).

2.3 ARV DRUGS

When HAART was first introduced to HIV-infected people in the United States in 1996, the prognosis for HIV/AIDS sufferers improved for the first time since the identification of the virus. HAART also changed what was previously a fatal illness into a chronic although serious illness that could be controlled and ameliorated by means of carefully applied interventions (Fauci & Lane 2005: 1124). There are three classes of ARV drugs that are currently in use. They are: (1)Reverse transcriptase inhibitors which are in turn subdivided into nucleoside analogues and non-nucleoside analogues (e.g. Zidovudine, Stavudine, Lamuvidine, Tenofovir from nucleoside analogues, and Nevirapine, Efavirenz from non-nucleoside analogues of reverse transcriptase inhibitors); (2) Protease inhibitors (e.g. Ritonavir, Lopinavir/Ritonavir), and (3) Entry inhibitors (e.g. Enfuvirtide) (Fauci & Lane 2005: 1124-1135; Hardon et al. 2006: 24).

2.3.1 ART in Ethiopia

While the introduction of highly active antiretroviral treatment (HAART) became available in 2003 in Ethiopia for those who could afford it, free HAART was first made available to HIV-infected patients in 2005 with the financial support of The Global Fund, the World Bank and the United States President's Emergency Plan for AIDS Relief (PEPFAR) (Assefa et al. 2009: [2]). The guideline for ART treatment in Ethiopia states that it consists of a "cocktail" of two drugs from nucleoside analogues and one drug from non-nucleoside analogues (such as Zidovudine/Lamuvidine, Lamuvidine and Nevirapine/Efavirenz). If non-nucleoside analogues are contraindicated for a particular patient, two nucleoside inhibitors and one protease inhibitor (such as Zidovudine/Stavudine, Lamuvidine and Ritonavir boosted Lopinavir (Kaletra)) can be used instead (EFMOHHAPCO 2008: 101). By 9 March 2009, 189,267 patients had started to use the recommended ART dosages while only 139,494 were alive and at that time on ART (EFMOHHAPCO 2009: [1]).

2.3.2 HIV and HAART

Since the introduction of anti-retroviral therapy (ART), the clinical prognosis for HIV/AIDS patients who use this form of therapy has changed dramatically. This has resulted in a significant decrease in the morbidity and mortality rates of HIV/AIDS patients (Jerene et al. 2006: [3]). In fact, HIV/AIDS is now considered to be a chronic (rather than a fatal) illness, although patients who had been infected require life-long treatment and monitoring (Chesney 2003: 169). A Zambian study undertaken by Chi, Cantrell, Zulu, Mulenga, Levy, Tambatamba, Reid, Mwango, Mwinga, Bulterys, Saag and Stringer (2009: 8) monitor the condition and behaviour of 27,115 patients who had been taking HAART for more than 12 months. This study found that a higher median CD4+count was reported in those who were optimally adherent when compared to those patients who were poorly adherent. The risk of death was also observed to be higher in those patients who were poorly adherent compared to those who were optimally adherent to the HAART regimen (Chi et al. 2009: 9). Gifford et al. (2000: 390) state that antiretroviral adherence was significantly associated with plasma viral suppression both in univariate and multivariate statistical analysis. These studies clearly show that in order to obtain the long-term benefits of HAART, patients must adhere

rigidly to the antiretroviral (ARV) drugs – with as near perfect adherence (Chesney 2003: 169; Glass et al. 2006: 387).

2.3.3 Adherence to HAART

According to Hardon et al. (2006: 37), *adherence* can be defined as "the extent to which patients follow the instructions they are given for prescribed treatments". Adherence to ART means taking the ARV medications prescribed at the "right time", in the "right doses" and in the "right way". Adherence is "not a single event". It is rather a "dynamic process" that needs to be addressed during every follow-up meeting with patients who are on an ART schedule (Amberbir et al. 2008: [2]). Adherence to ART can be calculated by dividing the number of doses taken by the number of prescribed doses that should be taken during a specific period (Bell et al. 2007: 560). Even if HAART has given hope to people who are living with HIV and although it plays a significant role in improving their quality of life, it requires near-perfect adherence if the patient is to obtain the benefits of the long-term effect. Such benefits include the maintenance of the maximum possible rate of viral suppression for as long as the regimen is being taken as prescribed (Chesney 2000: 171; Chesney 2003: 169; Gulick 2006: 943; Oyugi, Byakika-Tusiime, Ragland, Laeyendecker, Mugerwa, Kityo, Mugyenyi, Quinn & Bangsberg 2007: 969; Bangsberg 2008: 272).

2.3.4 Targets for adherence to HAART

A number of studies have shown that a more than 95% adherence rate is required if a patient is to receive all the benefits of ART and minimize the possibility of treatment failure (Chesney 2003: 169; Gulick 2006: 943; Hardon et al. 2006: 17; Oyugi et al. 2007: 969). A Mozambican study carried out by San Lio, Carbini, Germano, Guidotti, Mancinelli, Abdul Magid, Narciso, Palombi, Renzi, Zimba and Marzazzi (2008: 1613) established that the relationship between a >95% adherence rate and a final viral load of <1000 copies/ml was closer than the relationship between a >90% adherence rate and a final viral load of <1000 copies/ml.

2.3.5 Consequences of non-adherence to HAART

Gulick (2006: 943) points out that if an HIV patient on ART is not taking the ARV drugs conscientiously, i.e. if the patient is not optimally adherent to ART, the possibility of having the treatment fail along with a deterioration in the health status of the patient and the development of a multidrug resistance to ARV drugs that can be transmitted to others, is high indeed. A Senegalese study determined the viral load of a sub-sample of naïve ART patients after they had been taking ART for six months. What they found was that those patients who had maintained more than 90% adherence rate in the previous six months showed no detectable viral load while in those who maintained an adherence rate of less than 90% showed a detectable viral load (Etard, Laniece, Fall, Cilote, Blazejewski, Diop, Desclaux, Ecochard, Ndoye & Delaporte 2007: 1193). In a study undertaken in Malawi study, the adherence rate of patients who self-reported an adherence rate of less than 80% was regarded as the best predictor of detectable viral load during follow-up visits (Ferradini, Jeannin, Pinoges, Izopet, Odhiambo, Mankhambo, Karungi, Szumilin, Balandine, Fedida, Carrieri, Spire, Ford, Tassie, Guerin & Brasher 2006: 1335). Goldman, Cantrell, Mulenga, Tambatamba, Reid, Levy, Limbada, Taylor, Saag, Vermund, Stringer and Chi (2008: 1032) state that the risk of virological failure was highly likely in those who were sub-optimal and poorly adherent patients in comparison to those who were optimally adherent to the HAART regimen of dosages.

A Ugandan study that evaluated the association between different adherence measures and their respective viral load after 12 weeks in ART in ARV naive patients, showed that after twelve weeks the viral load was significantly associated with all adherence measures such as electronic medication monitoring, pill counting and three-day self-reporting (Oyugi, Byakika-Tusiime, Charlebois, Kityo, Mugerwa, Mugyenyi & Bangsberg 2004: 1101). In another Ugandan study, none of the patients who maintained a record of no interruptions in the HAART regimen for more than 48 hours developed drug resistance while 13% of those patients who interrupted their treatment for longer periods did develop drug resistance (Oyugi et al. 2007: 969). Weidle, Wamai, Solberg, Liechty, Sendagala, Were, Mermin, Buchacz, Behumbiize, Ransom and Bunnell (2006: 1592) also found that in patients who took HAART for one year, a viral load of at least 1000 copies/ml was associated with a pill count adherence of less than 95%. In the Swiss HIV Cohort Study, there was a strongly significant relationship between the

number of missed doses and optimal viral suppression with the rate of optimal viral suppression decreasing as the adherence rate decreased (Glass et al. 2006: 387). That means that ARV drugs are far less tolerant of non-adherence, and that the consequences of certain levels of non-adherence (for brief or intermittent periods) can be severe.

2.3.6 Adherence to HAART in developed countries

The adherence rate was found to be 81% in a Deep South HIV+ clinic sample in Mississippi, United States of America, in a study conducted by Amico et al. (2009: 69).In another study from the United States, the mean adherence rate that was reported one day and one week prior to the study was 79% and 78% respectively (Arnsten et al. 2001: 1419). A study in California, USA, that was designed to assess the prevalence and predictors of adherence in 180 HIV-positive patients who were being treated with ART, the average adherence rate over a four-week period – as measured by a medication event monitoring system (MEMS) – was found to be 80.6% (Wagner 2002: 602). In a study that assessed the meditational role of adherence self-efficacy on positive provider interactions and adherence to antiretroviral medications on 2,765 HIV patients were being treated with ART, only 68.25% of patients revealed an adherence rate of more than 90% in the three days prior to the study (Johnson, Chesney, Goldstein, Remien, Catz, Gore-Felton, Charlebois & Morin 2006: 263). In a longitudinal cohort study of 140 patients who were followed for 48 weeks in a study by Golin, Liu, Hays, Miller, Beck, Ickovics, Kaplan and Wenger (2002: 761), the adherence rate for more than 95% of the participants was sub-optimal. The study revealed that the participants took (on average) only 71% of their prescribed doses.

2.3.7 Adherence to HAART in developing countries

In the pilot study of the adult AIDS clinical trial group (AACTG), 17% of patients missed at least one of their doses in the two days prior to the study (Chesney, Ickovics, Chambers, Gifford, Neidig, Zwickl & Wu 2000: 262). Oyugi et al. (2007: 968) showed that the adherence rate of self-funding patients who were being treated with ART in Uganda, self-reported their adherence as 93% at 12 weeks and 91% at 24 weeks. The adherence rate in Puerto Rico, as identified by Amico et al. (2005: 668), was that 80% maintained more than a 95% adherence rate while 20% of the participants

demonstrated an adherence rate that was less than 95%. In a Botswana study, it was found that 75% of the patients were optimally adherent to HAART (i.e. these patients were ingesting more than 95% of their prescribed ARV medications in accordance with the required schedule) (Hardon et al. 2006: 6). In a Senegalese study in which 180 patients were followed for 84 months after they had begun their course of ART, the mean adherence rate was 91%. Of these, 78% of the cases in the sample were optimally adherent (i.e. >95% adherent to HAART) at the beginning of the study. Even after four years had elapsed, the mean adherence of this sample was 90% while the percentage of the population who were taking more than 95% of their prescribed ARV drugs was 70% (Etard et al. 2007: 1193).

The data from all the studies mentioned above from both developed and developing countries show that equivalent or better adherence rates than those achieved in developed countries can also be achieved in sub-Saharan African countries.

2.3.8 Adherence to HAART in Ethiopia

In a study by Tadious and Davey (2006: 241), 81.2% of patients on ART achieved an adherence rate of more than 95%. In a similar study by Markos et al. (2008: 176), 74.2% of patients being treated by means of ART, the adherence level was >95% a week before the assessment took place. In another study conducted by Amberbir et al. (2008: [6]) in the same year, 94.3% of patients maintained adherence rates of 95% in the week prior to the study. In another study with HIV-infected children, the adherence rate as reported by care givers was that 86.9% of children achieved a more than 95% adherence rate to ARV drugs (Biadgilign et al. 2008: [5]). This shows that even if the adherence rate that is reported in Ethiopia is better, there are still many people who are not optimally adherent to ART (i.e. who have demonstrated a >95% adherence rate). This state of affairs requires the implementation of urgent measures if treatment failures and the development of drug resistance are to be avoided.

In Ethiopia, the adherence rate to ART ranges from between the 74.2% reported by Markos et al. (2008: 176) and the 94.3% reported by Amberbir et al. (2008: [6]). These figures demonstrate that there are still many patients who are unable to maintain high rates of adherence to ART. Such patients may need personal assistance if they are to achieve more satisfactory adherence rates. Such rates of adherence can only be

achieved after all health care personnel and physicians have understood the obstacles that undermine and prevent adherence and after they have designed an intervention that is based on the results of a careful study of all the relevant factors in the affected population.

2.4 FACTORS AFFECTING LEVEL OF ADHERENCE TO HAART

Chesney (2000: 171) states that factors that affect adherence to HAART can be classified into the following four categories: (1) patient factors such as age, gender and substance abuse; (2) treatment factors such as, for example, complexities surrounding the act of drug dosing, pill burdens, side effects and special food requirements; (3) the provider-patient relationship; (4) attitudes towards the prevailing system of care such as, for example, any dissatisfaction with the health care system of the facility. According to Chesney (2003: 171), adherence to HAART can be affected by ARV regimen characteristics, patient-specific factors, provider-patient relationships, and various characteristics of the health care system itself. Chesney (2006: 149) suggests that adherence to ART must take into consideration a variety of social, cultural, economic and personal factors – an observation that suggests just how complex this problem is. Although numerous studies have shown that adherence to HAART is not optimal in many patients, the social, psychological, clinical and behavioural factors that are associated with it have not yet been fully explored or explained (Gifford et al. 2000: 387). In a study that Deribe, Hailekiros, Biadgilign, Amberbir and Beyene (2008: 329) undertook in Jimma University Specialized Hospital in Southwest Ethiopia, 28% of the total number of patients who commenced ART missed two or more visits to the ART clinic on their appointed dates. The reasons that the participants in this study gave for missing their appointments included a loss of hope in the efficacy of the medication, a lack of food, the debilitating effects of bouts of mental illness, a belief in the power of holy water to achieve what ART could not, the fact that they did not have the money required for transport, and the effect of various other illnesses that made their attendance impossible.

Other reasons that were mentioned for non-adherence in a study by Markos et al. (2008: 174) included being too busy to attend or simply forgetting to attend, changes in the daily routines of the participants, their periodic absences from home, the effect of patients who had reported disagreeable side effects in the month prior to the study, the

fact that they lived too far from the ART clinic, and the necessity to attend to the needs of their dependents. A study by Tadious and Davey (2006: 237) states that factors that correlated with adherence included “having regular follow-up at the clinic, not being depressed, having no side effects, a regimen that fitted the daily routine and satisfaction with the relationship with doctors”.

2.4.1 Service factors

After the launch of the free ART campaign in Ethiopia in 2005, many more patients gained access to HAART than ever before (EFMOHHAPCO 2008: 60). Access to care and the patient-health care provider relationship were found to be important factors that determined satisfactory adherence to HAART (Tadious & Davey 2006: 240).

2.4.2 Patient (personal) factors

Tadious and Davey (2006: 241) also demonstrated that “not being depressed, experiencing no side effects, and having a treatment schedule that fits [in] with [the] daily routine” were patient factors that were associated with satisfactory adherence to the HAART schedules.

2.4.3 Socio-economic and cultural factors

Tadious and Davey (2006: 240) also demonstrated that social support and access to treatment were critical factors in determining adherence to HAART. Social support was also identified as an independent predictor of adherence in the study conducted by Amberbir et al. (2008: [7]). In sub-Saharan African countries, economic obstacles such as a lack of the necessary funds needed to journey to the health care facility in those cases where patients had to travel long distances to get to the clinic, also constituted important reasons for sub-optimal adherence. These difficulties should obviously be urgently addressed if want to improve adherence rates among this group of the population (Ware, Idoko, Kaaya, Biraro, Wyatt, Agbaji, Chalamilla & Bangsberg 2009: 43). Chesney (2003: 175) concluded that adherence to HAART can be improved by addressing whatever social, economic and psychosocial issues there might be *before* a course of treatment commences. It is obviously pointless to begin a course of ART

treatment in those cases where a patient does not have the capacity, motivation or resources to practise optimal adherence.

2.5 THE INFORMATION-MOTIVATION-BEHAVIOURAL SKILLS (IMB) MODEL

According to Munro et al. (2007: [2]), health behaviour theories may be useful for assessing adherence and for developing practical interventions that will promote an optimal adherence to ART. From the various health behaviour theories that were available, the researcher selected the Information-Motivation-Behavioural skill (IMB) model of adherence in order to assess rates of adherence in a particular sample prior to designing and implementing a remedial intervention (Fisher et al. 2006b: 462; Amico et al. 2009: 73).

2.5.1 The origin and development of IMB model of adherence to HAART

The IMB model was initially used in efforts that were targeted at reducing the incidence of AIDS-risk behaviour, and the study undertaken by Fisher, Fisher, Misovich, Kimble & Malloy (1996: 120) showed that after an intervention that made use of the IMB model, participants showed significant increments in their personal preventive AIDS-risk behaviour. With antecedents in both the health sciences and in social psychology, the IMB model conceptualises adherence to ART as a health-related behaviour that is determined mainly by the extent of an individual's knowledge of ART, the serious consequences of non-adherence, by personal attitudes toward the taking of ARV medications (personal motivation), and by the ability to perform whatever adherence-related tasks are necessary, together with a strong sense of self-efficacy (behavioural skills) (Ware, Wyatt & Bangsberg 2006: 19). Information and motivation make a direct impact on adherence behaviour and an indirect impact on adherence behaviour through adherence behavioural skills (see figure 2.1) (Ware et al. 2006: 19). In the light of this, the following three points are considered to be of primary importance in the IMB model:

- Information about adherence
- Motivations for adherence
- Behavioural skills that facilitate adherence

2.5.2 Core assumptions of and statements about the IMB model

The IMB model assumes that adherence-related information, motivation, and behavioural skills are fundamental determinants of adherence to ART as well as a wide range of useful health-related behaviours. The model asserts that people who are well-informed and motivated to act and those who possess the behavioural skills to do so, are far more likely to adhere to the HAART regimen than those who lack these qualities and skills. The reverse is also true. A poorly informed person who lacks the motivation to act and those who lack the behavioural skills to act effectively, will be less likely to adhere to the requirements of the HAART regimen (Fisher et al. 2006b: 463).

The univariate characteristics of the IMB model considers that a direct relation exists between adherence behaviour and adherence information, adherence motivation and adherence behavioural skills while the mediational assumptions of the IMB model asserts that HAART adherence information and motivation generally manifest themselves in HAART adherence behavioural skills in a way that affects adherence behaviour – especially if sophisticated skills are a precondition for taking the ARV medications (Fisher et al. 2006b: 466).

The present practice is for patients who are involved with HAART to take one fixed-dose combination (FDC). This simplifies their lives because they are required to take only one tablet in the morning and one tablet in the evening (EFMOHHAPCO 2008: 61). This in itself reveals that no complex behavioural skills are required for patients who wish to adhere optimally to their medication. In such cases, adherence information and motivation will mainly exert a direct effect on adherence behaviour in addition to an indirect effect on behavioural skills (Amico et al. 2005: 664; Fisher et al. 2006b: 464; Starace, Massa, Amico & Fisher 2006: 155; Amico et al. 2009: 67). It is for this reason that this study assessed the univariate correlation of the IMB model constructs (HAART adherence-related information and motivation and behavioural skill elements) to the levels of adherence for prescribed ARV medications.

2.5.3 Applications of the IMB model

The IMB model of adherence to HAART can be used to understand, predict and promote adherence to ARV regimens and to propose a set of operations for designing,

implementing and evaluating HAART adherence promotion interventions. The IMB model can also be used to assess a wide range of health-related behaviours with information, motivation and behavioural skills as fundamental determinants of behaviour (Fisher et al. 2006b: 463).

2.5.4 Components of the IMB model when it is applied to adherence to HAART

The Information-Motivation-Behavioural (IMB) model that was used as the conceptual framework of this study is set out diagrammatically below:

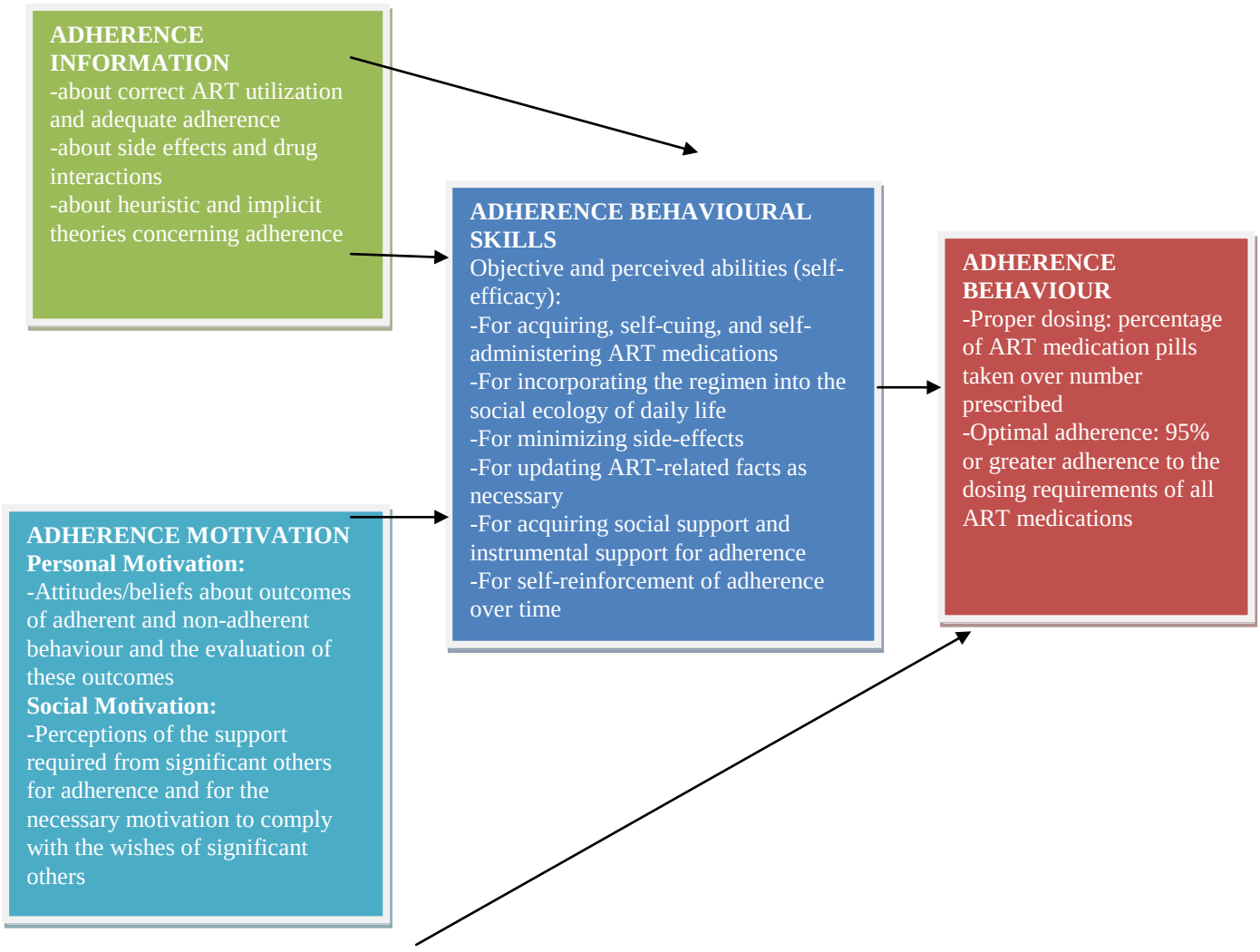

Figure 2.1 The conceptual framework of this research

(Source: Adapted from Fisher et al. 2006b: 465)

What follows is a brief examination of each of the IMB core concepts.

2.5.4.1 Adherence information to HAART

According to Fisher et al. (2006b: 463), the information that patients need for HAART adherence includes when and how to take the ARV medications, what level of adherence is required, the consequence of the failure to adhere to the dosage regimen, the side effects of ARVs, and any beliefs and misconceptions that patients may entertain with regard to ARVs. This model assumes that correct information will help patients to conscientiously adhere to HAART and that, conversely, inaccurate information may be an impediment to the necessary levels of HAART adherence. Some misconceptions (such as the belief embodied in the words: “Skipping my medication from time to time will eventually teach my immune system to fight the virus by itself”) may have a decisively detrimental effect on the level of adherence to HAART (Amico et al. 2005: 662; Starace et al. 2006: 154; Amico et al. 2009: 67).

2.5.4.2 Adherence motivation that facilitates HAART

An individual’s *motivation* to adhere conscientiously to HAART is the second factor that enables him or her to adhere to their ARV medication. This motivation includes both personal and social motivation (Amico et al. 2005: 663; Amico et al. 2009: 67). A personal motivation to adhere to the requirements of HAART may depend on an individual’s belief in the outcomes of adherence as opposed to the outcomes of non-adherence, the general effect of the drugs on the patient’s health, and the belief that adherence will ultimately improve the general health of the patient. All these are important factors for the patient concerned. Good personal motivation also includes positive general attitudes towards HAART, favourable attitudes toward one’s own specific HAART regimen, the perceived benefits of HAART adherence and the perceived likelihood of experiencing benefits from HAART and from maintaining high levels of adherence. The social motivation to adhere to HAART arises out of the support that the individual receives from his or her significant others (including family, friends and health care providers), and his or her motivation to comply with this support. The way in which the client perceives the relationship with his or her health care provider should also be included under the general heading of social motivation (Starace et al. 2006: 155). According to the requirements of the IMB model, both personal and social motivations are important if an individual is to adhere to an ARV regimen (Fisher et al. 2006b: 467; Starace et al. 2006: 155).

2.5.4.3 Adherence behavioural skills that promote HAART

According to the IMB model, adherence behavioural skills include both the objective ability and the perceived self-efficacy that is necessary for performing adherence-related skills (Starace et al. 2006: 155; Amico et al. 2009: 67). Examples of behavioural skills that the construct assessed include collection of drugs and the self-administering of ART medications, the skills and foresight that are necessary for fitting the taking of medications into one's daily routines, the ability (skill) to cope with HAART side effects, the ability and experience required to obtain whatever HAART information is relevant when it is needed, the solicitation and enlisting of social and instrumental support as it is needed, and the ability to practise self-regulation and self-reinforcement strategies. The behavioural skills that were measured also included the level of adherence-related perceived self-efficacy that is associated with HAART adherence (Amico et al. 2005: 663).

The IMB model of adherence assumes that a direct relationship exists between HAART adherence behavioural skills and the actual adherence behaviour that the patient manifests with relation to his or her regimen of HAART (Fisher et al. 2006b: 467; Starace et al. 2006: 155). In a study by Gifford et al. (2000: 389), the perceived self-efficacy of individuals to adhere to their prescribed HAART and those who were able to fit the daily ARV regimen into the schedule of their daily lives produced a significantly better level of adherence to HAART. A study by Johnson et al. (2006: 263) in the United States demonstrated that a higher adherence self-efficacy positively relates to higher ARV medication adherence in both univariate and bivariate analysis. In a Canadian study, the participants with a strong perception of self-efficacy to adhere to HAART were more adherent than those with a low perception of self-efficacy (Godin, Côté, Naccache, Lambert & Trottier 2005: 497). The IMB model also assumes that adherence-related information and motivation are related to adherence behavioural skills (Amico et al. 2005: 663). This means that well informed and motivated individuals will possess the necessary behavioural skills to adhere to their ARV medication according to the requirements of the prescription.

2.5.4.4 Adherence behaviour to HAART

Adherence behaviour is the cumulative percent of medications that a patient has taken from the number of drugs that have been prescribed for that patient. This can be calculated as the number of doses that a patient has taken over the total number that were prescribed during a specific time period (Amico et al. 2005: 665). The adherent behaviour of individuals to HAART can be divided into two modes: *optimal adherence* was practised by those who took 95% or more of their dosing requirements while *sub-optimal adherence* was practised by those who took less than 95% of the dosages that were prescribed for them during the prescribed period (Fisher et al. 2006b: 468; Glass et al. 2006: 386; Amico et al. 2009: 67; Amberbir et al. 2008: [4]).

2.5.5 Modifying factors of the IMB model relationship

Situational and personal factors such as inadequate or difficult access to medical care can affect the relationship between information, motivation and behavioural skills and adherent behaviour (Fisher et al. 2006b: 463; Amico et al. 2009: 67). This means that even well-informed and well-motivated individuals with adequate behavioural skills may not adhere if they lived too far away from the health care facility so that they are unable to come to take their drugs on a regular basis on their appointment dates. The IMB model asserts that in such cases the moderator variables may influence model constructs and this may exert a direct effect on HAART adherence behaviour (Fisher et al. 2006b: 268).

2.5.6 Summary of the components of the IMB model

The IMB model of adherence addresses information about adherence and the motivation to maintain adherence that includes personal and social motivations and the necessary behavioural skills for adhering to HAART. It also considers situational and individual characteristics such as the ease or difficulty of access to medical care that can affect the relationship between IMB model constructs and adherence behaviour (Amico et al. 2009: 67).

2.5.7 Limitations of the IMB model

While the IMB model questions that address the information needs, the motivation and the behavioural skills that are necessary for investigating adherence to HAART may differ in different cultures, the questions remain the same. This then represents one limitation of the model (Fisher at al. 2006b: 465). Thus, for example, the behavioural skills that are required to store and take drugs on time may not be difficult for those living in prison while they may be difficult for those who live at home. These assertions must be qualified by the realisation that individuals who are in prison may need to exercise highly sophisticated behavioural skills to cope with the stigma and discrimination that emanated from the institution – a problem that does not arise for those who live at home. The model measures the respondents' perceptions about the levels of information, motivation and behavioural skills that they need to adhere to HAART – and not their *actual* levels of knowledge, their actual levels of motivation and their actual behavioural skills. This is another limitation of this model that should actually be addressed in the future (Starace et al. 2006: 159).

2.6 MEASUREMENT OF HAART ADHERENCE BEHAVIOUR

If we want to design interventions that will address problems of adherence and that will be able to assess the impact of such problems, we need first to be able to measure adherence levels accurately (Berg & Arnsten 2006: 79). There is, however, no single method that is currently regarded as the best method for measuring adherence to HAART because it is a complex issue that is not easily reducible (Chesney 2006: 154; Hardon et al. 2006: 27). The use of different adherence measurement modes in different studies obviously creates difficulties for anyone who wants to identify the factors that are able to predict adherence successfully (Berg & Arnsten 2006: 79).

2.6.1 Types of adherence behaviour measurement

Adherence to ART could be measured objectively by electronic medical devices such as direct measures (e.g. monitoring methods that measure serum level drugs or its metabolites) and medication event monitoring system (MEMS) caps that are equipped with microprocessors that record the times and dates of bottle openings (Chesney 2006: 151). But MEMS caps can either underestimate or overestimate adherence rate

because patients can open the cap and then take more than one dose after a single opening (thereby producing an underestimation of the adherence rate to ART), or else the patient can open the cap but not take any tablet at all (thereby producing an overestimation of the adherence rate). Even though MEMS might be one of the best methods of objectively measuring adherence rates, it is not commonly used in Africa because of the financial constraints of most researchers who operate in Africa (Berg & Arnston 2006: 82). Other methods that are used to measure HAART adherence rates include subjective reporting methods such as self-reporting, pill counts (either announced or unannounced), and records of pharmacy refills (Berg & Arnsten 2006: 80; Chesney 2006: 152). The self-reporting of HAART adherence rates is the method that is most commonly used, and the researcher in the study used self-reported adherence rates in order to obtain the data required (Berg & Arnsten 2006: 81; Chesney 2006: 151; Simoni, Kurth, Pearson, Pantalone, Merrill & Frick 2006: 228).

Self-reported measures of adherence that emerge from interviews or from questionnaires have many advantages that include its simplicity, its low cost, the minimisation of the burdens that it places on patients, and the speed with which it can be administered (Simoni et al. 2006: 228). Even though higher rates of adherence have been reported by researchers who use self-reported measures of adherence (Arnsten et al. 2001: 1420; Bell et al. 2007: 560), a number of studies have confirmed the validity of self-reported assessments (Arnsten et al. 2001: 1422; Wagner 2002: 606; Oyugi et al. 2004: 1101; Nieuwkerk & Oort 2005: 445; Berg & Arnsten 2006: 81; Ferradini et al. 2006: 1339; Glass et al. 2006: 390; Hardon et al. 2006: 17).

2.7 CONCLUSION

This chapter presented the literature review and discussed the history of HIV, ARV drugs, the epidemiology of HIV throughout the world, in Africa, in Ethiopia, and in the Oromia regional state of Ethiopia in particular. This chapter also addressed the components of the Information-Motivation-Behavioural skills model and its basic assumptions, and discussed various types of adherence measurement methods that can be used to measure HAART adherence behaviour.

Chapter 3 describes the research methodology that was used in this study.

CHAPTER 3

Research methodology

3.1 INTRODUCTION

This chapter describes the research methodology of the study. It therefore includes descriptions of the research design. The population that the researcher used in the study, the sample, the method that the researcher used to determine the size and units of the sample, the research instrument, the methods that the researcher used to gauge validity and reliability, the data collection method and the way in which the data analysis was conducted. The ethical considerations that guided the study and finally, the limitations of the study followed. The decision to select a particular research methodology rather than another to guide the study is one of the most important steps in any research project.

The purpose of this study was to assess the levels of adherence to ART in Ethiopia in the Adama district of the Oromia region among adult HIV-infected patients, and to identify the major factors that affected levels of adherence to the HAART dosage regimen.

The objectives of the study were:

- to assess the level of HAART adherence behaviour among a representative sample of patients who were taking ARV drugs in the Adama district in Ethiopia during a particular time period.
- to assess the effect of various social and demographic variables on HAART adherence behaviour among the sample in the Adama district in Ethiopia
- to assess the impact on adherence behavioural skills of the sample of patients in the Adama district of Ethiopia of patients who are taking ARV drugs when they have been given clear information about ART itself, the way in which ART work, as well as information about the importance of very strict adherence to the HAART dosage regimen

- to assess the impact of information about ART and dosage schedules on self-reported HAART adherence behaviour in the Adama district of Ethiopia
- to assess the impact of motivation on the behavioural skills required for satisfactory HAART adherence skills among the sample in the Adama district of Ethiopia
- to assess the impact of motivation on HAART adherence behaviour as self-reported by patients taking ARV drugs in the Adama district of Ethiopia
- to determine the impact of HAART adherence behavioural skills on adherence behaviour to HAART from the self-reporting of patients who are taking ARV drugs in the Adama district of Ethiopia

The research methodology of this study was an indispensable part of this study because it enabled the researcher to place the research within a strict methodological framework and to make sure that the study fulfilled all the requirements of scientific research of this kind.

3.2 RESEARCH METHODOLOGY

The research methodology of this study, which embraces both the research design and the research method, is discussed in the sections that follow.

3.2.1 Research design

A research design can be described, metaphorically speaking, as the “architecture” of the study or the structured approach that the researcher follows in order to answer the questions that have been raised by the research objective (Morroni & Myer 2007: 77). If the researcher carries out each phase of the research by using the research design as a guide, he or she will be able to maintain a strict control over all the elements and phases of the study so that the research itself will be able to answer the questions that the researcher formulated at the beginning of the study.

In this study, the researcher made use of observational, analytical, cross-sectional and quantitative research designs to gather coherent information about patient’s information about importance of adherence to ART, their personal and social motivations to adhere to HAART, their personal behavioural skills, and the extent to which they adhere to the

required dosage schedules. The researcher obtained this information from the self-reported information that the participants offered about their individual levels of adherence. Each of these concepts will now be presented and discussed in turn.

3.2.1.1 Observational study design

The kind of research design which makes no use of clinical trials or that does not involve any kind of experimental or empirical interventions, is called an *observational study design* (Polit & Beck 2008: 760). In an observational study, the researcher measures exposures and outcomes without intervening in the processes themselves. This means that the data that the researcher collects all arise in the context of the natural settings in which the patients live and work on a daily basis (Morroni & Myer 2007: 77). In this research, the researcher assessed level of adherence (outcomes) and factors that influence adherence (exposure) without any prior interventions that might have affected the nature and extent of the data that was collected.

3.2.1.2 Analytical 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 by examining associations between independent and dependent variables (Morroni & Myer 2007: 78). In this research, the researcher obtained and recorded the levels of self-reported adherence and then assessed the factors that affected the levels of adherence by noting whether or not there were any statistically significant difference between the exposure variables and the outcome variables.

3.2.1.3 Cross-sectional research design

A study design in which the data is collected at one particular point in time is called a cross-sectional research design (Polit & Beck 2008: 751). A cross- sectional research design assesses and describes the prevalence of the outcomes or exposures in a population at a particular time. In a cross-sectional study, the researcher randomly samples the population without any prior knowledge or reference to exposures or outcomes. The researcher then compares the outcomes with the exposures and

observes whether there are any differences in the prevalence of outcomes and exposures (Morroni & Myer 2007: 85). In this study, researcher selected a random sample of patients from a database of the patients who were taking ART in the predefined geographical setting of the Adama district in the Oromia region of Ethiopia, and interviewed the patients who were thus randomly selected by using a structured questionnaire. The researcher purpose in doing this was to observe whether there were any differences in adherence patterns that could be attributed to differences in adherence information, adherence motivation and the adherence behavioural skills of the respondents themselves.

3.2.1.4 Quantitative research design

Polit and Beck (2008: 763) describe quantitative research design as that method of investigating a phenomenon by means of obtaining and analysing precise measurements and quantifications that relate to the phenomenon itself. Researchers who utilise a quantitative research design usually repeat sequences of measurement and quantifications in an environment that is highly structured and controlled in order to obtain their numeric data they need to answer their research questions (Polit & Beck 2008: 66). The researcher chose a quantitative research design for this study as it helps to assess quantified variables such as the degree of knowledge, personal and social motivation, and the behavioural skills of each of the individuals in the sample.

3.2.2 Research method

The *research method* is a particular way in which researchers structure their study in order to achieve their objectives (Polit & Beck 2008: 15). The following sections describe and discuss each of the following components of the research method: the population, sample and sample size, method of data collection and data analysis.

3.2.2.1 Population

Joubert and Katzenllenbogen (2007:94) describe a study (or target) population as the group about which a researcher wishes to gather certain kinds of information and draw valid conclusions from the data. The target population of this study consisted of all adult HIV patients older than 18 years of age who were taking a course of antiretroviral

treatment by attending a specific HIV clinic at the time of study. Each member of the sample had also taken ARV treatment regimen for a minimum of six months prior to the commencement of the study at this particular health facility in the Adama district of Ethiopia. The “accessible population” describes that part of the target population that was accessible to the researcher at the time when the study was conducted (Polit & Beck 2008: 338). The accessible population in *this* study consisted of the target population who had attended the ART clinic within two months of data collection time because patients can be appointed up for next follow up visit up to two months in the particular ART clinic where the study was conducted. As of March 2009, more than 12,000 people had been enrolled for treatment, and more than 7,000 of these were being treated by means of an ART regimen in the health facility selected for this study (EFMOHHAPCO 2009: [5]).

3.2.2.2 Sample

A sample is a subset of a population who have been selected to participate in a study (Polit & Beck 2008: 765). For the purposes of this research, the researcher selected a sample of the population because it would have been logistically impossible with available research funds to interview the whole population. It has been pointed out by Joubert and Katzenllenbogen (2007: 95) that it is usually far more effective to interview a truly representative sample than it is to interview a whole target population – provided that the sample is indeed representative of the whole target population.

3.2.2.2.1 Sampling procedures

Sampling is the process of selecting a portion of a total population to represent the entire population (Joubert & Katzenllenbogen 2007: 94). The researcher used a simple random sampling method to select the total number of patients that were required for the study because a sample of this kind is more useful than a sample selected by non-probability sampling if the researcher wishes to generalize the results of the study to the whole target of a population (Joubert & Katzenllenbogen 2007: 95). Each of the participants was thus randomly selected, and each of them was informed by the clinic’s service providers about the nature, scope and purpose of the study during their routine attendance at the clinic before they were invited to give their informed consent to participate in the study. In any simple random sampling of individuals, the sampling unit

is an individual. This means that each individual in the population has an equal chance of being selected for the sample. In order to achieve this, a sample frame that consists of the complete list of the whole target population is required (Joubert & Katzenllenbogen 2007: 96).The sample frame for the random sampling process was obtained from the database of the hospital that registered all the patients who are on ART in the hospital. A computer program was then used to randomly generate the sample that was required for the study from those who were currently being treated by means of ART and who had taken the prescribed medications for at least six months prior to the commencement of the study.

3.2.2.2.2 Sampling criteria

Each member of the sample had to comply with the following inclusion criteria for this study:

- They had to be patients who had been on ART for at least six months prior to commencement of the study.
- They had to be willing to give their informed consent and to self-disclose information about the exact nature of their adherence to the dosage schedule of the ARV drugs that had been prescribed for them.
- They had to be able to speak either Amharic or English because the researcher had prepared both English and Amharic versions of the questionnaire because Amharic is the national language of Ethiopia and the majority of the people who live in the Adama district of the Oromia region of Ethiopia use Amharic as their home language.
- They had to be at least 18 years old.

The research also utilised the following exclusion criteria:

- All patients who suffered from any severe mental illness, poor general health or who were less than 18 years old were excluded.
- All HIV-positive patients who were being treated in some way or another at the ART clinic but who were not participating in ART, as well as those who had taken the ARV medications for less than six months at the time of the study, were excluded.

3.2.2.2.3 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 (Polit & Beck 2008: 413). In order to estimate how large the size of the sample should be, the researcher used the following formula (Castillo-Riquelme & Cleary 2007: 347): $N = p (1-p) * (z^2)/d^2$ where p is the anticipated adherence proportion. For the purpose of this study to have adequate sample size, the least adherence report in Ethiopia in Markos et al. (2008: 176) 74.2% is taken as anticipated adherence proportion. If P = 0.7, d is the precision required on either side of the proportion (d = 0.05), and z refers to the cut-off value of the normal distribution (z = 1.96). When one uses this method of calculation, it returns a figure in which N = 323. But since the researcher added an additional 10% for the non-respondent rate, the total size of the sample that he considered to be necessary in order to obtain statistically significant results, was calculated to be 355.

3.2.2.3 Data collection

The researcher then collected data by means of interviews that were based on a structured questionnaire because a questionnaire helps to prevent participants from interpreting questions in their own particular way. This is one of the ways in which the reliability of the information that is gathered can be increased (Katzenllenbogen & Joubert 2007: 107). In this research, the selected participants were interviewed by trained interviewers in the ART clinic after the patients had kept their scheduled appointments with the clinical staff.

3.2.2.3.1 Data collection instrument

In order to assess and address adherence problems, it is preferable to use theory-based approaches that address multiple factors that affect adherence behaviour rather than merely focusing on one important factor – however significant that factor may be (Munro et al. 2007: [2], Ware et al. 2006: 18).

The researcher therefore decided that this study should use the structured questionnaire to address and assess the following factors that influence adherence behaviour:

- demographic characteristics
- adherence information
- adherence motivation
- adherence behavioural skills
- adherence behaviour

(These factors are set out in Appendix B of this study.)

The questions that were used in this questionnaire were based on the IMB model that were adapted from the LifeWindow's project questionnaire (Fisher, Amico, Cornman & Fisher 2006a: [2-6]), and were further modified for Ethiopian conditions. Adherence was assessed by means of a self-reporting protocol as it was relatively inexpensive and simple to apply, and which was sufficiently sensitive enough to return the kind of data that the researcher required (Chesney 2003: 171). The main factors that were assessed were rates of adherence on the same day as the interview, in the three days prior to the interview, in the seven days prior to the interview, in the two weeks prior to the interview, in the one month prior to the interview, and during the whole period during which the patient was actively cooperating with the ART regimen (Chesney et al. 2000: 258; Oyugi et al. 2004: 1100). The total adherence rate in each case was then calculated as the sum of actual dosages that were taken during a one-month period (as self-reported by the patient) over the number of doses that were prescribed for that one month (the latter figure representing what would be a perfect adherence rate).

3.2.2.3.2 Procedures of instrument development

The researcher used a modified version of the LifeWindow's project questionnaire that was originally compiled by Fisher et al. (2006a: [2-6]) so that it reflected the specific situation in Ethiopia. The English version was then translated into Amharic by two people who have a good working knowledge of both English and Amharic. These two translators compared their Amharic versions and then translated their commonly

agreed version back to English – and this version was compared with the original English one.

This first draft was also reviewed by two experts in this field, one of whom was a statistician and the other of whom was the researcher advisor. The feedback obtained from these two experts was incorporated into the questionnaire so that repetitions were avoided and words or phrases with ambiguous meanings were replaced by non-ambiguous constructions. They also focused on breaking down exceptionally long items into more manageable parts, and eliminating those items with double meanings so as to avoid any possibility of ambiguity. It was only after this had been done that the items were arranged in a logical order that would facilitate research.

3.2.2.3.3 Pre-testing

The researcher gave a questionnaire to various clinicians, researchers and others in order to obtain their comments about the length, suitability and content of the questionnaire. After all possible instances of ambiguity had been eliminated and translated it into the Amharic version, the researcher undertook a pre-test with 20 respondents from the ART clinic who were not included in the final survey. The researcher conducted a pre-test of the instrument in order to find out whether there were any problems in the wording (such as ambiguity of meanings) or limitations in the response categories of instrument. The comments of the subjects who took part in the pre-test were used to finalize the form of the questionnaire.

3.2.2.3.4 Data collection procedure

The researcher used the procedure described in paragraph below to collect the data of the study.

The researcher trained the nurses at the ARV clinics to conduct structured interviews with patients who had given their informed consent to be part of the study. During these interviews, the ART nurses who had been trained as interviewers filled in the information that they had been given by the interviewees in response to the questions in the questionnaire. The nurses who had been trained as interviewers in the ART clinics only requested to interview those patients whose unique ART number appeared

in the list that the computer had generated by means of a simple random number-generation method. Before the interview began, the respondents were informed about the objective of the study. They were also asked to give their written consent after they had been told that they had the right to refuse to participate and been informed that the data would only be used for the purposes that had been explained to them. During this interview, each nurse was given a complete set of the drug samples in their boxes so that patients could identify the drugs that they were taking by pointing to the boxes concerned.

3.2.2.4 Data analysis

Before the process of data analysis started, data was checked for any possible errors that might have arisen from the original document during the transcription process or during the process of data entry (Katzenllenbogen & Joubert 2007: 107). After data was coded and entered into a computer, the necessary data analysis was carried out by using the software called the Statistical Package for Social Science (SPSS) (Windows version 14). The researcher set the level of significance at 0.05 and used two-sided tests of significance. The analysis of the data consisted of both descriptive statistics that summarised the findings, and of inferential statistics – including the chi-square test and an analysis of variance (ANOVA) – to assess whether there were any significant differences that emerged from the self-reported adherence behaviour of the patients with regard to the information, motivation and behavioural skills of the respondents who were managing to adhere to their HAART dosage schedules.

3.2.2.4.1 Descriptive statistics

The researcher used descriptive statistics to summarise and describe the data so that he would be able to assess the level or distribution of any particular characteristic (Joubert 2007: 135). Simple statistics such as mean, standard deviation and percentages were used as descriptive statistics to describe the distribution of a variable in the study.

3.2.2.4.2 Inferential statistics

The researcher used inferential statistics to investigate the associations between independent and dependent variables (Joubert 2007: 136). The researcher also used the chi-square test and ANOVA to assess whether there were any significant differences in outcome variables when these were related to exposure variables.

3.2.2.4.2.1 Chi-square (X^2) test

The chi-square test is used to determine whether there was any association between the independent and dependent variables (Kirkwood & Sterne 2003: 165). In this study of adherence behaviour during HAART (which sought information about optimal adherence and sub-optimal adherence), the researcher also tried to identify whether there was any association between levels of information, motivation and behavioural skills that could have made an impact on levels of adherence to HAART.

3.2.2.4.2.2 ANOVA (Analysis of variance)

Analysis of variance (ANOVA) is used to assess whether there is any significant difference in outcome variables when the mean of an exposure variable with more than two categories are used (Kirkwood & Sterne 2003: 80). ANOVA was therefore used to assess whether there were any significant differences in the levels of adherence behaviour that were based on the level of information, personal and social motivation and behavioural skills required of respondents who were expected to adhere to HAART.

3.2.3 Validity and reliability of the instrument

If a researcher is to obtain accurate and trustworthy measurements of the phenomena in which he or she is interested, the instrument must be both valid and reliable (Myer & Karim 2007:155). These two points are discussed in the two paragraphs that follow.

3.2.3.1 Validity of the research instrument

The validity of research instrument refers to how accurate a research instrument measures what it is supposed to measure (Myer & Karim 2007:156). The face validity

and the content validity of the instrument work assessed by the experts in the field, by the research supervisor at the University of South Africa (UNISA), and during the pre-test of the questionnaire.

3.2.3.2 Reliability of the research instrument

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). The research instrument that was used in this study was compiled and adapted by the researcher from a standard questionnaire after the researcher had reviewed the literature and consulted various experts in the field. Since the researcher was already using a standardised questionnaire, it would be instructive to examine the internal consistency of the IMB model constructs (information, motivation and behavioural skills) in terms of how they have been reported in previous studies by using Cronbach's alpha. The reliability coefficient of the information construct of the IMB model was represented by Cronbach's α = 0.7 in a study in Amico et al. (2009: 70). The motivation construct of the IMB model that assessed "negative beliefs about medications scale" (such as "I am worried that the HIV medications I have been prescribed will hurt my health"; "It upsets me that the HIV medications I have been prescribed can affect the way I look"; "It upsets me that the HIV medications I have been prescribed can cause side-effects") revealed internal consistency (Cronbach's α = 0.74) (Amico et al. 2009: 70). In the study undertaken in Starace et al. (2006: 156), the motivation construct showed an internal consistency of α = 0.67 while the behavioural skill construct showed an internal consistency of α = 0.77. In another study in Amico et al. (2005: 666), the adherence-related motivation construct showed low inter-item consistency (Cronbach's α = 0.52) because the items that were included to measure motivation may not co-vary. In the same study conducted by Amico et al. (2005: 666), the inter-item consistency that assessed the behavioural skills relating to adherence was also low (Cronbach's α = 0.35) because diverse barrier items were included to assess behavioural skills elements. In the Amico et al. (2009: 70), the adherence behavioural skills assessment construct had a Cronbach's α = 0.88.

In this study at Adama district in Ethiopia, the scale that measured motivation to adhere to the HAART dosage schedule had a Cronbach's α = 0.74 while personal motivation to

adhere to HAART had a Cronbach's α = 0.867. In this study, the scale that measured the behavioural skills that were necessary to adhere to HAART had a Cronbach's α = 0.91. This indicates a good cohesion between the items that constitute this factor. This research was also conducted on an adequate number of subjects, and this served to enhance the reliability of the study (Myer & Karim 2007:156).

3.3 ETHICAL CONSIDERATIONS

Ethics is that branch of philosophy that deals with issues of morality and decisions about what is right and wrong for individuals and groups of individuals in particular circumstances (Stommel & Wills 2004: 373). The ethical implications of this study were taking into account from beginning to end; from the formulation of the topic to the preparation of the final report. Polit and Beck (2008: 170) point out that the three primary principles that were articulated in the Belmont Report constitute a standard for the conduct of ethical research. The main ethical principles that were adopted in this study included *beneficence, protection of and respect for human dignity, full disclosure,* and *justice*.

The ethical principle of *beneficence* imposes a duty on researchers to minimize risks for respondents and to maximize possible benefits for both respondents and for the community as a whole (Polit & Beck 2008: 170). No kind of harm was generated by this study because the only procedure that was used in data collection consisted of the interviewing of patients by trained professionals on the occasions when these patients attended the clinic for their routine treatment. There were also no questions in the questionnaire that might have been induced any kind of psychological disturbance or anxiety in those who responded to the questions.

The ethical principle that protects and respects *human dignity* was also addressed in this study. This concept includes the recognition that every individual has a right to self-determination as well as a right to full disclosure (Polit & Beck 2008: 171). Self-determination in this context means that the individuals concerned retain the right either to continue to participate as well as the right to withdraw voluntarily from the study at any time at all without incurring any adverse or negative consequences (Polit & Beck 2008: 171). In order to address the issue of voluntary participation, the participants in this research were included only if they had already given their written informed consent

to participate and only if they had already been clearly informed that they had the right to withdraw at any stage from participation in this study.

The ethical principle of *full disclosure* means that the researcher has fully described the scope, nature and purpose of the study to every participant. Such a disclosure will include any potential harm or benefits that might accrue from the study as well a clear explanation of the respondents' right to withdraw from the study at any time without incurring negative consequences (Polit & Beck 2008: 172). These disclosures were made in part when the participants were given the informed consent form because the informed consent form gave respondents an ample amount of information about the purpose of the study. The researcher also made sure that the participants understood the information that was given to them about their right of free choice either to participate or not participate in the study (Polit & Beck 2008: 176).

The Ethics Committee of the Faculty of Health Science at the University of South Africa reviewed the proposals that the researcher designed to protect the ethical rights of his patients. The Regional Health Bureau Ethics Committee did the same in Ethiopia. In both cases, the proposals were accepted.

The ethical principle of *justice* means that respondents' retain their right to fair treatment in all circumstances as well as the expectation that information that they have imparted will be treated as private and that when the results of the study are reported, the individual identity of respondents will under no circumstances be disclosed (Polit & Beck 2008: 173). In order to eliminate bias in the selection of the sample, the respondents were selected by means of a simple random sampling method that was generated by computer software. It can therefore be confirmed that there was no any bias in the selection of respondents for the interview. The ethical standards of research also require researchers strictly to protect the identity of their study participants (Joubert & Katzenllenbogen 2007: 121). All the data was therefore collected in private rooms, there were no witnesses present during any of the interviews, and the personal identity of the participants was strictly protected because all the questionnaires that were administered contained no information about the respondents.

Anonymity was assured because the names of the respondents were not indicated on any of the questionnaires and confidentiality was assured by the fact that the data that was collected was always secured in a safe and inaccessible place by the researcher.

3.4 LIMITATIONS OF THE STUDY

Even when a researcher collects data by using a structured questionnaire, there is still the possibility that a social desirability bias and recall bias will affect the answers of the respondents. This means that the actual adherence rate that the respondents have reported might be different if they were to fill the questionnaire by themselves while in this case they were asked by their health care providers. Since the study is also a cross-sectional study, it addresses the adherence during the month (the non-calendar 30 days) prior to the time when the study took place. One therefore needs to factor in the knowledge that adherence behaviour might vary among different patients at different times and on different days.

3.5 CONCLUSION

This chapter described the research methodology that the researcher used in this study, and described the research design, the target population, the sample, the size of the sample and the method that the researcher used to assemble the sample, the instrument at the researcher developed for data collection, the way in which the data was analysed (the data analysis), the ethical considerations that guided this study, and the limitations of the study.

Chapter 4 sets out and discusses the results of the study.

CHAPTER 4

Presentation and discussion of the results of the research

4.1 INTRODUCTION

Chapter 3 presented and discussed about the research design and the research methods that were used in this study. This chapter discusses the result that emerged from the data analysis as well as an interpretation of those results. It also includes other research findings that support the findings in the present research. The researcher analysed the data and presented the results by using percentages, p-values, the chi-square test, ANOVA, and various tables and graphs.

The purpose of this study was to assess levels of adherence to HAART and the factors that affect it in a randomly selected sample of HIV infected patients who were on a regimen of ART in the Adama district of the Oromia region of Ethiopia.

The objectives of the study were:

1. to assess the levels of HAART adherence behaviour in patients taking ARV drugs in the Adama district of the Oromia region of Ethiopia
2. to assess the effect of social and demographic variables on HAART adherence behaviour at Adama district of the Oromia region of Ethiopia
3. to assess the impact of information about ART and adherence on behavioural skills needed for HAART adherence among patients taking ARV drugs in the Adama district of the Oromia region of Ethiopia
4. to assess the benefits of having information about ART and adherence on self-reported HAART adherence behaviour in the Adama district of the Oromia region of Ethiopia
5. to assess the impact of motivation on the behavioural skills needed to practise strict HAART adherence in patients taking ARV drugs in the Adama district of the Oromia region of Ethiopia
6. to explore the impact of motivation on self-reported adherence behaviour to the HAART dosage regimen in the Adama district of the Oromia region of Ethiopia

7. to determine the impact of adherence behavioural skill needed to practice strict HAART adherence on their self-reported adherence behaviour of patients in the Adama district of the Oromia region of Ethiopia

4.2 DATA COLLECTION

In this study, the data was collected by means of a structured questionnaire that consisted of the following five sections:

1. demographic characteristics
2. adherence information
3. adherence motivation
4. adherence behavioural skills
5. adherence behaviour

The population consisted of HIV/AIDS patients on HAART who had been taking ARV medications for at least six months and who were at least 18 years old at the commencement of the study. A sample of 355 respondents was assembled by using software that randomly generated the sample of 355 respondents from the total population. It later emerged that six of the number generated by the computer were unavailable during the period specified by the study, namely from between 25 September 2009 and 25 November 2009. The number was accordingly adjusted that a working sample of 349 respondents (98.3% of the total) was obtained.

The data was at all times kept safely and stored in a place to which no one other than the researcher had access, and the data was saved and protected on by a secret password.

4.3 DATA ANALYSIS

A statistician analysed the data that was collected from all 349 respondents by using a Microsoft software package called the Statistical Package for the Social Science (SPSS) (version 14). The researcher used both descriptive statistics such as percentages and inferential statistics with the statistical significance set at 0.05, as well as graphs and tables, to depict the results. The data was analysed in terms of the

various sections and items on the questionnaire and were accordingly based on the conceptual framework of the study.

4.3.1 Descriptive statistics

4.3.1.1 Section 1: Demographic data

This section assessed information about age, gender, marital status, religion, highest level of education, occupation, monthly income, distance from the hospital, and whether or not the respondents could afford the cost of the transport that brought them to the health facility.

4.3.1.1.1 Age distribution

The respondents were classified in terms of the specific age ranges on the questionnaire. Table 4.1 shows the age distribution of the respondents.

Table 4.1 Respondents age distribution (N=349)

Age Classification	Frequency	Percent
1 Ages between 18 and 30	120	34.4
2 Ages between 31 and 40	142	40.7
3 Ages between 41 and 60	82	23.5
4 Ages of > 60 years	5	1.4
Total	349	100.0

Out of the total number of respondents, 34.4% were between 18 and 30 years old; 40.7% were between 31 and 40 years old; 23.5% were between 41 and 60 years old and only 1.4% were above 60 years of age. This shows that HIV affects mainly those who are usually most economically active in jobs and vocations because 75% of the affected respondents were aged between 18 and 40 years old.

4.3.1.1.2 Gender distribution

The interviewers recorded the gender of each respondent during the interview. Figure 4.1 depicts the gender distribution of the sample in this study.

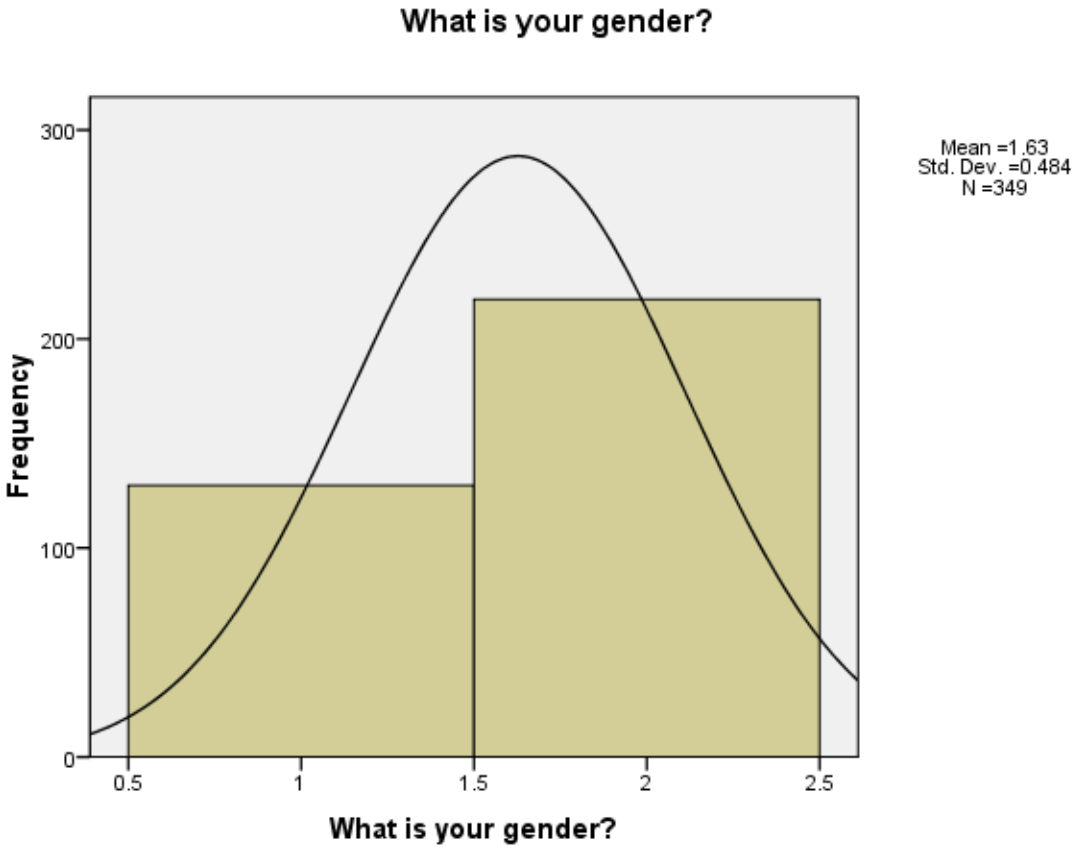

Figure 4.1 The gender distribution of the respondents. (N=349)

The gender distribution of the respondents was as follows: 62.8% were females and 37.2 were males. In the hospital ART clinic, females constituted 55% of the population who were on ART while males constituted 45% of the population who were on ART. This shows that females were more numerous in the research sample than were males in this study.

4.3.1.1.3 Marital status distribution

The respondents were asked about their marital status during the interview.

Table 4.2 depicts the marital status of all 349 respondents.

Table 4.2 Respondents marital status (N=349)

Marital status	Frequency	Percent
1 Married	166	47.6
2 Single	43	12.3
3 Widowed	71	20.3
4 Divorced	69	19.8
Total	349	100.0

Out of the total number of respondents, 47.6% were married, 12.3% were single, 20.3% were widowed, and 19.8% were divorced. This indicates that more than 50% of the respondents were not in a relationship with a partner at the time of the study while the remainder describe themselves as “married”.

4.3.1.1.4 Religion distribution

Respondents were asked whether they were adherence of any particular religion during interview. Figure 4.2 depicts the distribution of the respondents’ religion.

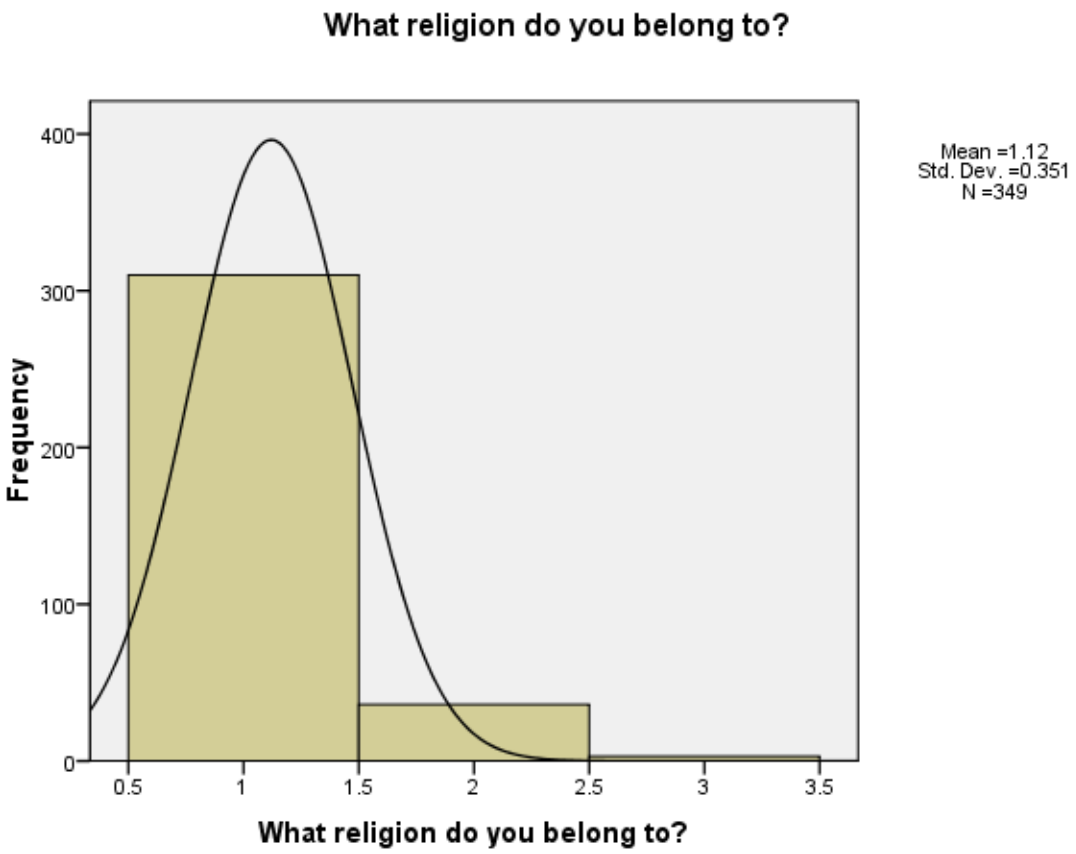

Figure 4.2 Religion distribution of respondents (N=349)

Out of the total number of respondents, 88.8% of the respondents said that they were Christians; 10.3% said that they were Muslims, and only 0.9% of the respondents claim that they were in a religion which was accorded under the heading of “Others”. This shows that the majority of the population in this study claimed to be Christians.

4.3.1.1.5 Highest level of education

The respondents were asked to disclose the highest level of education that they had attained prior to the interview. Table 4.3 depicts the distribution of the highest levels of education attained by the respondents.

Table 4.3 Respondents highest level of education (N=349)

Level of education	Frequency	Percent
1 No formal education	59	16.9
2 Primary education	113	32.4
3 Secondary education	140	40.1
4 Tertiary level	37	10.6
Total	349	100.0

Out of the total number of respondents, 16.9% had no formal education; 32.4% had some primary education; 40.1% had some secondary education, and 10.6% had acquired some tertiary educational qualification. These results reveal that only 10.6% of the respondents in this study had attained an education qualification beyond that of high school.

4.3.1.1.6 Occupation

Figure 4.3 below depicts the occupational distribution of the respondents at the time of the interview.

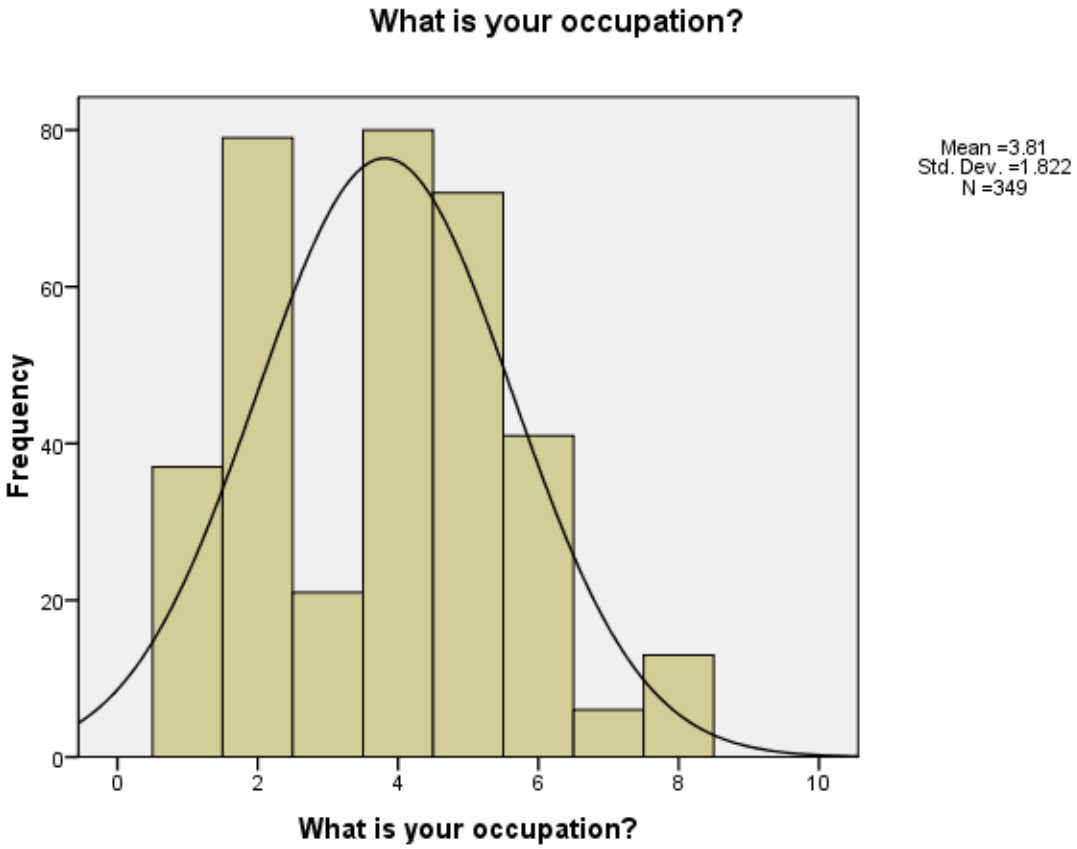

Figure 4.3 Respondents' occupation distribution (N=349)

Out of the total number of respondents, 10.6% were employed by the government, 22.6% were employed in the private sector, 6% worked for non-governmental organizations, 22.9% were self-employed workers or merchants, 20.6% were housewives, 11.7% were unemployed (jobless), 1.7% were students and 3.7% were classified under the heading of "Other". These figures show that only 11.7% of the respondents were unemployed (without jobs).

4.3.1.1.7 Monthly income of respondents

The respondents were asked to disclose their monthly income during the interview. Table 4.4 below depicts the monthly income distribution of the respondents in the sample.

Table 4.4 Respondents' monthly income in terms of the Ethiopian birr (N=349)

Amount of monthly income	Frequency	Percent
1 Less than 200	126	36.1
2 200-600	140	40.1
3 600-1000	37	10.6
4 1000-2000	37	10.6
5 Greater than 2000	9	2.6
6 Total	349	100

Out of the total number of respondents, 36.1% earned a monthly income of less than 200 Ethiopian birr monthly, 40.1% received a monthly income of between 200 and 600 Ethiopian birr, 10.6% received a monthly income of between 1000 and 2000 Ethiopian birr, and only 2.6% of respondents received a monthly income of more than 2000 Ethiopian birr.

4.3.1.1.8 Distance from the health facility

Respondents were asked during the interview how far they had to travel to attend the health facility for their scheduled treatments. If they were not able to estimate the distance in kilometres, they were asked to name the town from which they came. The interviewer then calculated the distance in kilometres from their home town or village to the health facility on the basis of the distance of the town from Adama.

Figure 4.4 depicts the distances that the respondents had to travel in order to be present at their scheduled appointments at the health facility.

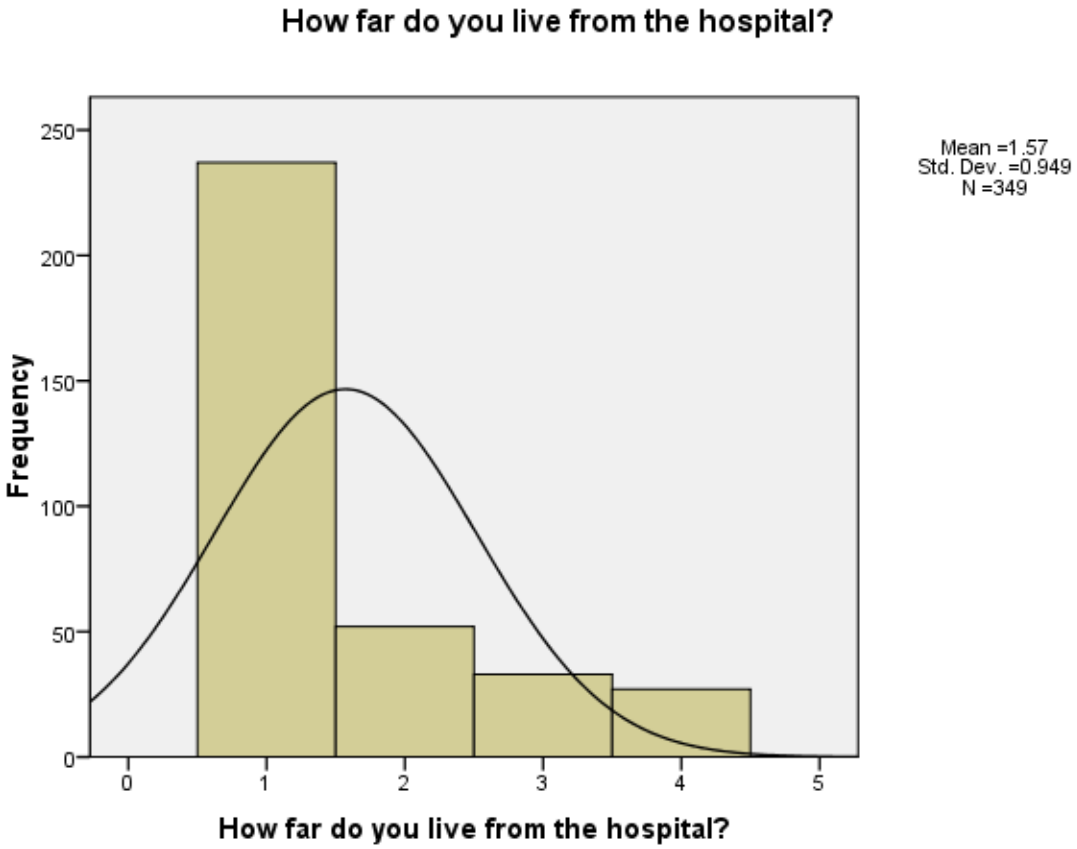

Figure 4.4 The distances that respondents had to travel in order to reach the health facility (N=349)

Out of the total number of respondents, 67.9% were within 20 km of the health facility, 14.9% had to travel between 20 and 50 kilometres, 9.5% had to travel between 50 and 100 kilometres, and 7.7% had to travel more than 100 kilometres in order to attend the health facility for their scheduled appointments. These results show that almost two-thirds of all the respondents lived within 20 km from the health facility.

4.3.1.1.9 Whether or not respondents were able to afford the money that they had to disburse for transportation costs

Respondents were asked whether they were able to afford what they had to pay for transportation every time they come to the health facility for treatment. Table 4.5 depicts the proportion of respondents who could and who could not afford to pay their own transport costs.

Table 4.5 Whether or not respondents could afford to pay their transport costs (N=349)

Could you afford to pay for your transport to the clinic?	Frequency	Percent
1 Yes, I can	322	92.3
2 No, I cannot	27	7.7

These results show that majority of the respondents said that they could afford to pay for transport to attend the health facility for the purpose of obtaining a fresh allocation of prescribed HIV medications.

4.3.1.2 Section 2: Adherence information

This section assessed how much the respondents knew about adherence to HAART.

4.3.1.2.1 I know how my HIV medications are supposed to be taken

Table 4.6 indicates the respondents' perceived knowledge about how HIV medications are supposed to be taken.

Table 4.6 Respondents' knowledge about how ARV drugs should be taken. (N=349)

Respondents' knowledge of how to take the prescribed medications.	Frequency	Percent
1 No, I don't know	3	.9
2 Yes, I know	346	99.1
Total	349	100.0

Out of the total number of respondents, 99.1% claim that they knew how to take their medications while only 0.9% said they didn't know how to take their medications. These figures suggest that the majority knew how to take their ARV medications. In contrast to the findings in this study, Starace et al. (2006: 156) indicated that only 51% of their samples were adequately informed about how to adhere to the HAART dosage schedule, and that 49% demonstrated that they were inadequately informed about how to adhere to their HAART dosage schedule. In a study carried out by Wang and Wu

(2007: 151), only 75.4% of their patients were able to demonstrate the correct dosage schedules for their HIV-prescribed medications.

4.3.1.2.2 I know what to do if I have missed an ARV dose

Table 4.7 shows how much the respondents knew about what they had to do if they missed a scheduled dose of ARV medications.

Table 4.7 The respondents' knowledge about what they have to do when they had missed a scheduled ARV dose (N=349)

The respondents' knowledge of what they had to do when they missed an ARV dose.	Frequency	Percent
1 No, I don't know what to do.	57	16.3
2 Yes, I know what to do.	292	83.7
Total	349	100.0

Out of the total number of respondents, 83.7% said that they knew what they had to do if they missed a dose of ARV medications while 16.3% said they didn't know what to do if they missed a dose of ARV medications. These results show that more than 16% of the respondents were of the opinion that they didn't know what they should do if they had missed a dose(s) of their ARV medications.

4.3.1.2.3 I know the possible side effects of my HIV medications

Table 4.8 shows the respondents' responses to the question about whether they understood the side effects of their HIV medications or not.

Table 4.8 The responses of respondents to the question about whether they understood the side effects of their HIV medications or not (N=349)

"I know side effects of my HIV medications."	Frequency	Percent
1 No, I don't know.	25	7.2
2 Yes, I know.	324	92.8
Total	349	100.0

Out of the total number of respondents, 92.8% said that they knew about the side effects of their ARV medications while 7.2% said they did not know about the possible side effects of their HIV medications. This shows that only less than 10% of the population were ignorant of the possible side effects of their HIV medications.

4.3.1.2.4 As long as I am feeling healthy, then missing my ARV medications from time to time is OK.

Table 4.9 indicates the extent of the respondents' perceptions that they knew about the effects of missing their ARV medications – "for so long as I am feeling healthy".

Table 4.9 The responses of respondents to the question about whether they thought it was OK or not OK to miss their dosage of ARV medications provided that they felt healthy (N=349)

"It is OK to miss my dosage of ARV medication provided that I am feeling healthy."	**Frequency**	**Percent**
1 Yes, it is OK.	9	2.6
2 No, it is not OK.	340	97.4
Total	349	100.0

Out of the total number of respondents, 97.4% said it was not OK to miss doses while 2.6% said it was OK to miss doses provided that they felt healthy. A study carried out by Golin et al. (2002: 759) reported that 77% of their respondents did not agree with the statement, "You could fight off HIV without medication."

4.3.1.2.5 If prescribed ARV drugs are not taken properly, they may not work in the future

Table 4.10 shows the responses of the respondents to what they thought would happen if they did not take their HIV medications as prescribed (in terms of whether the medications would work in the future or not).

Table 4.10 The responses of respondents to what they thought about the effectiveness of ARV drugs in the future if they did not take their HIV medications as prescribed (N=349)

If ARV drugs are not taken properly, they may not work properly in the future.	Frequency	Percent
1 Yes, they will work properly in the future if the medications are not taken as prescribed.	9	2.6
2 No, they may not work properly in the future if the medications are not taken as prescribed.	340	97.4
Total	349	100.0

Out of the total number of respondents, 97.4% of the respondents said that the medications would not work properly in the future if they missed doses from time to time while 2.6% of the respondents said the drugs would work properly in the future if they did not take their medications as prescribed. This is a higher rate than that reported in the study by Golin et al. (2002: 759), who reported that 85% patients agreed that if they did not take their HIV drugs as prescribed, their HIV would become resistant to treatment in the future. This rate of responses is also higher than that reported in the study undertaken by Wang and Wu (2007: 151), who reported that 66.3% of their patients believed that non-adherence to HAART could lead to the failure of the treatment in the future.

4.3.1.3 Section 3: Adherence motivation

This section assessed the personal and social motivation of respondents to adhere to their ARV medications.

4.3.1.3.1 Personal motivation

4.3.1.3.1.1 Those respondents who were concerned about being seen by others when they were taking their ARV medications

Table 4.11 shows the number of respondents who were concerned about being seen by others when they were taking their ARV medications.

Table 4.11 Respondents who were concerned about being seen by others when they were taking their ARV medications (N=349)

I am worried about being seen by others while I am taking my ARV medication.	Frequency	Percent
1 Strongly agree	55	15.8
2 Agree	72	20.6
3 Undecided	2	0.6
4 Disagree	140	40.1
5 Strongly disagree	80	22.9
Total	349	100.0

Out of the total number of respondents, 15.8% strongly agreed with the statement, 20.6% agreed with the statement, 0.6% were undecided, 40.1% disagreed with this statement, and 22.9% strongly disagreed with the statement that they would be worried to be seen by others while taking their ARV medications. In a study conducted by Wang and Wu (2007: 152), 43.8% claimed that they had been treated differently by their neighbours and friends after their neighbours and friends knew that they were taking HAART.

4.3.1.3.1.2 Planning my life around HAART frustrates me

Table 4.12 shows the attitudes of respondents to whether it frustrated them to have to plan their life so that they could accommodate their ARV drugs prescription times.

Table 4.12 Respondents' attitudes to whether or not it frustrated them to have to plan their lives so that they could accommodate their HIV medications (N=349)

It frustrates me to have to plan my life to accommodate the taking of my prescribed ARV drugs.	Frequency	Percent
1 Strongly agree	9	2.6
2 Agree	28	8.0
3 Undecided	2	.6
4 Disagree	201	57.6
5 Strongly disagree	109	31.2
Total	349	100.0

Out of the total number of respondents, 2.6% strongly agreed with the statement, 8% agreed, 0.6% were undecided, 57.6% disagreed, and 31.2% strongly disagreed with the

idea that it frustrated them to have to plan their lives around their HIV medications. The results obtained from the survey showed that more than 88% of the respondents were not frustrated by having to plan their lives in such a way that they could accommodate their HIV medications in their schedules.

4.3.1.3.1.3 I don't like taking HAART because it reminds me of my HIV-positive status

Table 4.13 depicts the respondents' attitudes to the statement that they didn't like taking their HIV medications because it reminded them that they were HIV-positive.

Table 4.13 The attitudes of the respondents to the statement that they didn't like taking their HIV medications because it reminded them they are HIV-positive (N=349)

I don't like taking my HAART because it reminds me that I am HIV-positive.	Frequency	Percent
1 Strongly agree	4	1.1
2 Agree	24	6.9
4 Disagree	227	65.0
5 Strongly disagree	94	26.9
Total	349	100.0

Out of the total number of respondents, 1.1% strongly agreed with the statement, 6.9% agreed, 65% disagreed, and 27% strongly agreed with the statement that they did not like to take their HIV medications because it reminded them that they were HIV-positive. The result shows that more than 91% f the respondents did not agree with the statement that they did not like to take their HIV medications because it reminded them that they were HIV-positive.

4.3.1.3.1.4 Having to take HIV medications daily for the rest of my life frustrates me

Table 4.14 depicts the responses of respondents to the statement that having to take HIV medications daily for the remainder of their lives frustrated them.

Table 4.14 The responses of respondents to the question of whether having to take their HIV medications daily for the rest of their lives frustrated them or not (N=349)

Having to take HIV medications daily for the rest of my life frustrates me.	Frequency	Percent
1 Strongly agree	9	2.6
2 Agree	18	5.2
3 Undecided	3	.9
4 Disagree	213	61.0
5 Strongly disagree	106	30.3
Total	349	100.0

Out of the total number of respondents, 2.6% strongly agreed with the statement, 5.2% agreed, 0.9% remained undecided, 61% disagreed and 30.3% strongly disagreed with the statement that it would frustrate them to think that they would have to take HIV medications daily for the rest of their lives. The result shows that more than 91% of the respondents were not frustrated by the thought that they would have to take their HIV medications daily for the rest of their lives.

4.3.1.3.1.5 It upsets me to think that the HIV medications that had been prescribed for me can affect the way that I look

Table 4.15 depicts the responses of the respondents to the statement that it would upset them to think that the HIV medications that were prescribed for them could affect the way they looked.

Table 4.15 The responses of respondents to the statement that it would upset them to think that the HIV medications that had been prescribed for them could affect the way they looked (N=349)

It upsets me to think that the HIV medications can affect the way I look.	Frequency	Percent
1 Strongly agree	21	6.0
2 Agree	41	11.7
3 Undecided	22	6.3
4 Disagree	189	54.2
5 Strongly disagree	76	21.8
Total	349	100.0

Out of the total number of respondents, 6% strongly agreed with the statement, 11.7% agreed, 6.3% remained undecided, 54.2% disagreed, and 21.8% strongly disagreed with the statement that its went upset them think that the HIV medications that had been prescribed for them could affect the way they looked. The results show that 86% of the respondents were not upset by the fact that the HIV medications could affect the way that they looked.

4.3.1.3.1.6 I am upset by the thought that the prescribed HIV medications can cause side effects

Table 4.16 shows the responses of the respondents to the statement that the taking of prescribed HIV medications could cause side effects.

Table 4.16 The responses of respondents to the statement that they would be upset by the fact that prescribed HIV medications would cause side effects (N=349)

It upsets me to know that HIV medications have side effects.	**Frequency**	**Percent**
1 Strongly agree	4	1.1
2 Agree	44	12.6
3 Undecided	16	4.6
4 Disagree	210	60.2
5 Strongly disagree	75	21.5
Total	349	100.0

Out of the total number of respondents, 1.1% strongly agreed with the statement, 12.6% agreed, 4.6% remained undecided, 60.2% disagreed, and 21.5% strongly disagreed with the statement that they would be upset to think that the prescribed HIV medications could cause side effects. These responses show that more than 81% of the respondents were not upset about the side effects that can be caused by HIV medications.

4.3.1.3.1.7 I am worried about the fact that the HIV medications may harm my health

Table 4.17 shows the responses of the respondents to whether or not they were worried by the fact that the HIV medications could harm their health.

Table 4.17 The responses of respondents to the statement that they were worried that the HIV medications could harm their health (N=349)

I am worried about the fact that HIV medications will harm my health.	Frequency	Percent
1 Strongly agree	11	3.2
2 Agree	70	20.1
3 Undecided	19	5.4
4 Disagree	198	56.7
5 Strongly disagree	51	14.6
Total	349	100.0

Out of the total number of respondents, 3.2% strongly agreed with the statement, 20.1% agreed, 5.4% remained undecided, 56.7% disagreed and 14.6% strongly disagreed with the statement that they would be worried by the knowledge that the HIV medications that were prescribed for them could harm their health. These results indicate that more than 70% of the respondents did not worry about the fact that the HIV medications that were prescribed for them could harm their health.

4.3.1.3.2 Social motivation

4.3.1.3.2.1 Social support for taking HIV medications

Table 4.18 below depicts the estimations of the degree of social support that respondents receive from their significant others.

Table 4.18 The responses of respondents to whether or not they receive social support from their significant others when they take their HIV medications (N=349)

I receive social support when I take my HIV medications.	Frequency	Percent
1 Strongly agree	7	2.0
2 Agree	33	9.5
3 Undecided	2	.6
4 Disagree	139	39.8
5 Strongly disagree	168	48.1
Total	349	100.0

Out of the total number of respondents, 2% strongly agreed with the statement, 9.5% agreed, 0.6% remained undecided, 39.8% disagreed and 48.1% strongly disagreed with the statement that they received support from their significant others to take their HIV medications. This is an enormous cause for concern because more than 87% of respondents reported that they did not receive any social supports from their significant others. It might also indicate that they have not disclosed their HIV status.

4.3.1.4 Section 4: Behavioural skills

Section 4 assessed the behavioural skills of respondents with regard to HAART adherence.

4.3.1.4.1 It is hard or easy for me to remain informed about HIV treatment

The respondents were asked during the interview whether it was easy or hard for them to remain well informed about HIV treatment.

Table 4.19 depicts the extent to which the respondents felt that it was either hard or easy to remain well informed about HIV treatment.

Table 4.19 Respondents responses how hard or easy they can stay informed about HIV treatment (N=349)

It is hard or easy for me to remain well informed about HIV treatment.	**Frequency**	**Percent**
2 Hard	35	10.0
3 Sometimes hard and sometimes easy	5	1.5
4 Easy	201	57.6
5 Very easy	108	30.9
Total	349	100.0

Out of the total number of respondents, 10% maintained that it was hard for them to remain well informed about HIV treatment, 1.5% were undecided, 57.6% said that it was easy for them to remain well informed, and 30.9% said it was very easy for them to remain well informed about HIV treatment. This in effect means that 88.5% of the respondents have the perception that they are able to remain well informed about their HIV treatment.

4.3.1.4.2 It is hard or easy to obtain the support you need from others in order to take your HIV medications

Table 4.20 indicates whether the respondents felt that it was hard or easy for them to obtain the support that they needed from others in order to take their HIV medications.

Table 4.20 The responses of respondents to the statement that it was either hard or easy to obtain the support they needed from others in order to take their HIV medications (N=349)

I can obtain the support I need from others in order to take my HIV medications.	Frequency	Percent
2 Hard	15	4.3
3 Sometimes hard and sometimes easy	4	1.1
4 Easy	208	59.6
5 Very easy	122	35.0
Total	349	100.0

Out of the total number of respondents, 4.3% said it was hard for them to obtain the support they needed from others in order to take their HIV medications, 1.1% said that it was difficult to decide, 59.6% said it was easy for them to obtain support, and 35% said that it was very easy for them to obtain the support they needed from others in order to take their HIV medications. This study therefore showed that 94.6% of the participants felt that they could obtain the support they needed from others in order to take their HIV medications.

4.3.1.4.3 It is hard or easy for me to collect my HIV medication refills in time

The respondents were asked whether it was hard or easy for them to collect their HIV medications refills on time.

Table 4.21 indicates whether it was hard or easy for the respondents to obtain their HIV medication refills on time.

Table 4.21 The responses of respondents to the statement that it was either hard or easy for them to obtain their HIV medication refills on time (N=349)

I can get my HIV medication refills on time.	Frequency	Percent
1 Very hard	2	.6
2 Hard	19	5.4
3 Sometimes hard and sometimes easy	3	.9
4 Easy	240	68.8
5 Very easy	85	24.3
Total	349	100.0

Out of the total number of respondents, 0.6% said that it was very hard for them to obtain refills on time, 5.4% said they did was hard, 0.9% said they did was sometimes hard and sometimes easy, 68.8% said it was easy, and 24.3% said it was very easy for obtain their HIV medication refills on time. Of the respondents in this study, 93.1% of the population therefore felt that they were able to obtain the refills of their HIV medications on time.

4.3.1.4.4 It is either hard or easy to take one's HIV medications when one is wrapped up in what one is doing

The respondents were asked how hard or easy it was for them to take their HIV medications when they were wrapped up in what they were doing during the interview.

Table 4.22 depicts the responses of the respondents to whether it was hard or easy for them to take their HIV medications when they were wrapped up in what they were doing.

Table 4.22 The responses of respondents to whether it was hard or easy for them to take their HIV medications when they were wrapped up in what they were doing (N=349)

I can take my HIV medications even when I am wrapped up in what I am doing.	Frequency	Percent
2 Hard	33	9.5
3 Sometimes hard and sometimes easy	14	4.0
4 Easy	240	68.7
5 Very easy	62	17.8
Total	349	100.0

Out of the total number of respondents, 9.5% said it was hard for them to take their HIV medications when they were wrapped up in what they were doing, 4% said that it was sometimes hard and sometimes easy, 68.7% said it was easy, and 17.8% said it was very easy for them to take their HIV medications even though they were wrapped up in what they were doing. This study shows that 86.5% of the respondents said they were able to take their HIV medications even when they were wrapped up in what they were doing.

4.3.1.4.5 It is hard or easy for me to manage the side effects of my HIV medications

The respondents were asked whether it was hard or easy for them to manage the side effects of their HIV medications.

Table 4.23 shows the extent to which the respondents felt that it was either hard or easy for them to manage the side effects of their ARV medications.

Table 4.23 The responses of respondents who felt that it was either hard or easy to manage side effects of HIV medications (N=349)

I am able to manage the side effects my HIV medications.	**Frequency**	**Percent**
1 Very hard	2	.6
2 Hard	77	22.1
3 Sometimes hard and sometimes easy	20	5.7
4 Easy	204	58.5
5 Very easy	46	13.2
Total	349	100.0

Out of the total number of respondents, 0.6% said it was very hard for them to manage the side effects of the HIV medications, 22.1% said that it was hard, 5.7% said that it was sometimes hard and sometimes easy, 58.5% said it was easy, and 13.2% said it was very easy to manage the side effects of their HIV medications. The result of the survey showed that 71.7% of the respondents were of the opinion that they were able to manage the side effects of their HIV medications.

4.3.1.4.6 It is hard or easy for me to remember to take my HIV medications.

The respondents were asked how hard or easy it was for them to remember to take their HIV medications.

Table 4.24 sets out the opinions of the respondents about whether it was hard or easy for them to remember to take their HIV medications.

Table 4.24 The responses of respondents to a question about whether it was hard or easy for them to remember to take their prescribed HIV medications (N=347)

I am able to remember to take my HIV medications.	Frequency	Percent
1 Very hard	1	.3
2 Hard	24	6.9
3 Sometimes hard and sometimes easy	10	2.9
4 Easy	243	70.0
5 Very easy	69	19.9
Total	347	100.0

Out of the total number of respondents, 0.3% said it was very hard for them to remember to take their HIV medications, 6.9% said that it was hard for them to remember, 2.9% said that it was sometimes hard and sometimes easy for them to remember, 70% said it was easy for them, and 19.9% said it was very easy for them to remember to take their prescribed HIV medications. These results indicate that 89.9% of the respondents were of the opinion that they were able to take their HIV medications on time.

4.3.1.4.7 It is hard or easy to take one's HIV medications despite the fact that the pills are hard to swallow, despite the fact that they taste bad, and despite the fact that they make one feel sick in one's stomach

The respondents were asked whether it was hard or easy for them to take their HIV medications even though their pills were hard to swallow, even though they tasted bad and even though they made one sick in one's stomach.

Table 4.25 shows whether the respondents felt that it was hard or easy for them to take their HIV medications despite the fact that the pills were hard to swallow, that they tasted bad and that they made one feel sick in one's stomach.

Table 4.25 The responses of respondents to whether it was hard or easy for them to take their HIV medications despite the fact that the pills were hard to swallow, that they tasted bad and that they made one feel sick in one's stomach (N=349)

I take my HIV medications despite the fact that the pills are hard to swallow, that they taste bad and that they make one feel sick in one's stomach.	Frequency	Percent
2 Hard	27	7.7
3 Sometimes hard and sometimes easy	17	4.9
4 Easy	258	73.9
5 Very easy	47	13.5
Total	349	100.0

Out of the total number of respondents, 7.7% said it was hard for them to take them the medications, 4.9% said that it was sometimes hard and sometimes easy, 73.9% said it was easy, and 13.5% said that it was very easy for them to take their HIV medications despite the fact that the pills were hard to swallow, that they tasted bad and that they made one feel sick in one's stomach. These results show that 87.4% of the respondents felt that they could take their HIV medications even though the pills were hard to swallow, even though they tasted bad and even though they made them feel sick in their stomachs.

4.3.1.4.8 It is hard or easy to stick to the treatment plan when the side effects interfere with one's daily activities

Respondents were asked whether it was easy or hard to stick to their treatment plan when side effects interfered with their daily activities.

Table 4.26 shows the respondents' answers to the question as to whether it was easy or hard for them to stick to their treatment plan when the side effects interfered with daily activities.

Table 4.26 Respondents' responses to the question as to how hard or easy was for them to stick to their treatment plan when the side effects interfered with their daily activities (N=349)

How hard or easy it was to stick to the treatment plan when the side effects interfered with their daily activities	Frequency	Percent
1 Very hard	1	.3
2 Hard	7	2.0
3 Sometimes hard and sometimes easy	13	3.7
4 Easy	175	50.2
5 Very easy	153	43.8
Total	349	100.0

Out of the total number of respondents, 0.3% said that it was very hard to for them to stick to their treatment plan, 2% said it was hard, 3.7% said that it was sometimes hard and sometimes easy, 50.2% said it was easy, and 43.8% said it was very easy to stick to treatment plan when side effects interfered with their daily activities. The study shows that 94% of the respondents were committed to stick to the treatment plan even when the side effects of drugs interfered with their daily activities.

4.3.1.4.9 It is hard or easy to make HIV medications a regular part of daily life

The respondents were asked whether it was hard or easy for them to make HIV medications part in their daily life.

Table 4.27 shows the result of the question as to whether it was hard or easy for respondents to make HIV medications a regular part of their daily life.

Table 4.27 Respondents' responses to the question as to how hard or easy it was to make the taking of HIV medications a regular part of their daily life (N=349)

How hard or easy was it to make the taking of HIV medications a regular part of your daily life?	Frequency	Percent
2 Hard	28	8.0
3 Sometimes hard and sometimes easy	11	3.2
4 Easy	249	71.3
5 Very easy	61	17.5
Total	349	100.0

Out of the total number of respondents, 8% said it was hard to incorporate the taking of HIV medications a regular part of daily life, 3.2% said it was sometimes hard and sometimes easy, 71.3% said it was easy, and 17.5% said it was very easy to make HIV medications a regular part of their daily lives. The result show that 88.8% of the respondents felt that they could incorporate the taking of HIV medications into the routine of their daily lives.

4.3.1.4.10 It is hard or easy for patients to take their HIV medications when their usual routine changed

The respondents were asked whether it was hard or easy for them to take their HIV medications when there usual daily routine changed.

Table 4.28 presents the answers to the question about whether it was hard or easy for them to take their HIV medications when their usual routine changed.

Table 4.28 The responses of respondents to the question about how hard or easy it was for them to take their HIV medications when their daily routine changed (N=349)

Was it hard or easy for you to take your HIV medications when your daily routine changed?	Frequency	Percent
1 Very hard	3	.9
2 Hard	52	14.8
3 Sometimes hard and sometimes easy	5	1.4
4 Easy	226	64.8
5 Very easy	63	18.1
Total	349	100.0

Out of the total number of respondents, 0.9% said it was very hard for them to take their HIV medications when their daily routine changed, 14.8% said it was hard, 1.4% said that it was sometimes hard and sometimes easy, 64.8% said it was easy, and 18.1% said that it was very easy. The study therefore shows that 82.9% of the respondents were able to continue to take their HIV medications even when their daily routine changed.

4.3.1.4.11 How hard or easy is it for you to take HIV medications when you do not feel emotionally well?

Respondents were asked whether it was hard or easy for them to take their HIV medications when they did not feel emotionally well.

Table 4.29 sets out the answers of the respondents to the question about whether it was hard or easy for them to take their HIV medications when they did not feel emotionally well.

Table 4.29 Respondents' responses to the question about whether it was hard or easy for them to take their HIV medications when they did not feel emotionally well (N=349)

How hard or easy is it for you to take your HIV medications when you are not feeling well?	Frequency	Percent
2 Hard	39	11.2
3 Sometimes hard and sometimes easy	9	2.6
4 Easy	251	71.9
5 Very easy	50	14.3
Total	349	100.0

Out of the total number of respondents, 11.2% said it was hard for them to take their HIV mediations when they were not feeling emotionally well, 2.6% said it was sometimes hard and sometimes easy, 71.9% said it was easy, and 14.3% said that it was very easy. The results show that 86.2% of the respondents are able to take their HIV medications even when they are not feeling emotionally well.

4.3.1.4.12 How hard or easy is it for you to take your HIV medications when you are feeling physically good and don't show any symptoms of HIV disease?

The respondents were asked whether it was hard or easy for them to take their HIV medications when they were feeling physically good and did not show any symptoms of their HIV disease.

Table 4.30 presents the answers to the question about whether it was hard or easy for respondents to take their HIV medications when they feeling physically good and did not show any symptoms of their HIV disease.

Table 4.30 The answers of the respondents to the question about whether it was hard or easy for them to take their HIV medications when they were feeling physically good and did not show any symptoms of their HIV disease (N=349)

How hard or easy is it for you to take your HIV medications when you are feeling physically good and don't show any symptoms of HIV disease?	Frequency	Percent
2 Hard	13	3.7
3 Sometimes hard and sometimes easy	6	1.7
4 Easy	195	55.9
5 Very easy	135	38.7
Total	349	100.0

Out of the total number of respondents, 3.7% said it was hard for them to take their HIV medications when were feeling physically good and did not show any symptoms of their HIV disease, 1.7% said it was sometimes hard and sometimes easy, 55.9% said it was easy, and 38.7% said it was very easy. The results show that 94.6% of the respondents said that they were able to take their HIV medications even when they were feeling physically good and did not show any symptoms of their of their HIV disease.

4.3.1.4.13 Was it hard or easy for you to take your HIV medications when you did not feel physically good?

The respondents were asked whether it was hard or easy for them to take HIV their medications when they did not feel physically good.

Table 4.31 shows the answers to the question about whether it was hard or easy for the respondents to take their HIV medications when they do not feel physically good.

Table 4.31 The responses of respondents to the question about whether it was hard or easy for them to take their HIV medications even when they were not feeling physically good (N=349)

Was it hard or easy for you to take your HIV medications when you did not feel physically good?	Frequency	Percent
2 Hard	24	6.9
3 Sometimes hard and sometimes easy	11	3.1
4 Easy	239	68.5
5 Very easy	75	21.5
Total	349	100.0

Out of the total number of respondents, 6.9% said that it was hard for them to take their HIV medications when they were not feeling physically well, 3.1% said that it was sometimes hard and sometimes easy, 68.5% said that it was easy, and 21.5% said it was very easy. The result shows that 90% of the respondents maintained that they were able to take their HIV medications even when they were not feeling physically good.

4.3.1.4.14 How hard or easy is it to talk to health care providers about HIV medications and its side-effects and symptoms?

The respondents were asked whether it was hard or easy for them to talk to their health care providers about their HIV medications so they could obtain help in solving any problems that might arise from the taking of their medications or from having to deal with the side-effects and symptoms.

Table 4.32 shows the answers to the question about whether it was hard or easy for them to talk to health care providers about their HIV medications in order to solve any problems that arose from the taking of HIV medications.

Table 4.32 The answers of the respondents to a question about how hard or easy it was to talk to their health care providers about HIV medications and its side-effects and symptoms (N=349)

How hard or easy is it to talk to health care providers about HIV medications and its side-effects and symptoms?	Frequency	Percent
1 Very hard	1	.3
2 Hard	9	2.6
3 Sometimes hard and sometimes easy	1	.3
4 Easy	208	59.6
5 Very easy	130	37.2
Total	349	100.0

Out of the total number of respondents, 0.3% said it was very hard to talk to their health care providers about HIV medications and their side-effects and symptoms, 2.6% said it was hard, 0.3% said that it was sometimes hard and sometimes easy, 59.6% said it was easy, and 37.2% said that it was very easy. These results show that 96.8% of the respondents are unable to talk to their health care providers about HIV medications and their side-effects and symptoms.

4.3.1.5 Objective 1: To assess the level of HAART adherence behaviour among patients taking ARV drugs in the Adama district of Ethiopia

4.3.1.5.1 Section 5: HAART Adherence behaviour

4.3.1.5.1.1 Percentage of ARV doses taken in one month

Respondents were asked how many doses they had missed in the previous month. Their replies were used to calculate the percentage of those who took <95% or >95% of the ARV medications prescribed.

Table 4.33 shows the results of the question about how many doses each patient had missed during the previous month.

Table 4.33 The percent of ARV doses taken by the respondents in the month preceding the study (N=349)

Percentage of ARV doses taken in the month preceding the study	Frequency	Percent
1 <95% adherence of ART	69	19.8
2 >95% adherence of ART	280	80.2
Total	349	100.0

Out of the total number of respondents, 19.8% of the respondents said that they had taken their HIV medications for less than 95% of the time while 80.2% of the respondents said that they had taken their HIV medications for more than 95% of the months preceding the study. This result shows that 19.8% of respondents were not taking their HIV medications optimally (>95% of their scheduled prescribed ARV dosages). These results are similar to those that were reported by Amico et al. (2005: 668) in a study carried out in Puerto Rico. These results also show a much higher rate of non-compliance with the dosage requirements than is found in other studies such as those undertaken by Golin et al. (2002: 759), Weiser, Wolfe, Bangsberg, Thior, Gilbert, Makhema, Kebaabetswe, Dickenson, Mompati, Essex and Marlink (2003: 284), Starace et al. (2006:155), Goldman et al. (2008: 1032), and Markos et al. (2008: 176). But there are other studies that show results similar to those reported in the study by patients who self-reported their adherence to the required HAART dosage schedules. The studies in question are those that were undertaken by Arnsten et al. (2001: 1419), Tadious and Davey (2006: 241), and Wang and Wu (2007: 152). The self-reported adherence rate revealed in the study is lower than that reported in the studies undertaken by Wagner (2002: 602), Oyugi et al. (2004: 1101), Glass et al. (2006: 387), Amberbir et al. (2008:[6]) in Ethiopia and abroad.

4.3.2 Inferential statistics

In this part of data analysis, the researcher performed a statistical analysis in order to determine whether there were any significant differences in the HAART adherence behaviour of the respondents who were well informed about the requirements of ART and adherence and those who are not, and whether personal and social motivation and the behavioural skills required for HAART adherence created a significant pattern of adherence among those who possessed these qualities and those who did not. The

research also performed an analysis to determine whether there were significant differences in the behavioural skills required for HAART adherence among those who possessed more or less information and those who possessed more or less motivation to comply with HAART adherence.

4.3.2.1 Objective 2: To assess the effect of social and demographic variables on HAART adherence behaviour in the Adama district of Ethiopia

4.3.2.1.1 Demographic factors that can influence HAART adherence behaviour

4.3.2.1.1.1 Age and HAART adherence behaviour

The researcher constructed a cross tabulation to determine whether there were any significant differences between people in the different age groups and degrees of HAART adherence behaviour.

Table 4.34 depicts the percentage of respondents who adhered to HAART for less than 95% of the time and for more than 95% and how these adherence figures corresponded of to the different age groups of respondents.

Table 4.34 Respondents who adhered to HAART optimally and sub-optimally and how this behaviour related to their respective age classification (N=349)

Crosstab

Count

		Q5_1 Did you miss any ARV dose?		
		1 <95% Adherence to HAART schedule	2 >95% Adherence to HAART schedule	Total
Q1_1 How old are you?	1 Age between 18 and 30	29	91	120
	2 Age between 31 and 40	30	112	142
	3 Age between 41 and 60	10	72	82
	4 Age >60 years	0	5	5
	Total	69	280	349

Out of the total number of respondents aged between 18 and 30 years, 29 adhered to HAART for less than 95% of the time while 91 of them adhered to HAART for more than 95% of the time. For those between 31 and 40 years old, 30 of them adhered to HAART for less than 95% of the time while 112 of them adhered to HAART for more than 95% of the time. For those between 41 and 60 years old, 10 of them adhered to HAART for less than 95% of the time while 72 of them adhered to HAART for more than 95% of the time. For those who were more than 60 years old, none of them said that they adhered to HAART for less than 95% of the time while 5 of them said they adhered to HAART for more than 95% of the time.

Table 4.35 shows the X2 test. This test reveals whether there is significant difference among the age scales with respect to adherence behaviour.

Table 4.35 Chi-square test result of respondents' HAART adherence behaviour when compared by age (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.826[a]	3	.120
Likelihood Ratio	7.083	3	.069
Linear-by-Linear Association	5.186	1	.023
N of Valid Cases	349		

a. 2 cells (25.0%) have an expected count of less than 5.
The minimum expected count is .99.

The results of this study showed that there were no significant differences in adherence behaviour among people from different age-group classifications. This is supported by some previous studies such as those of Chesney et al. (2000: 263), Weiser et al. (2003: 284), Amico et al. (2005: 668), Wang and Wu (2007: 152), and Amberbir et al. (2008: [6]). This is in contrast to other studies such as those of Stone, Hogan, Schuman, Rompalo, Howard, Korkontzelou and Smith (2001: 132) and Glass et al. (2006: 387) which showed that the age of the patient affected the level of HAART adherence. Stone et al. (2001: 132) state that the younger the patient, the more likely it was that they would miss doses. Glass et al. (2006:387), in a Swiss cohort study, also found that the younger the patient, the less likely it was that that they would adhere to

the HAART schedule. A study by Wagner (2002: 602) showed that the older the patient, the higher was the rate of HAART adherence.

4.3.2.1.1.2 Gender and HAART adherence behaviour

Figure 4.5 depicts the number of females and males who said that they adhered to the HAART schedule for less than 95% of the time and those who adhered to the HAART schedule for more than 95% of the time in the month prior to the study.

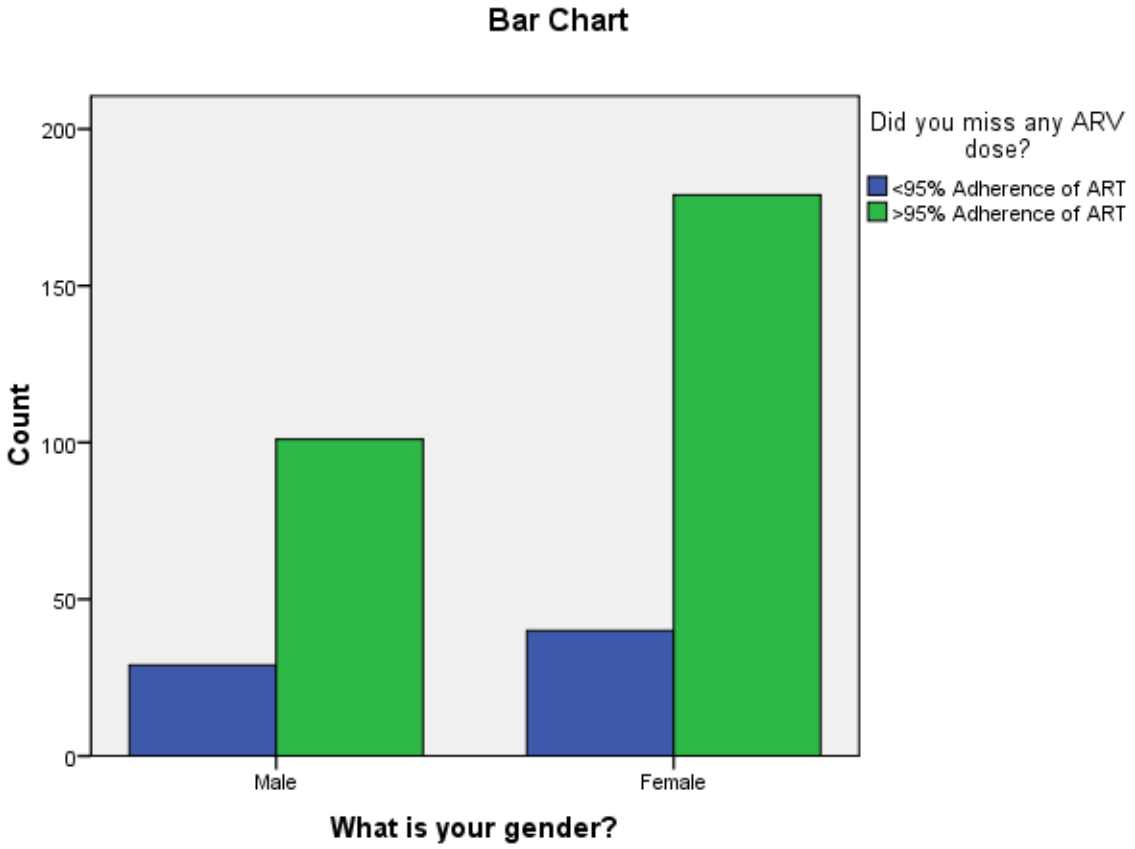

Figure 4.5 Optimal and sub-optimal adherence in terms of gender distribution (N=349)

Of the male respondents, 29 of them adhered to their HAART schedule for less than 95% of the time while 101 of them said that they adhered to the schedule for more than 95% of the time. Of the female respondents, 40 said that they adhered to the HAART schedule for less than 95% of the time while 179 said that they adhered to the schedule for more than 95% of the time in the month prior to data collection.

Table 4.36 shows the Chi-square analysis of gender with adherence behaviour.

Table 4.36 Chi-square test result of gender versus HAART adherence behaviour. (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.841[a]	1	.359		
Continuity Correction[b]	.605	1	.437		
Likelihood Ratio	.831	1	.362		
Fisher's Exact Test				.405	.218
Linear-by-Linear Association	.838	1	.360		
N of Valid Cases	349				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.70.

b. Computed only for a 2x2 table

The results showed that there were no significant gender differences with regard to adherence behaviour. This is supported by research undertaken by Chesney et al. (2000: 263), Golin et al. (2002: 759), Weiser et al. (2003: 284) and Glass et al. (2006: 389), who all found that there was no significant correlation between gender and non-adherence to HAART. Another study conducted by Johnson et al. (2006:263) also found no significant differences in HAART adherence rates in terms of gender. This, however, stands in contrast to the study by Wagner (2002: 603) that found significant differences between female and male HAART adherence rates. In one of the studies, the men in the sample were more adherent to the requirements of the HAART dosage regimen than were the women in the sample (Godin et al. 2005: 498).

4.3.2.1.1.3 Marital status and HAART adherence behaviour

Figure 4.6 shows the relationship between frequency of HAART adherence behaviour and the marital status of the respondents in this study.

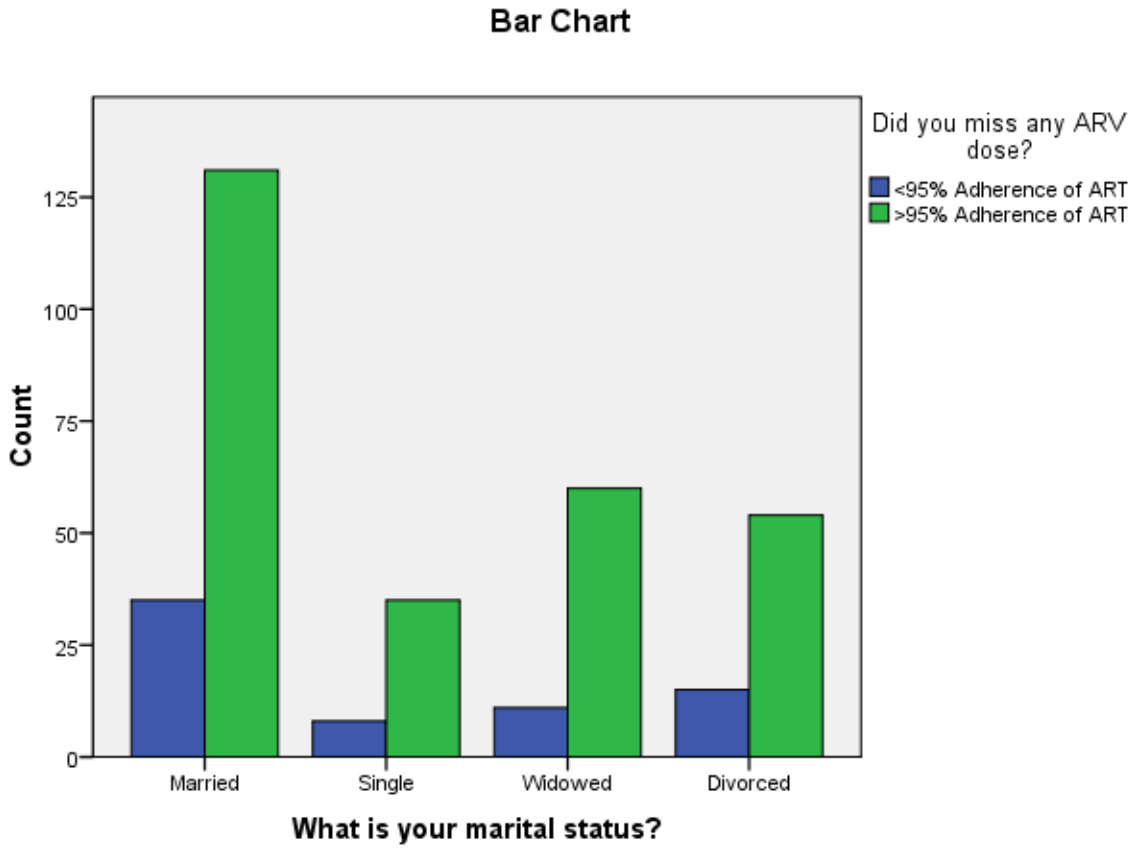

Figure 4.6 HAART adherence behaviour in the context of the marital status of the respondents (N=349)

Out of the total number of the married respondents, 35 of them adhered to HAART <95% while 131 of them adhered to HAART >95% in the month prior to data collection. Out of the total number of single respondents, 8 adhered to HAART <95% while 35 of them adhered to HAART >95% in the month prior to the data collection. Out of the total number of widowed respondents, 11 of them adhered to HAART <95% while 60 of them adhered to HAART >95% in the month prior to data collection. Out of the total number of divorced respondents, 15 of them adhered to HAART <95% while 54 of them adhered to HAART >95% in the month prior to data collection.

Table 4.37 shows the Chi-square test for marital status and adherence behaviour.

Table 4.37 The Chi-square test for marital status and HAART adherence behaviour (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.205[a]	3	.752
Likelihood Ratio	1.249	3	.741
Linear-by-Linear Association	.077	1	.781
N of Valid Cases	349		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.50.

The result showed that there was no significant difference between adherence behaviour and the marital status of the respondents in this study. This finding corresponds to that of Weiser et al. (2003: 284). These findings nevertheless contrast with those of a Swiss cohort study which found that those who lived alone were more likely to be non-HAART-adherent with regard to their HIV medications (Glass et al. 2006: 387). But Wagner (2002: 602) found that being single was associated with a greater adherence to the HAART dosage regimen. In the study conducted by Godin et al. (2005: 498), individuals who lived with someone were more likely to adhere to HAART than those who lived alone. These results may be attributable to the fact that the presence of another person or people in the domestic situation could serve to remind patients of the times when they should be taking their drugs. But at the same time, the presence of others in the domestic situation could also impede adherence by adding so many responsibilities to the lives of the people on ART that they might become more likely to forget about taking their own HIV medications (Wagner 2002: 605).

4.3.2.1.1.4 HAART adherence behaviour and religion

Figure 4.7 shows the religion of the respondents and the rates of optimal and non-optimal adherence to HAART.

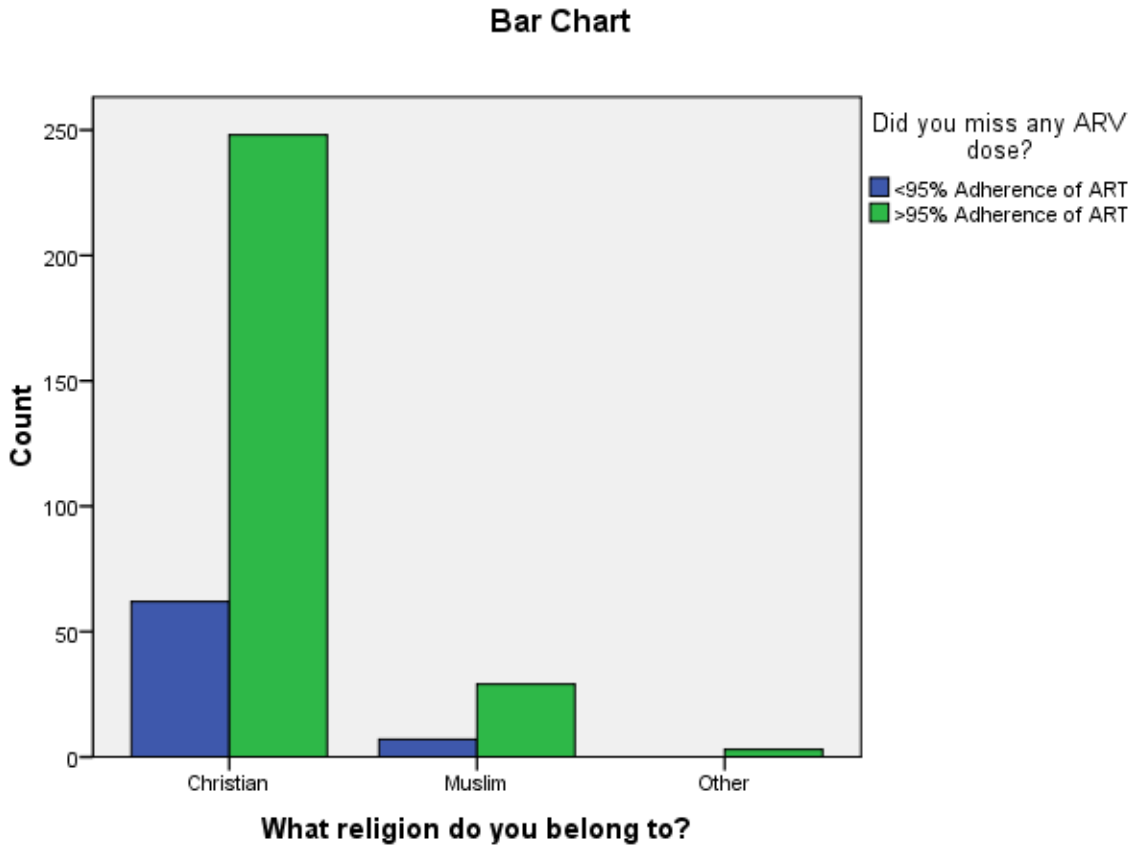

Figure 4.7 The religion of the respondents and rates of adherence and non-adherence to HAART (N=349)

Out of the total number of Christian respondents, 66 of them showed a sub-optimal HAART adherence rate of <95% while 248 of them were optimally adherent (>95%). Out of the total number of Muslim respondents, 7 were sub-optimally adherent to HAART while 29 of them were optimally adherent to HAART. The three respondents whose religion was recorded as “Other” (i.e. neither Christian nor Muslim) were optimally adherent to HAART.

Table 4.38 shows Chi-square analysis of religion of respondents with regard to adherence behaviour.

Table 4.38 Chi-square test result of religion with regard to HAART adherence behaviour (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.752[a]	2	.687
Likelihood Ratio	1.334	2	.513
Linear-by-Linear Association	.249	1	.618
N of Valid Cases	349		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .59.

The analysis showed that there was no significant difference with regard to HAART adherence behaviour among the religions in this study. This supports the findings in the study conducted by Amberbir et al. (2008: [6]).

4.3.2.1.1.5 Adherence behaviour and levels of education

Figure 4.8 shows the adherence behaviour of respondents in terms of their level of education.

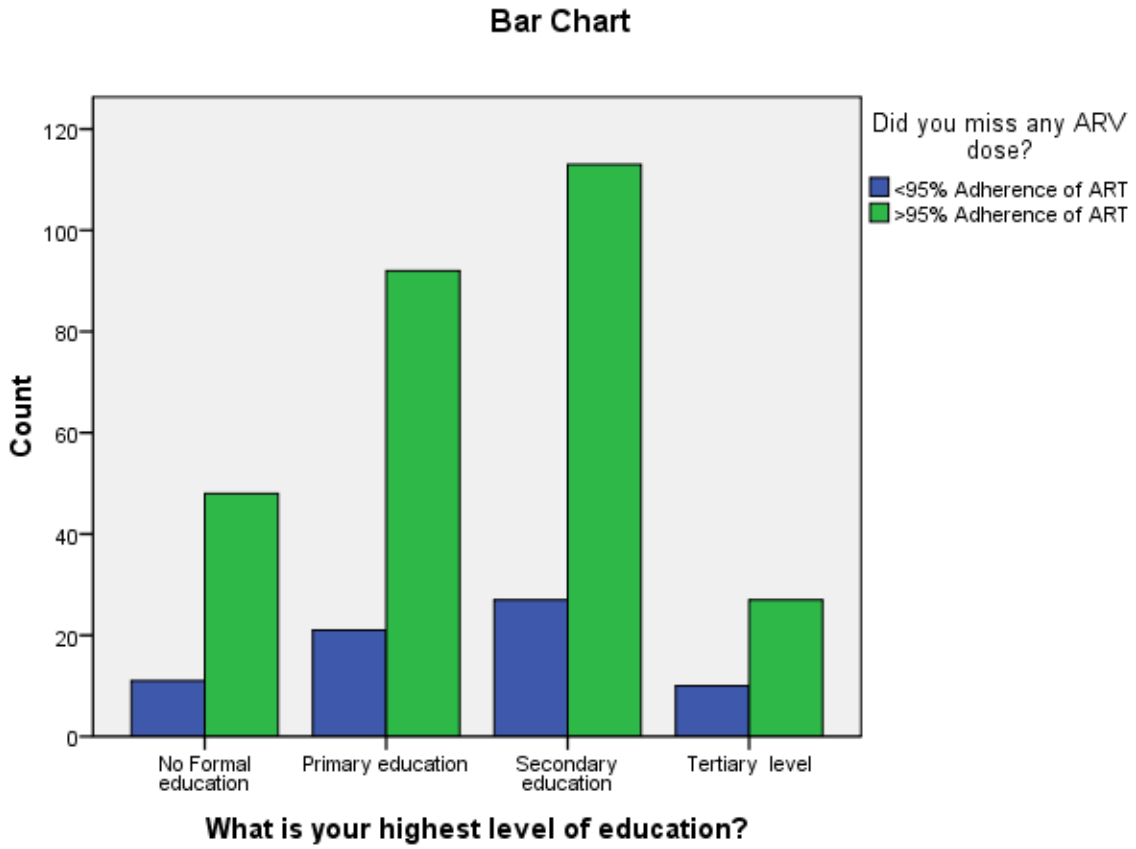

Figure 4.8 HAART adherence behaviour and the highest level of education attained by respondents (N=349)

Out of the total number of respondents with no formal education, 11 were sub-optimally adherent to HAART while 48 were optimally adherent to HAART. Out of the total number of respondents with primary education, 21 were sub-optimally adherent to HAART while 92 were optimally adherent to HAART. Out of the total number of respondents who had a secondary education, 27 were sub-optimally adherent to HAART while 113 were optimally adherent to HAART. Out of the total number of respondents with a tertiary education, 10 were sub-optimally adherent to HAART while 27 were optimally adherent to HAART.

Table 4.39 shows the Chi-square test result of adherence and the level of education of the respondents.

Table 4.39 Chi-square test result with respect to HAART adherence behaviour and level of education

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.397[a]	3	.706
Likelihood Ratio	1.304	3	.728
Linear-by-Linear Association	.648	1	.421
N of Valid Cases	349		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.32.

The results showed that there were no significant differences in terms of adherence behaviour and level of education. This supports the findings in a study conducted by Stone et al. (2001: 130), which found no significant association between non-adherence and educational status. This may be attributable to the fact that understanding the concept of a fixed HAART dosage combination that needs to be taken at specific times is a concept that is not sophisticated and can be understood by people with very little education. These findings, however, contrast with those in a study conducted by Gifford et al. (2000: 389) that levels of education were associated with non-adherence to HAART. In a similar vein, a Swiss study conducted by Glass et al. (2006:387) found that those participants who had only a basic education were more likely to be non-HAART-adherent. Golin et al. (2002: 759) also found that those with lower educational qualifications were less likely to adhere to their HAART regimen. The study by Wagner (2002: 603) found that those with a college education were more likely to adhere to the HAART regimen while Weiser et al. (2003: 284), by contrast, found that lower levels of education were associated with higher HAART adherence rates in their study. These contradictory results seem to indicate that a lack of education does not necessarily predict a lower level of HAART adherence (Chesney 2000: 175).

4.3.2.1.1.6 HAART adherence behaviour and occupation

Figure 4.9 shows the relationship between the occupations of the respondents and their adherence behaviour.

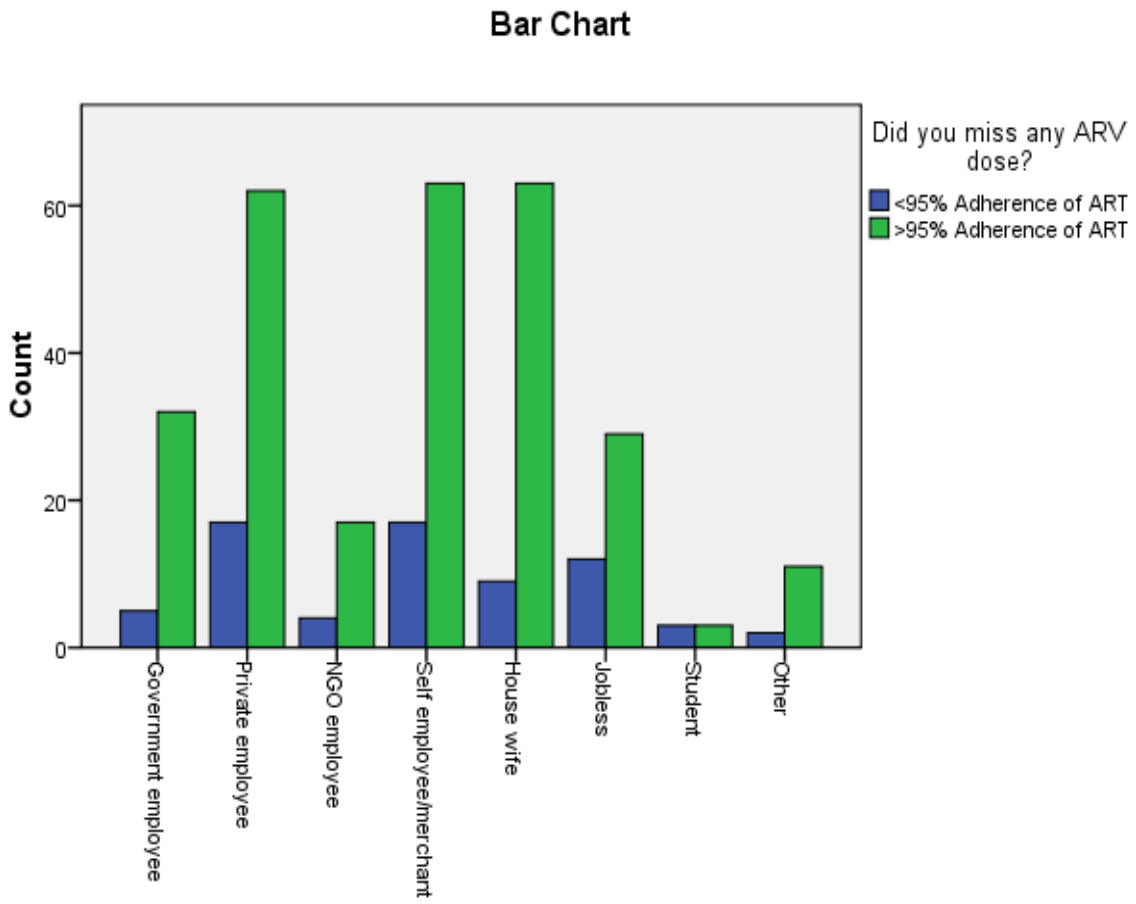

Figure 4.9 Adherence behaviour and the occupations of respondents (N=349)

Out of the total number of 37 respondents who were government employees, 5 were sub-optimally adherent while 32 of them were optimally adherent. Out of the total number of 79 respondents who were privately employed, 17 respondent sub-optimally adherent while 62 respondents were optimally adherent. Out of the total number of 21 respondents who were employed by non-governmental organizations, 4 were sub-optimally adherent while 17 of optimally adherent. Out of the total number of 80 respondents who were either self-employed or merchants, 17 were sub-optimally adherent while 63 were optimally adherent. Out of the total of 41 unemployed ("jobless") respondents, 12 were sub-optimally adherent while 29 of them were optimally adherent. Out of the total number of 6 respondents who were students, 3 were sub-optimally adherent while the remaining 3 of them were optimally adherent to the HAART regimen of dosages. Out of the 13 remaining "Other" respondents, 2 were optimally adherent while 11 were sub-optimally adherent.

Table 4.40 depicts the Chi-square test analysis of the respondents' occupations and the relationship to adherence behaviour.

Table 4.40 Chi-square test result of the occupation of respondents in the relationship to HAART adherence behaviour (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.528[a]	7	.217
Likelihood Ratio	8.949	7	.256
Linear-by-Linear Association	.549	1	.459
N of Valid Cases	349		

a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is 1.19.

The results showed that there were no significant differences among those with different occupations with regard to their adherence behaviour. This finding is supported by studies conducted by Wagner (2002: 602) and Wang and Wu (2007: 152), who also found no significant association between type of employment and adherence behaviour.

4.3.2.1.1.7 HAART adherence behaviour and monthly income

Figure 4.10 reveals the relationship between monthly income and the adherence behaviour of respondents.

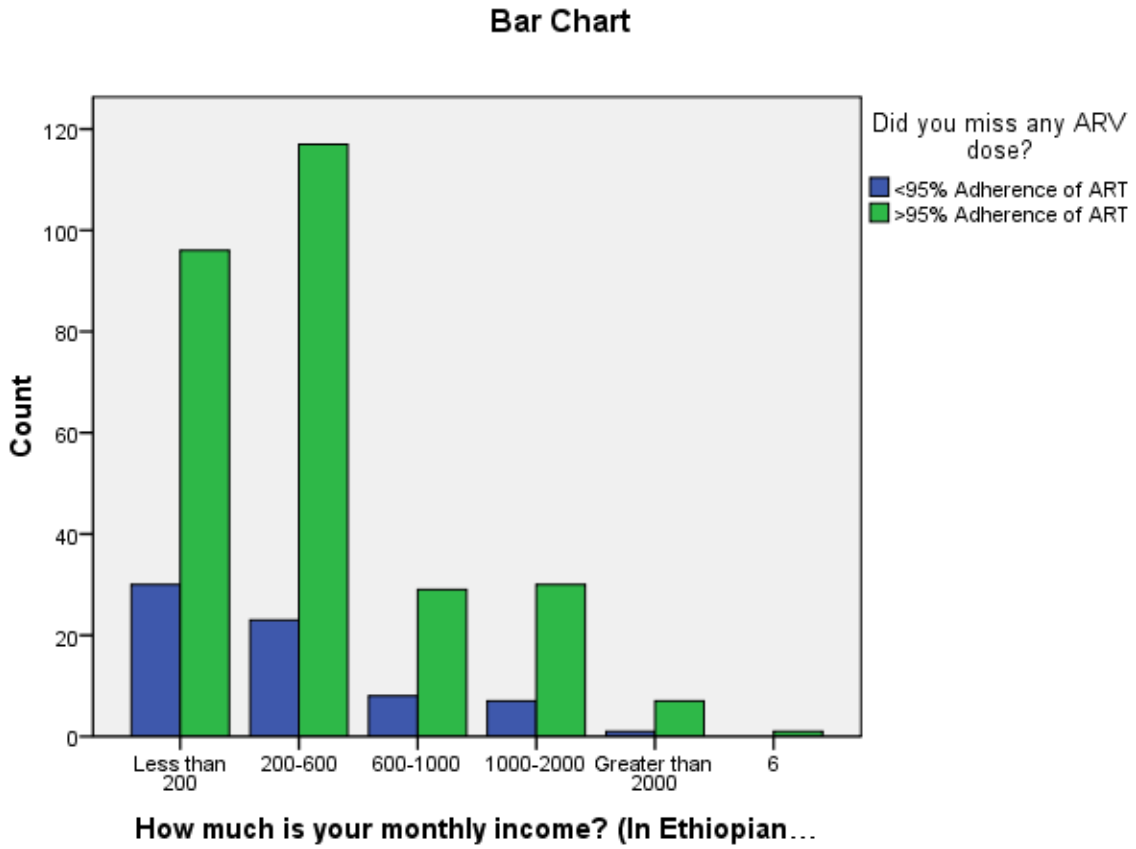

Figure 4.10 Monthly income of the respondents and their respective HAART adherence behaviour (N=349)

Of the 126 respondents with a monthly income of <200 birr, 30 were sub-optimally adherent while 96 were optimally adherent. Of the 140 respondents with a monthly income of 200-600 birr, 23 were sub-optimally adherent while 117 were optimally adherent. Of the 37 respondents with a monthly income of 600-1000 birr, 8 were sub-optimally adherent while 29 were optimally adherent. Of the 37 respondents with a monthly income of 1000-2000 birr, 7 were sub-optimally adherent while 30 were optimally adherent. Of the 8 respondents with a monthly income of >2000 birr, only 1 was sub-optimally adherent while the remaining 8 respondents were optimally adherent. Table 4.41 shows the Chi-square test result of respondents' monthly income in Ethiopian birr versus adherence behaviour.

Table 4.41 Chi-square test result of the respondents with regard to monthly income and optimal and sub-optimal HAART adherence behaviour (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.892[a]	5	.717
Likelihood Ratio	3.101	5	.684
Linear-by-Linear Association	.904	1	.342
N of Valid Cases	349		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is .20.

The results showed that there was no significant difference in the adherence behaviour of respondents who received widely differing monthly incomes. This results has been confirmed by previous studies (Chesney et al. 2000: 263; Weiser et al. 2003: 284; Amico et al. 2005: 668; Wang & Wu 2007: 152; Amberbir et al. 2008:[6]). This result may be connected with the fact that HAART is currently freely distributed in Ethiopia. Monthly income may therefore not be an important factor for HIV-positive people with low incomes who desire to use HIV medications. This finding is in contrast to that of Golin et al. (2002: 759) who found that people with lower incomes were less likely to be adherent.

4.3.2.1.1.8 HAART adherence behaviour and the distance that respondents had to travel to get to the health facility

Figure 4.11 shows how far respondents lived from the heath facility and whether or not their adherence behaviour was affected by this factor.

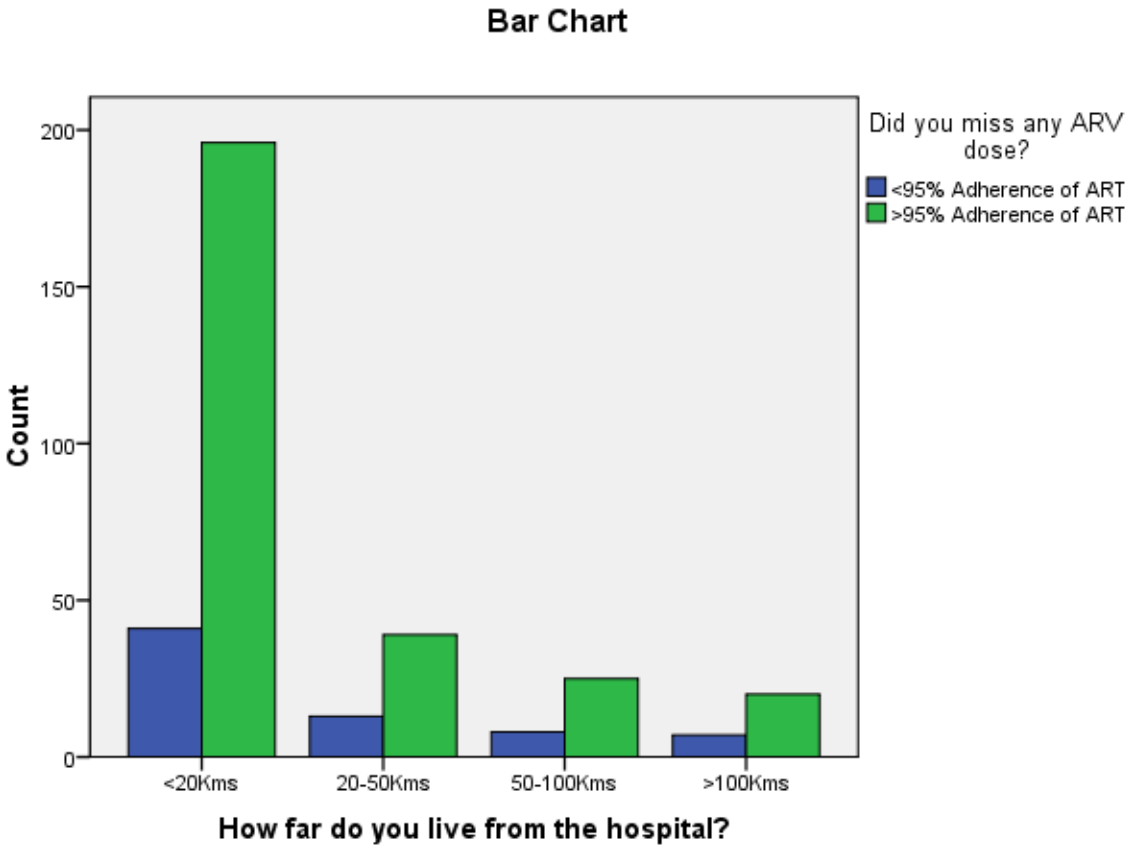

Figure 4.11 HAART adherence behaviour and the distance of the respondents from the health facility (N=349)

Out of the total number of respondents, 41 of the 237 respondents who lived more than 20 km from the health facility were sub-optimally adherent while 196 of them were optimally adherent. Out of the total number of respondents who lived between 20 and 50 km from the health facility, 13 were sub-optimally adherent while 39 of them were optimally adherent. Out of the total number of respondents, 33 of the respondents who lived between 50 and a hundred km from the health facility, 8 were sub-optimally adherent while 25 were optimally adherent. Out of the 27 respondents who lived more than 100 km from the health facility, 7 were sub-optimally adherent while 20 of them were optimally adherent.

Table 4.42 shows the Chi-square test analysis that relates the respondents' distance from the facility to their HAART adherence.

Table 4.42 Chi-square test result of respondents HAART adherence behaviour and distance from the health facility (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.870[a]	3	.412
Likelihood Ratio	2.784	3	.426
Linear-by-Linear Association	2.277	1	.131
N of Valid Cases	349		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.34.

The results show that there were no significant differences between the adherence behaviour of respondents and their distance from the health facility. This result could have been affected by the fact that the random sampling that was used in this study was drawn from patients who were currently on ART. Those who were non-adherent and who had defaulted from their treatment because they lived significant distances the health facility might not therefore have been included in the study. This supports a study by Golin et al. (2002: 759) that states that ready access to care is not statistically significantly related to HAART adherence. In contrast to the findings of this study, Markos et al. (2008: 176) found that patients who lived less than 47 kilometres or exactly 47 km away from the health facility were *more* likely to adhere to the HAART regimen than those who lived more than 47 km from the facility.

4.3.2.1.1.9 HAART adherence behaviour and the ability to pay for transport to get to the health facility

Figure 4.12 reveals the adherence behaviour of respondents in relation to whether or not they were able to pay for their transport to the health facility.

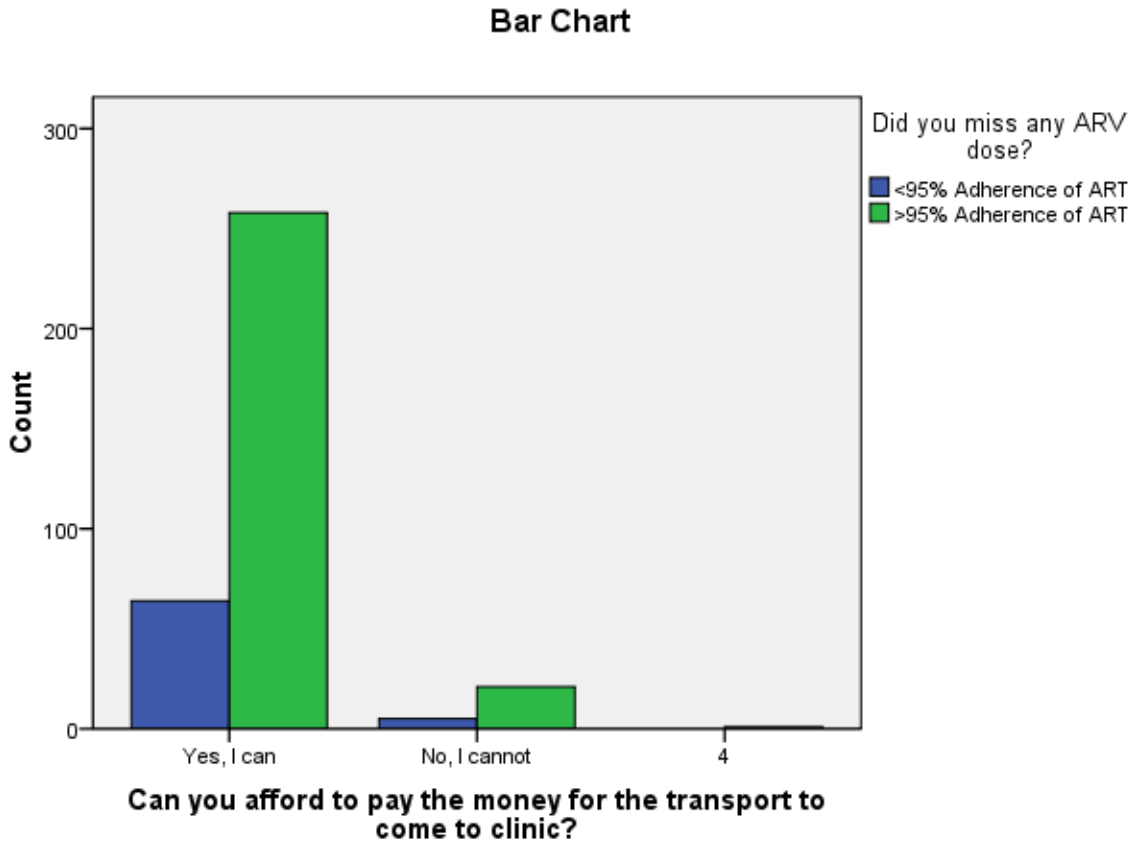

Figure 4.12 HAART adherence behaviour and the ability of respondents to pay for transport (N=349)

Out of the total number of 322 respondents who had originally confirmed that they could afford to pay for their transport to reach the health facility, 64 were sub-optimally adherent while 258 were optimally adherent. Out of the total number of 26 respondents who said they could not afford to pay for their transport, 5 were sub-optimally adherent while 21 were optimally adherent.

Table 4.43 shows chi-square test of the relationship between respondents' adherence behaviour and their ability to afford the transport to come to the health facility to obtain re-fills of their medication.

Table 4.43 Chi-square test of respondents HAART adherence behaviour and the ability to afford the cost of travelling to the health facility (N=349)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.253[a]	2	.881
Likelihood Ratio	.448	2	.799
Linear-by-Linear Association	.104	1	.747
N of Valid Cases	349		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .20.

The result showed that there was no significant difference between respondents who can afford and those who can't afford and their optimal and sub-optimal adherence behaviour to HAART. This could be because the random sampling of this study was done from the patients who are currently on ART and those who were non-adherent and defaulted from treatment because they can't afford to pay for their transport to come to the health facility not included in the study. This is in support of Golin et al. (2002: 759) that state access to care not statistically significantly related to adherence to HAART. Contrary to this study result Hardon, Akurut, Comoro, Ekezie, Irunde, Gerrits, Kglatwane, Kinsman, Kwasa, Maridadi, Moroka, Moyo, Nakiyemba, Nsimba, Ogenyi, Oyabba, Temu and Laing (2007: 660) in their qualitative study state that transport cost was important reason for some ARV users failure to visit health facility for their follow up and refill their HIV medications on their appointment date.

In summary, the result of this study showed that there was no significant difference in adherence behaviour to HAART based on social and demographic variables of respondents.

4.3.2.2 Objective 3: To assess the impact of information on ART and importance of adherence to HAART on behavioural skill to adhere to HAART in the Adama district of Ethiopia

4.3.2.2.1 Knowledge on adherence to HAART and HAART adherence behavioural skills

This section assessed whether there was significant difference amongst respondents behavioural skill to adhere to HAART based on the information they had about HAART and importance of adherence to it.

4.3.2.2.1.1 Knowledge on how current HIV medications to be taken and HAART adherence behavioural skills

Table 4.44 shows respondents' adherence behavioural skill mean score in those who knew and didn't know about on how to take their current HIV medications.

Table 4.44 Respondents mean adherence behavioural skill who knew and didn't know how to take their HIV medications (N=349)

Information how to take HIV medications	Adherence behavioural skill							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 No, I don't know	3	2.9048	.57735	.33333	1.4705	4.3390	2.29	3.43
2 Yes, I know	346	4.0598	.50106	.02694	4.0068	4.1127	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The mean adherence behavioural skill in those who didn't know how to take their HIV medications was 2.9048 while in those who knew how to take their HIV medication was 4.0598.

Table 4.45 shows the ANOVA analysis of respondents' knowledge on how to take their HIV medications versus their behavioural skill to adhere to HAART.

Table 4.45 ANOVA result of respondents' adherence behavioural skill in those who knew and didn't know how to take their HIV medications (N=349)

ANOVA

Q4 Adherence Behaviour Skill

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.968	1	3.968	15.774	.000
Within Groups	87.282	347	.252		
Total	91.250	348			

The result shows that there was significant difference amongst respondents who had and had no knowledge on how to take their HIV medications with their adherence behavioural skill to adhere to HAART.

4.3.2.2.1.2 HAART adherence behavioural skills and the respondents' knowledge of what they should do if they missed a dose of HIV medications

Table 4.46 shows the mean value of HAART adherence behavioural skills among respondents who knew what to do and those who did not know what to do when they missed a dose of HIV medications.

Table 4.46 Respondents' mean HAART adherence behavioural skills among those who knew what to do when they missed a dose of their HIV medications and those who did not know what to do when they missed a dose of their HIV medications (N=349)

Information about what patients knew what to do when they missed a dose of their ARV?	Behavioural skill							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 No, I do not know what to do.	57	3.6491	.44694	.05920	3.5305	3.7677	2.29	4.07
2 Yes, I know what to do.	292	4.1280	.48738	.02852	4.0719	4.1842	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The mean behavioural skill score among those who did not know what to do when they had missed a dose of ART medications was 3.6491 while among those who knew what to do when they missed a dose of their HIV medications, it was 4.1280.

Table 4.47 shows an ANOVA analysis result of the HAART adherence behavioural skills for respondents who knew what to do when they missed a dose and those who did not know what to do when they missed a dose of their HIV medication.

Table 4.47 ANOVA of the respondents' HAART adherence behavioural skills among those who knew and those who did not know what to do when they missed a dose of ARV (N=349)

ANOVA

Q4 Adherence Behaviour Skill

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.939	1	10.939	47.263	.000
Within Groups	80.311	347	.231		
Total	91.250	348			

The results show that there was significant difference between those who knew and those who did not know what to do when they missed a dose of ARV drugs in the context of their HAART adherence behavioural skills.

4.3.2.2.1.3 HAART adherence behavioural skills and knowledge about the side effects of ARV drugs

Table 4.48 shows the HAART adherence behavioural skills of those who said they knew and those who said that they did not know about the possible side effects of their HIV medications.

Table 4.48 Respondents' mean HAART adherence behavioural skills among those who knew and among those who did not know the possible side effects of HIV medications (N=349)

Knowledge of the side effects of the HIV medications	Adherence behavioural skill							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 No, I am did not know about them.	25	3.5743	.50863	.10173	3.3643	3.7842	2.29	4.07
2 Yes, I know about them.	324	4.0865	.49440	.02747	4.0325	4.1406	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The mean HAART adherence behavioural skills among those who were aware of the side effects of HIV medications was 4.0865 while among those who did not know about the side effects of HIV medications, it was 3.5743.

Table 4.49 shows an ANOVA analysis of the behavioural skills of respondents who knew about the possible side effects of their HIV medications and those who did not know about the possible side effects of HIV medications.

Table 4.49 ANOVA of respondents' HAART adherence behavioural skills of those who knew about the possible side effects of their HIV medications and those who did not know about the possible side effects of their HIV medications (N=349)

ANOVA

Q4 Adherence Behaviour Skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.090	1	6.090	24.814	.000
Within Groups	85.160	347	.245		
Total	91.250	348			

The results show that there was a significant difference between the behavioural skills of those respondents who knew about the possible side effects of their HIV medications and those who did not know about the possible side effects of their HIV medications in this study.

4.3.2.2.1.4 HAART adherence behavioural skills and the belief that it is OK to miss HIV medication doses so as long as the patient feels healthy

Table 4.50 shows the HAART adherence behavioural skills of those respondents who thought that it was OK and those who did not think that it was OK to miss doses of HIV medications for as long as they were feeling healthy.

Table 4.50 Respondents' mean HAART adherence behavioural skills in the context of the belief it was OK or not OK to miss doses of HIV medications provided that they were feeling healthy (N=349)

As long as I am feeling healthy, it is OK to miss a dose of HIV medication.	Adherence behavioural skill							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 Yes, it is OK.	9	3.5159	.53545	.17848	3.1043	3.9275	2.29	4.00
2 No, it is not OK.	340	4.0640	.50462	.02737	4.0101	4.1178	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The mean HAART adherence behavioural skills score among those who thought that it was OK to miss HIV medications provided that one is feeling healthy is 3.5159, while among those who did not think that it was OK, the mean HAART adherence behavioural skills score was 4.0640.

Table 4.51 shows the result of an ANOVA analysis of the respondents' HAART adherence behavioural skills among those who thought that it was OK to miss their HIV medications provided that they were feeling healthy and among those who thought that it was not OK to miss their HIV medications provided that they were feeling healthy.

Table 4.51 ANOVA analysis of the respondents' HAART adherence behavioural skills among those who thought that it was OK to miss their HIV medications provided that they were feeling healthy and among those who thought that it was not OK to miss their HIV medications provided that they were feeling healthy. (N=349)

ANOVA

Q4 Adherence Behaviour Skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.634	1	2.634	10.314	.001
Within Groups	88.616	347	.255		
Total	91.250	348			

The results show that there was a significant difference between the HAART adherence behavioural skills of those respondents who thought that it was OK to miss their HIV medications provided that they were feeling healthy and among those who thought that it was not OK to miss their HIV medications provided that they were feeling healthy.

4.3.2.2.1.5 The HAART adherence behavioural skills of respondents who knew that if their HIV medications were not taken as prescribed, they might not work properly and among those who did not know that if their HIV medications were not taken as prescribed, they might not work properly in the future

Table 4.52 shows the mean of the respondents' HAART adherence behavioural skills among those who knew that if their HIV medications were not taken as prescribed, they might not work properly in the future and among those who did not know that if their HIV medications were not taken as prescribed, they might not work properly in the future.

Table 4.52 Respondents' mean HAART adherence behavioural skills among those who knew that if their HIV medications were not taken as prescribed, they might not work properly and among those who did not know that if their HIV medications were not taken as prescribed, they might not work properly in the future (N=349)

If ARV drugs are not taken properly, they may not work in the future.	HAART adherence behavioural skills							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 No, they will work in the future.	9	3.6905	.54281	.18094	3.2732	4.1077	2.29	4.00
2 Yes, they will not work in the future.	340	4.0593	.50863	.02758	4.0051	4.1136	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The mean HAART adherence behavioural skills score among those who think that HIV medications might not work in the future if they do not take them properly is 4.0593, while among those who thought that HIV medications would work in the future even if they did not take them properly is 3.6905.

Table 4.53 shows the ANOVA results of the respondents' HAART adherence behavioural skills in the context of knowledge about whether HIV medications would not work in the future if not taken as prescribed.

Table 4.53 ANOVA result of respondents' HAART adherence behavioural skills in the context of knowledge about whether HIV medications might or might not work in the future if not taken as prescribed. (N=349)

ANOVA

Q4 Adherence Behaviour Skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.193	1	1.193	4.597	.033
Within Groups	90.057	347	.260		
Total	91.250	348			

The results shows that there was significant difference in the behavioural skills of respondents among those who knew that if their HIV medications were not taken as

prescribed, they might not work properly and among those who did not know that if their HIV medications were not taken as prescribed, they might not work properly in the future.

The researcher concluded that there were significant differences in the behavioural skills of those who knew and understood the dangers of not complying with HAART dosages and those who didn't know and understand the dangers if they did not take their HIV medications as prescribed. This supports the hypothesis that possessing accurate information about ART and meticulous adherence to HAART schedules makes a strong impact on the behavioural skills of respondents who adhere to HAART. This hypothesis is supported in the studies undertaken by Amico et al. (2005: 668) and Starace et al. (2006: 157).

4.3.2.3 Objective 4: To assess the impact of having correct information about ART and adhering to HAART schedules on self-reported HAART adherence behaviour of respondents in the Adama district of Ethiopia

4.3.2.3.1 Correct information about HAART in the context of HAART adherence behaviour

4.3.2.3.1.1 The adherence behaviour of those respondents who knew how to take their HIV medication and of those respondents who did not know how to take their HIV medication

Table 4.54 shows the HAART adherence behaviour of those respondents who knew how to take their HIV medications and of those respondents who did not know how to take their HIV medications.

Table 4.54 Respondents' HAART adherence behaviour of those respondents who knew how to take their HIV medications and of those respondents who did not know how to take their HIV medications (N=349)

Crosstab

Count

		Q5 Did you miss any ARV dose?		
		1 <95% Adherence to ART dosage schedule	2 >95% Adherence to ART dosage schedule	Total
Q2_1 I know how each of my current HIV medications is supposed to be taken. (I know, for example, whether or not my current medications can be taken with food, herbal supplements, or other prescription medications.)	1 No, I don't know	1	2	3
	2 Yes, I know.	68	278	346
	Total	69	280	349

The results show that only one person from among those who adhered less than 95% of the time to their HAART dosage schedules and 2 respondents from among those with a greater than 95% adherence rate did not know how to take their current HIV medications.

Table 4.55 shows the Chi-square analysis of the respondents' adherence behaviour among those who knew and those who did not know how to take their current HIV medications

Table 4.55 Chi-square analysis of respondents' adherence behaviour in the context of whether or not they knew how to take their HIV medications

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.351[a]	1	.554		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.307	1	.580		
Fisher's Exact Test				.485	.485
Linear-by-Linear Association	.350	1	.554		
N of Valid Cases	349				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .59.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.351[a]	1	.554		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.307	1	.580		
Fisher's Exact Test				.485	.485
Linear-by-Linear Association	.350	1	.554		
N of Valid Cases	349				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .59.

b. Computed only for a 2x2 table

The results showed that there were no significant differences in the adherence behaviour of those who knew and those who did not know how to take their HIV medications. This may be explained by the fact that only very few people from the whole population said they did not know how to take their HIV medications. These findings support those of the study undertaken by Miller, Liu, Hays, Golin, Ye, Beck, Kaplan and Wenger (2003: 526) which demonstrated that even a proper understanding of how (and in what circumstances) to take HIV medications did not result in proper HIV medication adherence among all patients. This finding is in contrast to that of Stone, Hogan, Schuman, Rompalo, Howard, Korkontzelou and Smith (2001: 132), who demonstrated that patients who correctly understood the implications of their HIV medication dosages were significantly more likely to adhere to the prescribed HIV medication regimen.

4.3.2.3.1.2 Whether respondents knew what to do when they missed their dose of HIV medications or whether they did not know what to do when they missed their dose of HIV medications in the context of the self-reported HAART adherence behaviour of the respondents

Table 4.56 shows adherence behaviour of respondents who knew what to do when they missed their dose of HIV medications and those who did not know what to do when they missed their dose of HIV medications.

Table 4.56 Respondents' HAART adherence behaviour among those who knew what to do when they missed their dose of HIV medications and those who did not know what to do when they missed their dose of HIV medications. (N=349)

Crosstab

Count

		Q5 Did you miss any ARV dose?		
		1 <95% Adherence of ART	2 >95% Adherence of ART	Total
Q2_2 I know what to do if I miss my dose of HIV medications. (By this I mean that I would know, for example, whether or not to take the HIV medications later or not.)	1 No, I do not know.	12	45	57
	2 Yes, I know.	57	235	292
	Total	69	280	349

Table 4.57 shows the Chi-square test of respondent's HAART adherence behaviour among those who knew what to do and those who did not know what to do if they had missed their doses of HIV medications.

Table 4.57 Chi-square test result of the respondents' HAART adherence behaviour and their knowledge or lack of knowledge of what to do when doses of ARV medications are missed

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.071[a]	1	.791		
Continuity Correction[b]	.007	1	.933		
Likelihood Ratio	.070	1	.792		
Fisher's Exact Test				.856	.457
Linear-by-Linear Association	.070	1	.791		
N of Valid Cases	349				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.27.

b. Computed only for a 2x2 table

The results show that there was no significant difference in the HAART adherence behaviour of those respondents who knew what to do and in those respondents who did not know what to do when doses of ARV medications were missed.

4.3.2.3.1.3 HAART adherence behaviour and the respondents' knowledge or lack of knowledge about the possible side effects of HIV medications

Table 4.58 shows the frequency of adherence behaviour of respondents among those who knew and did not know the possible side effects of their HIV medications.

Table 4.58 Respondents' HAART adherence behaviour among those who knew and did not know possible side effects of HIV medications (N=349)

Crosstab

Count

		Q5 Did you miss any ARV dose?		
		1 <95% Adherence of ART	2 >95% Adherence of ART	Total
Q2_4 I know what the possible side effects of my HIV medications have.	1 No, I don't know	5	20	25
	2 Yes, I know	64	260	324
	Total	69	280	349

Table 4.59 shows the Chi-square test of respondents' HAART adherence behaviour among those who knew and did not know possible side effects of HIV medications

Table 4.59 Chi-square test result of respondents' HAART adherence behaviour and their knowledge of the possible side effects of HIV medications

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	1	.976		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.001	1	.976		
Fisher's Exact Test				1.000	.574
Linear-by-Linear Association	.001	1	.976		
N of Valid Cases	349				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.94.

b. Computed only for a 2x2 table

The results show that there was no significant difference in HAART adherence behaviour between those who knew about the possible side-effects of HIV medications and those who did not know about the possible side effects of HIV medications. That means that the mere knowledge of the possible side effects of HIV medications may not exert a significant or direct impact on HAART adherence behaviour. In contrast to the findings in this study, Wang and Wu (2007: 152) were able to demonstrate that their respondents' knowledge about the possible side effects of ARV drugs was independently associated with HAART adherence.

4.3.2.3.1.4 HAART adherence behaviour among those respondents who believed that missing HIV medications was OK provided that they felt well and among those who believed that missing HIV medications was not OK provided that they felt well

Table 4.60 shows the frequency of respondents who believed that missing HIV medications was OK provided that they felt well and among those who believed that missing HIV medications was not OK provided that they felt well in the context of HAART adherence behaviour.

Table 4.60 Respondents' HAART adherence behaviour among those who felt that missing HIV medications was OK provided that they felt well and among those who believed that missing HIV medications was not OK provided that they felt well (N=349)

Crosstab

Count

		Q5 Did you miss any ARV dose?		
		1 <95% Rate of adherence to ART	2 >95% Rate of adherence to ART	Total
Q2_5 As long as I am feeling healthy, it is OK to miss my HIV medications from time to time.	1 Yes, it is OK.	2	7	9
	2 No, it is not OK.	67	273	340
	Total	69	280	349

Table 4.61 shows the Chi-square test of respondents' HAART adherence behaviour among those who said it was OK or not OK to miss a dose of HIV medications so long as they felt OK.

Table 4.61 Chi-square test result of respondents' HAART adherence behaviour and knowledge on whether they felt it was OK or not OK to miss HIV medications so long as they felt OK

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.035[a]	1	.852		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.034	1	.854		
Fisher's Exact Test				.694	.559
Linear-by-Linear Association	.035	1	.852		
N of Valid Cases	349				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.78.

b. Computed only for a 2x2 table

The results showed that there was no significant difference in HAART adherence behaviour between those who felt that missing HIV medications from time to time was OK provided that they were feeling well and those who felt that missing HIV medications was not OK provided that they were feeling well. .

4.3.2.3.1.5 HAART adherence behaviour among respondents who knew that HIV medications might not work in the future if they did not take HIV medications as prescribed and those who did not know that HIV medications might not work in the future if they did not take HIV medications as prescribed

Table 4.62 shows frequency of respondents' HAART adherence behaviour among those who knew and those did not know that HIV medications would not work in the future if they did not take the medications as prescribed.

Table 4.62 Respondents' HAART adherence behaviour among those who knew and did not know that HIV medications might not work in the future if they did not take the HIV medications as prescribed. (N=349)

Crosstab

Count				
		Q5 Did you miss any ARV dose?		
		1 <95% Adherence of ART	2 >95% Adherence of ART	Total
Q2_6 If I don't take my HIV medications as prescribed, these kinds of medications may not work for me in the future.	1 No, it will work	3	6	9
	2 Yes, it may not work	66	274	340
	Total	69	280	349

Table 4.63 shows Chi-square test analysis of the respondents' HAART adherence behaviour among those who knew and those who did not know that HIV medications would not work in the future unless they were taken as prescribed.

Table 4.63 Chi-square test analysis of the respondents' HAART adherence behaviour among those who knew and those who did not know that HIV medications might not work in the future unless they were taken as prescribed

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.071[a]	1	.301		
Continuity Correction[b]	.373	1	.541		
Likelihood Ratio	.940	1	.332		
Fisher's Exact Test				.388	.254
Linear-by-Linear Association	1.068	1	.301		
N of Valid Cases	349				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.78.

b. Computed only for a 2x2 table

The results show that there was no significant difference in HAART adherence behaviour among those who knew and those who did not know that HIV medications would not work in the future unless the drugs were taken properly as prescribed. This is

in contrast to the findings of Chesney et al. (2000: 263) who showed that those who were poorly adherent to HAART were less sure about the possibility of resistance if they did not take their HIV medications appropriately. Also in contrast to the findings of this study was the findings of the study conducted by Wang and Wu (2007: 152) who showed that the patient's knowledge about treatment failure was independently associated with HAART adherence.

In conclusion, there was no significant difference in HAART adherence behaviour on the basis of whether or not the respondents knew or did not know about the implications and importance of strict adherence to HAART dosage regimens. This finding is supported by the findings in the study conducted by Starace et al. (2006: 157). They also found that HAART adherence information was not significantly associated with HAART adherence behaviour. Weiser et al. (2003: 284) also found that being well-informed about HIV and ART was not significantly associated with HAART adherence. This is in contrast to the findings in the study conducted by Wagner (2002: 606). Wagner's study, which was designed to assess predictors of adherence, found that the more patients knew about HIV and the importance of strict HAART adherence, the more likely they were to adhere to their HAART drug schedule.

In section 4.3.2.2.1 of this study, the researcher showed that there was a significant difference in HAART adherence behavioural skills among respondents on the basis of the extent of the information they had about HAART and the importance of strict adherence to the HAART dosage schedule. In section 4.3.2.3.1 (above), no significant differences were detected in HAART adherence behaviour among respondents on the basis of the extent of the amount of information they had about HAART and importance of adhering to a strict HAART dosage regimen. These two sets of findings support the hypothesis that having information about HAART and the importance of adhering to a strict HAART dosage regimen have no direct impact on HAART adherence behaviour – although it may indirectly affect the level of HAART adherence behavioural skills. This supports the findings from the study by Amico et al. (2009: 71) that state that information about HAART was significantly associated with behavioural skills but not with HAART adherence behaviour. Markos et al. (2008: 175) also showed that there was no significant difference in the HAART adherence behaviour of respondents on the basis the information that respondents had about the importance of strict adherence to HAART dosage schedules. In a study that assessed the extent of HAART adherence

among women who were living with HIV, Kalichman, Rompa, DiFonzo, Simpson, Austin, Luke, Kyomugisha and Buckles (2001: 62) found that those women who missed their HIV medications and those who were strictly HAART adherent did not differ in the amount of knowledge they had about HAART and the importance of strict dosage schedules.

4.3.2.4 Objective 5: To assess the impact of motivation to HAART adherence on HAART adherence behavioural skills in the patients who were taking ARV drugs in the Adama district of Ethiopia

4.3.2.4.1 Impact of the motivation to HAART adherence on HAART adherence behavioural skills to HAART

This section attempts to identify impact of the motivation to HAART adherence on HAART adherence behavioural skills to HAART.

4.3.2.4.1.1 Personal motivation to adhere to HAART and the behavioural skills required to adhere to HAART

Is it possible to detect any significant differences in level of adherence behavioural skills to adhere to HAART based on level of personal motivation to comply with the HAART dosage regimen?

4.3.2.4.1.1.1 Those who are worried that other people might realize that they are HIV+ if they see them taking their HIV medications and the existence of HAART adherence behavioural skills

Table 4.64 shows the mean response of HAART adherence behavioural skills for the extent to which respondents worry that other people might realize that they are HIV+ if they should be seen to be taking their HIV medications.

Table 4.64 Respondents' HAART adherence behavioural skills mean score for the extent to which respondents worry that other people might realize that they are HIV+ if they should be seen to be taking their HIV medications

Q4 HAART adherence behavioural skills

I get worried when I think that other people may see me taking my HIV medications.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	55	3.6091	.70159	.09460	3.4194	3.7988	2.21	4.71
2 Agree	72	4.0089	.43057	.05074	3.9077	4.1101	2.86	5.00
3 Undecided	2	3.2143	.10102	.07143	2.3067	4.1219	3.14	3.29
4 Disagree	140	4.0732	.31839	.02691	4.0200	4.1264	2.57	4.86
5 Strongly disagree	80	4.3696	.46316	.05178	4.2666	4.4727	2.79	4.93
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.65 shows the ANOVA result of HAART adherence behavioural skills for the extent to which people worry that other people might realize that they are HIV+ if they are seen to be taking their HIV medications.

Table 4.65 ANOVA results for HAART adherence behavioural skills and degree to which respondents worry that other people might realize they are HIV+ if they are seen to be taking their HIV medications

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.459	4	5.115	24.855	.000
Within Groups	70.790	344	.206		
Total	91.250	348			

The results show that there were significant differences in HAART adherence behavioural skills on the basis of the extent to which patients were worried that other people might realize that they were HIV+ if they were seen to be taking their HIV medications.

4.3.2.4.1.1.2 HAART adherence behavioural skills and extent to which patients become frustrated about taking HIV medications because they have to plan their life around the taking of their medications

Table 4.66 shows the mean score of respondents' HAART adherence behavioural skills on the basis of their tendency to become frustrated about taking HIV medications because they have to plan their life around the taking of their HIV medications.

Table 4.66 Respondents' mean response to HAART adherence behavioural skills on the basis of their levels of frustration about taking HIV medications because they have to plan their life around the taking of their HIV medications

Q4 HAART adherence behavioural skills

I become frustrated when I have to take HIV medications.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	9	2.8175	.59666	.19889	2.3588	3.2761	2.21	3.86
2 Agree	28	3.4133	.57714	.10907	3.1895	3.6371	2.29	4.21
3 Undecided	2	3.8214	.05051	.03571	3.3676	4.2752	3.79	3.86
4 Disagree	201	3.9744	.32889	.02320	3.9287	4.0202	2.57	4.93
5 Strongly disagree	109	4.4584	.35116	.03363	4.3917	4.5250	3.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.67 shows ANOVA result of the respondents' HAART adherence behavioural skills on the basis of their levels of frustration about taking HIV medications because they have to plan their life around the taking of their HIV medications.

Table 4.67 ANOVA result of the respondents' HAART adherence behavioural skills on the basis of their levels of frustration about taking HIV medications because they have to plan their life around the taking of their HIV medications

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	44.454	4	11.114	81.697	.000
Within Groups	46.795	344	.136		
Total	91.250	348			

The results show that there were significant differences in the HAART adherence behavioural skills of the respondents on the basis of their levels of frustration about taking HIV medications because they have to plan their life around the taking of their medications.

4.3.2.4.1.1.3 HAART adherence behavioural skills and the fact that some patients didn't like to take HIV medications because it reminded them that they are HIV+

Table 4.68 shows the mean HAART adherence behavioural skills of respondents on the basis of the extent of their agreement that they didn't like taking HIV medications because it reminded them of their HIV+ status.

Table 4.68 The mean HAART adherence behavioural skills of respondents on the basis of the extent of their agreement that they didn't like taking HIV medications because it reminded them of their HIV+ status

Q4 HAART adherence behavioural skills

I don't like taking my HIV medications because it reminds me of my HIV+ status.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	4	2.8214	.47201	.23600	2.0704	3.5725	2.29	3.29
2 Agree	24	3.3393	.68163	.13914	3.0515	3.6271	2.21	4.07
3Undecided	0	0	0	0	0	0	0	0
4 Disagree	227	3.9764	.39342	.02611	3.9249	4.0279	2.57	4.93
5Strongly disagree	94	4.4608	.32226	.03324	4.3948	4.5268	3.43	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.69 shows ANOVA results of respondents' HAART adherence behavioural skills on the basis of the extent of their agreement that they didn't like taking HIV medications because it reminded them of their HIV+ status.

Table 4.69 ANOVA result of respondents' HAART adherence behavioural skills on the basis of the extent of their agreement that they didn't like taking HIV medications because it reminded them of their HIV+ status

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	35.256	3	11.752	72.409	.000
Within Groups	55.994	345	.162		
Total	91.250	348			

The results show that there were significant differences in HAART adherence behavioural skills on the basis of the extent of their agreement that they didn't like taking HIV medications because it reminded them of their HIV+ status.

4.3.2.4.1.1.4 HAART adherence behavioural skills on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives

Table 4.70 shows the mean HAART adherence behavioural skills on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives.

Table 4.70 The HAART adherence behavioural skills of respondents on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives

Q4 HAART adherence behavioural skills

I become frustrated when I think that I will have to take HIV medications for the rest of my life.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	9	2.7302	.48284	.16095	2.3590	3.1013	2.21	3.50
2 Agree	18	3.3373	.55046	.12974	3.0636	3.6110	2.29	4.21
3 Undecided	3	3.8333	.04124	.02381	3.7309	3.9358	3.79	3.86
4 Disagree	213	3.9765	.37634	.02579	3.9257	4.0274	2.29	4.93
5 Strongly disagree	106	4.4363	.34192	.03321	4.3704	4.5021	3.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.71 shows ANOVA results of the HAART adherence behavioural skills on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives.

Table 4.71 ANOVA results of respondents' HAART adherence behavioural skills on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.929	4	10.482	73.112	.000
Within Groups	49.320	344	.143		
Total	91.250	348			

The results show that there were significant differences in the HAART adherence behavioural skills on the basis of the level of frustration that respondents felt because they knew that they would have to take HIV medications for the rest of their lives.

4.3.2.4.1.1.5 HAART adherence behavioural skills and the extent to which patients felt upset because of the fact that HIV medications could affect the way they looked

Table 4.72 shows respondents mean HAART adherence behavioural skills and the extent to which patients felt upset because of the fact that HIV medications could affect the way they looked.

Table 4.72 Respondents' HAART adherence behavioural skills and the extent to which patients felt upset because of the fact that HIV medications could affect the way they looked

Q4 HAART adherence behavioural skills

HIV medications affect the way that I look.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	21	3.1667	.70759	.15441	2.8446	3.4888	2.21	4.57
2 Agree	41	3.8746	.41212	.06436	3.7445	4.0046	2.64	4.57
3 Undecided	22	3.8701	.26784	.05710	3.7514	3.9889	3.29	4.64
4 Disagree	189	4.0213	.40690	.02960	3.9630	4.0797	2.29	5.00
5 Strongly disagree	76	4.5113	.30818	.03535	4.4409	4.5817	3.36	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.73 shows ANOVA result of the respondents' HAART adherence behavioural skills and the extent to which patients felt upset because of the fact that HIV medications could affect the way they looked.

Table 4.73 ANOVA result of respondents' HAART adherence behavioural skills and the extent to which patients felt upset because of the fact that HIV medications could affect the way they looked

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	34.686	4	8.671	52.737	.000
Within Groups	56.564	344	.164		
Total	91.250	348			

The results show that there were significant differences in HAART adherence behavioural skills on the basis of the response of patients to the thought that HIV medications could affect the way they looked.

4.3.2.4.1.1.6 HAART adherence behavioural skills and the extent to which patients were upset because of the side effects of HIV medications

Table 4.74 shows the respondents' HAART adherence behavioural skills and the extent to which patients were upset because of the side effects of HIV medications.

Table 4.74 Respondents' mean HAART adherence behavioural skills and the extent to which patients were upset because of the side effects of HIV medications

Q4 HAART adherence behavioural skills

I am upset about the side effects of HIV.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	4	3.2679	.71041	.35520	2.1374	4.3983	2.29	3.86
2 Agree	44	3.4578	.60124	.09064	3.2750	3.6406	2.21	4.36
3 Undecided	16	3.8036	.20287	.05072	3.6955	3.9117	3.29	4.07
4 Disagree	210	4.0277	.37619	.02596	3.9765	4.0789	2.29	4.93
5 Strongly disagree	75	4.5533	.28574	.03299	4.4876	4.6191	3.50	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.75 shows ANOVA results for HAART adherence behavioural skills and the extent to which patients were upset because of the side effects of HIV medications.

Table 4.75 ANOVA result for respondents' HAART adherence behavioural skills and the extent to which patients were upset because of the side effects of HIV medications

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.955	4	9.489	61.247	.000
Within Groups	53.295	344	.155		
Total	91.250	348			

The results show that there were significant differences in the HAART adherence behavioural skills of the respondents on the basis of the extent to which patients were upset because of the side effects of HIV medications.

4.3.2.4.1.1.7 HAART adherence behavioural skills in relation to the worry that patients felt that HIV medications might harm their health

Table 4.76 shows the respondents' HAART adherence behavioural skills in relation to the worry that patients felt that HIV medications would harm their health.

Table 4.76 Respondents' mean HAART adherence behavioural skills in relation to the worry that patients felt that HIV medications might harm their health

Q4 HAART adherence behavioural skills

HIV medications will harm my health.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	11	3.2338	.83672	.25228	2.6717	3.7959	2.21	4.57
2 Agree	70	3.7888	.49269	.05889	3.6713	3.9063	2.43	4.86
3 Undecided	19	3.6654	.31321	.07186	3.5144	3.8164	3.00	4.07
4 Disagree	198	4.0920	.40924	.02908	4.0346	4.1493	2.29	4.93
5 Strongly disagree	51	4.5637	.28352	.03970	4.4839	4.6434	3.79	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.77 shows ANOVA results of respondents' HAART adherence behavioural skills in relation to the worry that patients felt that HIV medications would harm their health.

Table 4.77 ANOVA results of respondents' HAART adherence behavioural skills in relation to the worry that patients felt that HIV medications might harm their health

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	28.721	4	7.180	39.503	.000
Within Groups	62.528	344	.182		
Total	91.250	348			

The results show that there were significant differences in the HAART adherence behavioural skills of respondents in relation to the worry that patients felt that HIV medications would harm their health.

In conclusion, the results showed that the level of the HAART behavioural skill of respondents was significantly different on the basis of their levels of personal motivation to adhere to the HAART regimen. These findings are consistent with those in the study by Amico et al. (2005: 668) and Starace et al. (2006: 158).

4.3.2.4.1.2 HAART adherence behavioural skills and the social motivation of patients to adhere to the HAART dosage regimen

4.3.2.4.1.2.1 HAART adherence behavioural skills and the degree to which the patients' significant others encourage them to take their HIV medications

Table 4.78 shows the HAART adherence behavioural skills of respondents and the degree to which the patients' significant others encourage them to take their HIV medications.

Table 4.78 Respondents' mean HAART adherence behavioural skills in relation to the extent to which the patients' significant others encouraged them to take their HIV medications

Q4 HAART adherence behavioural skills

My significant others encourage me to take my ARV medication.	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1 Strongly agree	7	3.7143	.44607	.16860	3.3017	4.1268	2.79	4.07
2 Agree	33	3.8723	.64970	.11310	3.6419	4.1027	2.29	4.93
3 Undecided	2	3.5357	.35355	.25000	.3592	6.7123	3.29	3.79
4 Disagree	139	4.0719	.40920	.03471	4.0033	4.1406	2.29	5.00
5 Strongly disagree	168	4.0865	.55080	.04250	4.0026	4.1704	2.21	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

Table 4.79 shows ANOVA results of respondents' HAART adherence behavioural skills in relation to the extent to which the patients' significant others encouraged them to take their HIV medications.

Table 4.79 ANOVA result of respondents' HAART adherence behavioural skills in relation to the extent to which the patients' significant others encouraged them to take their HIV medications

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.651	4	.663	2.573	.038
Within Groups	88.599	344	.258		
Total	91.250	348			

The results show significant differences in the HAART adherence behavioural skills of respondents in relation to the extent to which the patients' significant others encouraged them to take their HIV medications. This finding is supported by Amico et al. (2009: 71) who demonstrated that the social motivation measured item was

significantly related to HAART adherence behavioural skills but was not significantly directly related to self-reported HAART adherence behaviour.

4.3.2.5 Objective 6: To explore the motivational factors to adhere to HAART impact on the self-reported HAART adherence behaviour of patients taking ARV drugs in the Adama district of Ethiopia

4.3.2.5.1 HAART adherence behaviour and the motivation of patients to adhere to HAART

4.3.2.5.1.1 HAART adherence behaviour and the personal motivation of patients to adhere to HAART

In this section, the researchers assessed the optimal and sub-optimal HAART adherence behaviour of respondents in terms of their personal motivation in order to find out whether there were any significant differences among those who were better motivated in comparison to those who were lesser motivated to adhere to their HIV medication dosage schedules.

Table 4.80 shows mean score of personal motivation to adhere to HAART in the context of sub-optimal and optimal HAART adherence behaviour.

Table 4.80 Optimal and sub-optimal HAART adherence behaviour and the respondents' personal motivation to adhere to the HAART schedule of dosages. (N=349)

HAART adherence behaviour	Personal motivation							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
1 <95% Adherence to ART	69	3.5651	.67557	.08133	3.4028	3.7274	2.00	4.82
2 >95% Adherence to ART	280	4.0713	.47871	.02861	4.0150	4.1276	2.29	5.00
Total	349	3.9712	.56006	.02998	3.9123	4.0302	2.00	5.00

The results showed that the personal motivation of those with a mean HAART adherence of <95% HAART adherence was 3.5651 while the personal motivation of those with a HAART adherence rate of >95% HAART was 4.0713.

Table 4.81 shows the ANOVA analysis of personal motivation to adhere to HAART with sub-optimal and optimal HAART adherence.

Table 4.81 ANOVA result of the respondents' personal motivation to adhere to HAART in the context of optimal and sub-optimal HAART adherence behaviour (N=349)

ANOVA

Q3 HAART adherence to motivation – personal motivation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.185	1	14.185	51.827	.000
Within Groups	94.972	347	.274		
Total	109.157	348			

The results show that there was a significant difference (p=0.000) in HAART adherence behaviour among those who were more optimally motivated to adhere to HAART compared to those who were less optimally motivated to adhere to HAART. This finding is in agreement with Fisher et al. (2006: 464) that state motivation to adhere to the HAART regimen had direct relationship with HAART adherence behaviour if the skill required for HAART adherence was not "complex". This finding is in contrast to those in studies undertaken by Amico et al. (2005: 669), Starace et al. (2006: 157) and Amico et al. (2009: 71), in which motivation to adhere to HAART was found to be directly related to HAART adherence behavioural skills but not directly related to HAART adherence behaviour. Wagner (2002: 606) states that high levels of HAART adherence motivation are strongly associated with better HAART adherence. Kalichman et al. (2001: 63) demonstrated that the women in their study who had lower levels of motivation to consistently take their HIV medications had a record of missing their HIV medications.

4.3.2.5.1.2 HAART adherence behaviour and extent of social motivation to adhere to HAART

This section assessed the social motivation of HAART adherence behaviour among respondents in the month prior to data collection.

4.3.2.5.1.2.1 HAART adherence behaviour in the context of active support from significant others to comply with the HAART regimen

Table 4.82 shows the frequency of HAART adherence behaviour among those who said that they had been actively encouraged by their significant others to take their HIV medications and those who said that they had not been actively encouraged by their significant others to take their HIV medications.

Table 4.82 The frequency of HAART adherence behaviour among those who said that they had been actively encouraged by their significant others to take their HIV medications and those who said that they had not been actively encouraged by their significant others to take their HIV medications (N=349)

Crosstab

			Q5 Did you miss any ARV dose?		
			1 <95% HAART adherence	2 >95% HAART adherence	Total
Q3_8 Most people who are important to me and know that I'm HIV positive support me in my taking of HIV medications.	1 Strongly agree	Count	2	5	7
		% of Total	.6%	1.4%	2.0%
	2 Agree	Count	10	23	33
		% of Total	2.9%	6.6%	9.5%
	3 Undecided	Count	0	2	2
		% of Total	.0%	.6%	.6%
	4 Disagree	Count	31	108	139
		% of Total	8.9%	30.9%	39.8%
	5 Strongly disagree	Count	26	142	168
		% of Total	7.4%	40.7%	48.1%
	Total	Count	69	280	349
		% of Total	19.8%	80.2%	100.0%

Table 4.83 shows Chi-square test of respondents' HAART adherence behaviour among those who said that they had been actively encouraged by their significant others to

take their HIV medications and those who said that they had not been actively encouraged by their significant others to take their HIV medications.

Table 4.83 Chi-square test of respondents' HAART adherence behaviour among those who said that they had been actively encouraged by their significant others to take their HIV medications and those who said that they had not been actively encouraged by their significant others to take their HIV medications

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.657[a]	4	.226
Likelihood Ratio	5.878	4	.208
Linear-by-Linear Association	4.418	1	.036
N of Valid Cases	349		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is .40.

The results show that there was no significant difference in HAART adherence behaviour between those who said that they had been actively encouraged by their significant others to take their HIV medications and those who said that they had not been actively encouraged by their significant others to take their HIV medications. This finding is supported by Miller et al. (2003: 515) who demonstrated that social support was not an independent predictor of HAART adherence. Golin et al. (2002: 759) were able to find no association between social support and HAART adherence. The finding of this study is also in agreement with those of Amico et al. (2009: 71), who report that their measurement of social motivation was significantly related to behavioural skill – but was not significantly or directly related to self-reported HAART adherence behaviour. This is contrary to the findings of Glass et al. (2006: 391) in the Swiss Cohort HIV study that concluded patients who have little or no social support are at an increased risk of non-adherence to HAART. Amberbir et al. (2008: [6]) also state that HAART adherence was common among those who enjoyed a significant degree of social support.

4.3.2.6 Objective 7: To determine the impact of HAART adherence behavioural skills on self-reported HAART adherence behaviour in the patients in this study who were taking ARV drugs in the Adama district of Ethiopia

4.3.2.6.1 The impact of HAART adherence behavioural skills on HAART adherence behaviour

This section assessed whether there was any significant difference between those with better behavioural skills and those with a lower level of behavioural skills and optimal and sub-optimal HAART adherence behaviour.

Table 4.84 shows the descriptive statistics that show how HAART adherence behavioural skills were related to the self-reported optimal and sub-optimal HAART adherence behaviour in the month prior to data collection.

Table 4.84 Respondents' mean HAART adherence behavioural skills on the basis of self-reported levels of HAART adherence behaviour (N=349)

HAART adherence behaviour	HAART adherence behavioural skills							
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound		Minimum	Maximum
1 <95% HAART adherence	69	3.6843	.66392	.07993	3.5248	3.8438	2.21	4.86
2 >95% HAART adherence	280	4.1399	.42241	.02524	4.0902	4.1896	2.57	5.00
Total	349	4.0498	.51207	.02741	3.9959	4.1037	2.21	5.00

The results showed that the mean HAART adherence behavioural skills for those with <95% HAART adherence rate was 3.6843 while the HAART adherence behavioural skills for those with >95% HAART adherence rate was 4.1399.

Table 4.85 shows the ANOVA analysis of the respondents' behavioural skills with HAART adherence behaviour.

Table 4.85 ANOVA result of HAART adherence behaviour with HAART adherence behavioural skills. (N=349)

ANOVA

Q4 HAART adherence behavioural skills

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.493	1	11.493	50.004	.000
Within Groups	79.756	347	.230		
Total	91.250	348			

The result showed that there was a significance difference (p=0.000) in HAART adherence among respondents a month before the data was collected with regard to HAART adherence behavioural skills. This finding agrees with those studies that used the IMB model of HAART adherence (Amico et al. 2005: 669; Starace et al. 2006: 157).

4.4 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 figures.

Chapter 5 concludes the study by drawing conclusions, discussing limitations and making certain recommendations for further research and practice in this field.

CHAPTER 5

Conclusions, limitations and recommendations

5.1 INTRODUCTION

The purpose of this study was to assess the level of adherence to ART in the Adama district of the Oromia region of Ethiopia on the part of adult HIV-infected patients and to identify the major factors that affected adherence to ART so that the result of the study could be used to address the challenges that patients experience and to encourage them to adhere strictly to HAART so that it can be optimally efficacious.

Although strict adherence to the dosage regimen of ARV drugs is critical for the success of HAART, few studies have been done in the Adama district to identify and assess the factors that affect the level of patient adherence to the HAART dosage regimen. Since the long term success of HAART is totally dependent on strict long-term adherence to the dosage schedules, the researcher used theoretical constructs derived from the IMB model, that originated in developed countries, to identify and assess factors affecting drug adherence among HIV-positive patients. By using the predictors associated with the IMB model, the researcher was able in this study to identify those factors that affect adherence.

In this chapter, the researcher draws his conclusions and identifies the limitations of the study before making various recommendations for practice and further research in the field.

5.2 FINDINGS

The findings that were obtained from this study are discussed below in the same sequence in which the objectives of the study were listed.

The objectives of the study were:

1. to assess the level of adherence behaviour among HAART patients who take ARV drugs in the Adama district of Ethiopia
2. to assess the effect of a variety of social and demographic variables on individual HAART adherence behaviour in the Adama district of Ethiopia
3. to assess the way in which information about ART and the importance of adherence to HAART schedules affect the behavioural skill and the ability of patients to be strict about taking their ARV drugs in the Adama district of Ethiopia
4. t o assess the impact of having adequate and sufficient information about ART on self-reported HAART adherence behaviour in the Adama district of Ethiopia
5. to assess the impact of motivation to adhere to the HAART dosage schedule has on the behavioural skills they enable patients to adhere to the HAART regimen as they take their ARV drugs in the Adama district of Ethiopia
6. to explore the impact of the motivation to adhere to the HAART regimen on their self-reported HAART adherence behaviour among patients who are taking ARV drugs in the Adama district of Ethiopia
7. to determine the impact of HAART adherence behavioural skills of respondents on their self-reported HAART adherence behaviour in the Adama district of Ethiopia

5.2.1 Objective 1: To assess the level of adherence behaviour among HAART patients who take ARV drugs in the Adama district of Ethiopia

5.2.1.1 Level of adherence behaviour

Out of the total number of respondents, 19.8% respondents took their HIV medications <95% of the time, while 80.2% of the respondents took their HAART medications for >95% within the 30 days preceding the study. Although this represents a better adherence rate than one finds in many other studies that had been conducted in various places throughout the world, it still indicates that a significant number of the population is sub-optimally adherent to HAART, and this poses a serious threat because when ARV medications are taken only intermittently, they develop an increasing ability to withstand the HI virus that negates the efficacy of the HAART regime in the future. This obviously poses an enormous threat to the overall health

status of individuals and of the community as a whole because the selection of ARV drugs that are available to patients in developing countries such as Ethiopia, are very limited indeed. Health care professionals who administer ARV therefore need to take urgent action in order to improve the level of optimal adherence among those who are currently receiving ARV medications.

5.2.2 Objective 2: To assess the effect of a variety of social and demographic variables on individual HAART adherence behaviour in the Adama district of Ethiopia

5.2.2.1 The impact of demographic factors on HAART adherence behaviour

5.2.2.1.1 HAART adherence behaviour and the age of patients

Out of the total number of respondents in the age group between 18 and 30 years old, 29 were HAART-adherent for <95% of the time while 91of them were HAART-adherent for >95%. Out of the total number of respondents in the age group of those age between 31 and 40 years old, 30 of them were HAART-adherent to HAART for <95% while 112 of them were HAART-adherent for >95% of the time. Out of the total number of respondents in the age group of those between 41 and 60 years old, 10 were HAART-adherent for <95% while 72 of them were HAART-adherent for >95% of the time. Of the total number of respondents who were 60 or older than 60 years old, none were HAART-adherent for <95% of the time, while 5 of them (the total number from the sample) said they were HAART-adherent for >95% of the time. All these figures reflect the self-reported dosage frequency in the 30 days prior to the study.

These results show that no significant differences were reported with regard to adherence or non-adherence in the various groups used for age classification in this study. This finding from the study suggests that there is no need to prepare a special campaign to address the particular age group among those who are being treated by HAART because there are no adherence problems that are specific to a particular group.

5.2.2.1.2 HAART adherence behaviour and gender

From the male respondents, 29 reported that they adhered to their HAART dosage schedule for <95% of the time while 101 of them reported that they adhered to the HAART schedule for >95%. From the female respondents, 40 reported that they adhered to their HAART for <95% of the time while 179 of them said they adhered to their HAART schedule for >95% of the time in the months preceding data collection.

The result showed that there were no differences in HAART-adherence that could be linked to gender differences, and that there was therefore no need to create a special message about HIV medication adherence that focused on gender differences.

5.2.2.1.3 HAART adherence behaviour and marital status

Out of the total number of respondents who were married in the sample, 35 self-reported that they adhered to HAART for <95% of the time while 131 of them self-reported that they adhered to the HAART schedule for >95% of the time in the month preceding data collection. Out of the total number of single respondents (i.e. those who had never been married, widowed or divorced) in the sample, 8 self-reported that they adhered to the HAART schedule for <95% of the time while 35 of them self-reported that they adhered to the HAART schedule for >95% of the time (the 30 days that preceded the data collection). Out of the total number of widowed respondents, 11 self-reported that they adhered to the HAART schedule for <95% while 60 reported that they adhered to the HAART schedule for >95% of the time in the month preceding data collection. Out of the total number of divorced respondents, 15 reported that they adhered to the HAART schedule for <95% of the time while 54 reported that they adhered to the HAART for >95% of the time (i.e. in the 30 days preceding the data collection).

These results show that there were no significant differences in the adherence behaviour with respect to marital status in this study and that there is therefore no need to create a special information campaign based on the marital status of those who are taking ARV medications.

5.2.2.1.4 HAART adherence behaviour and religion

From a respondents who were Christian, 66 of them self-reported a sub optimal HAART adherence of <95% while 248 self-reported an optional adherence rate of >95% adherent. From the respondents who were Muslim, 7 self-reported a sub-optimal HAART adherence rate while 29 reported an optimal adherence rate. Out of these three respondents whose religion was described in the survey as “Other” (i.e. they belonged to religions that were neither Christianity nor Islam), the HAART-adherence rate was optimal.

This analysis reveals the fact that there were no significant differences in the adherence behaviour between the members of different religions in this study. There is therefore no need to create a special religion-based message that will encourage people from and religions who are on the HAART schedule to abide by the medically recommended dosage schedules.

5.2.2.1.5 HAART adherence behaviour and levels of education

Out of the respondents who had no formal education, 11 were sub-optimally adherent to HAART while 48 were optimally adherent to HAART. Out of a group of respondents who had a primary education, 21 were sub-optimally adherent to HAART while 92 were optimally adherent to HAART. Out of the group of respondents who had a secondary education, 27 were sub-optimally adherent to HAART while 113 of them were optimally adherent to HAART. Out of the group of respondents who had a tertiary education, 10 of the respondents were sub-optimally adherent to HAART while 27 were optimally adherent to HAART.

These results show that there were no significant differences in HAART adherence rates and adherence behaviour that significantly correlates with levels of education (or no formal education at all). This indicates that so long as all patients truly understand the message about the importance of meticulously adhering to the HAART dosage schedule, their adherence rates are not affected by levels of education (or no formal education at all).

5.2.2.1.6 HAART adherence behaviour and occupation

Out of the 37 respondents who were government employees, 5 of them were sub-optimally adherent while 32 of them were optimally adherent to the HAART dosage schedules. Out of the 79 respondents who were employed in the private sector, 17 adhered sub-optimally to the HAART schedule while 62 of them adhered optimally to the schedule. Out of the 21 respondents who worked as non-governmental organization (NGO) employees, 4 were sub-optimally adherent while 17 were optimally adherent to the HAART dosage schedules. Out of the 80 respondents who were either self-employed or merchants, 17 were sub-optimally adherent while 63 were optimally adherent to the HAART dosage schedules. Out of the 41 respondents who were unemployed (jobless at the time of the interview), 12 were sub-optimally adherent while 29 were optimally adherent to the HAART dosage schedule. Out of the 6 respondents who were students, 3 were sub-optimally adherent while the remaining 3 were optimally adherent to the HAART dosage schedule. Out of the 13 “Other” respondents, 2 of them were optimally adherent while 11 were sub-optimally adherent to the HAART dosage schedule.

These results show that there were no significant differences in HAART adherence behaviour that can be significantly related to the various occupations of the respondents and their adherence behaviour. There is therefore no need to devise interventions that will target people in different occupational groups and those who are unemployed with specially designed messages that will encourage the meticulous HAART adherence behaviour that is indispensable for the long-term success and efficacy of HAART.

5.2.2.1.7 HAART adherence behaviour and monthly income

Out of the group of 126 respondents who received a monthly income of <200 birr, 30 were sub-optimally adherent while 96 were optimally adherent to the HAART dosage schedule. Out of the 140 respondents with a monthly income of between 200 and 600 birr, 23 were sub-optimally adherent while 117 of them were optimally adherent. Out of the 37 respondents with a monthly income of between 600 and 1000 birr, 8 were sub-optimally adherent while 29 were optimally adherent. Out of the 37 respondents with monthly income of between 1000 and 2000 birr, 7 were sub-optimally adherent while 30

were optimally adherent to the HAART dosage schedule. Out of the 8 respondents with a monthly income of >2000 birr, only 1 respondent was sub-optimally adherent while the remaining 8 respondents were optimally adherent to the HAART dosage schedule. The result indicates that there were no significant differences in HAART adherence behaviour among respondents that is affected by their monthly income. Since ARV medications are now freely available in Ethiopia, financial considerations exert no direct bearing on the ability of an HIV-positive person to purchase the necessary ARV medications.

5.2.2.1.8 HAART adherence behaviour and distance from the health care facility

Out of the 237 respondents who lived <20 kilometres from the health facility, 41 were sub-optimally adherent while 196 were optimally adherent to HAART. Out of the 52 respondents who lived between 20 and 50 kilometres from the health facility, 13 were sub-optimally adherent while 39 were optimally adherent to HAART. Out of the 33 respondents who lived between 50 and 100 km from the health care facility, 8 were sub-optimally adherent while 25 were optimally adherent to HAART. Out of the 27 respondents who lived more than 100 km away from the health facility, 7 were sub-optimally adherent while 20 of them were optimally adherent to the required HAART dosage schedule.

This result indicates that there were no significant differences in HAART adherence behaviour among respondents that was dependent upon the distance they had to travel from their homes in order to reach the health care facility. These figures indicate that both those patients who had to travel long distances to reach the health care facility and those who lived near to a their health care facility did not vary significantly with regard to their HAART dosage adherence behaviour and the journeys to the facility that they had to make in order to obtain their refills of medication.

5.2.2.1.9 HAART adherence behaviour and the ability to afford the cost of transport to the health facility

Out of the 322 respondents who said they could afford to pay for their transport to get to the health facility, 64 of them were sub-optimally adherent while 258 of them were optimally adherent to the required HAART dosage schedules. Out of the 26

respondents who said they could not afford to pay for the transport they needed to reach the health care facility, 5 were sub-optimally adherent while 21 were optimally adherent to the HAART dosage requirements.

This result shows that there were no significant differences between the respondents who could afford to pay the transport fees and those who could not afford to pay the transport fees and either optimal or sub-optimal HAART adherence behaviour. But this factor requires further research because the needs of patients may well be affected if they cannot afford to pay the transport costs that allow them to travel to the facility in order to obtain their refill of HAART medication. Although this study demonstrates that there was no difference in adherence behaviour between these two groups and although only a few of the respondents said that they could not afford to pay their transport costs to reach health facility for HAART refill, the needs of those who cannot afford transport need to be thoroughly investigated because, without transport, patients who live some distance away from the health care facility will be unable to obtain a refills in time – and this may well affect their adherence behaviour.

One may say, in conclusion, that with regard to objective 2, there were no significant differences in the adherence behaviour of respondents on the basis of the individual demographic factors of respondents. It is therefore may be unnecessary to address demographic and social variables during intervention that attempts to identify and eliminate obstacles and barriers that prevent optimal HAART appearance in population groups of this kind.

5.2.3 Objective 3: To assess the impact of knowledge about HAART and the importance of meticulous adherence to dosage schedules on the behavioural skills that are required by patients who take ARV drugs in the Adama district of Ethiopia

5.2.3.1 The extent of patient knowledge about ART and the impact that this makes on adherence behavioural skills that are necessary for adhering to HAART dosage schedules

5.2.3.1.1 Adherence behavioural skills and the influence of explicit information about HIV medications and their adherence requirements

The results of this study demonstrated that there were significant differences among respondents who possessed information about ART and those who possessed no information about ART and knowledge about how to take their HIV medications and the adherence behavioural skills that facilitate adherence to HAART. It is therefore important to educate patients in out to take their HIV medications if we wish to bring significant differences in the behavioural skills that they need to adhere meticulously to the requirements of the HAART dosage schedules.

5.2.3.1.2 Adherence behavioural skills and knowledge about what to do when a patient misses a scheduled dose or dosages of HIV medications

The results of this study show that there were significant differences between those who knew and those who did not know what to do when they missed a dose of their ARV drugs in spite of their HAART adherence behavioural skills. There seems to indicate that if an intervention can be designed to provide patients with the necessary knowledge about what they should do when they miss any dose of their ARV drugs, such knowledge would bring significant differences in their behavioural skills in adhering to their ARV medications.

5.2.3.1.3 HAART adherence behavioural skills and knowledge of the side effects of ARV drugs

The results obtained from the studies show that there were significant differences in the behavioural skills of those respondents who knew about the possible side effects of their HIV medications and those who did not know about the possible side effects of HIV medications in this study. This indicates that the behavioural skills that enable HIV patients to adhere to their ARV medications can be fortified by information about the side effects of HIV medications. A programme that educates HIV patients in this regard and consequently brings significant differences in their HAART adherence behavioural skills should form part of the routine interventions that strive to eliminate the obstacles to HAART adherence among patients who are being given ARV medications.

5.2.3.1.4 HAART adherence behavioural skills and the mistaken belief that it is OK for patients to miss dosages of HIV medication so long as they feel healthy

The results from this study showed that there were significant differences in the HAART adherence behavioural skills of respondents who believed and in those who did not believe that it was OK for them to miss dosages of their HIV medications so long as they felt healthy. This clearly indicates that all patients need to understand that missing HIV medications is highly undesirable (and ultimately dangerous and even lethal to them and to the whole community), and that all patients therefore need to improve their HAART adherence behavioural skills by understanding the consequences of missing dosages – even though they might not do so all that often. This emphasis should form an important part of the interventions that are designed to eliminate the obstacles that undermine correct HAART adherence behaviour.

5.2.3.1.5 HAART adherence behavioural skills and the knowledge that if HIV medications not taken as prescribed, they will not work effectively

The results of this study demonstrated that there were significant differences in the behavioural skills between those respondents who knew and those respondents who did not know that HIV medications will not work effectively if they are not taken in strict accordance with the required dosage schedules. That implies that patients have to

understand that HIV medications will not work effectively in the future unless they are taken as prescribed to bring significant difference in their adherence behavioural skill.

One may say, by way of conclusion, that the HAART adherence behavioural skills are significantly different among those who do have and among those who do not have the necessary knowledge about the crucial importance of ARV medications for their own long-term health and for that of the community at large.

5.2.4 Objective 4: To assess the impact of having correct HAART adherence information on self-reported HAART adherence behaviour among patients in the Adama district of Ethiopia

5.2.4.1 Knowledge about HAART and self-reported HAART adherence behaviour

5.2.4.1.1 HAART adherence behaviour and knowledge about how current HIV medications should be taken by patients

The results of this study showed that there were no significant differences in the HAART adherence behaviour of those who knew and those who did not know how to take their HIV medications. This seems to indicate that education alone may not be sufficient to eliminate the obstacles that prevent optimal HAART adherence behaviour.

5.2.4.1.2 Self-reported HAART adherence behaviour and the knowledge about what to do when dose(s) of HIV medications are missed

The results of this study indicated that there were no significant differences in the HAART adherence behaviour of respondents among those who knew and among those who did not know what to do when they missed a scheduled dose of ARV medications. It therefore seems as though education alone is not a vital factor in the HAART adherence behaviour of respondents when they miss their scheduled doses of HIV medications.

5.2.4.1.3 HAART adherence behaviour and information about the possible side effects of HIV medications

The results of the study show that there were no significant differences in the HAART adherence behaviour of respondents among those who knew and among those who did not know about the possible side effects of HIV medications. This means that information about the possible side effects of HIV medications alone does not seem to improve the HAART adherence behaviour of respondents.

5.2.4.1.4 HAART adherence behaviour and the patients' belief that it is OK to miss dosages of HIV medications so long as they feel well

The results of this study showed that there were no significant differences in the HAART adherence behaviour of respondents between those who believed and those who did not believe that it was okay to miss dosages of HIV medications from time to time provided they felt well (OK). That means educating on the myth that missing their HIV medications provided that they feel well (OK) will harm their present and future health prospects alone does not improve the HAART adherence behaviour of respondents.

5.2.4.1.5 HAART adherence behaviour and the knowledge that medications will not work in the future if patients do not take their HIV medications as prescribed by the HAART dosage regimen

The results of this study show that there were no significant differences in HAART adherence behaviour among those who knew and those who did not know that HIV medications would not work effectively as a therapeutic measure unless the medications were taken meticulously as prescribed. It was clear that the knowledge that the HIV medications would not work effectively in the future if they were not taken meticulously was insufficient to make a significant difference to the HAART adherence behaviour of the respondents.

In conclusion, one may state that the findings of this study showed that there were no significant differences in this research population in adherence behaviour on the basis

of whether patients knew or did not know about the way in which HAART works and the importance of strict adherence to the dosage requirements.

The findings that relate to objectives 3 and 4 in this study show that information (knowledge) about HAART and the importance of HAART adherence seems to have no direct effect on HAART adherence behaviour while it has direct impact on HAART adherence behavioural skill.

5.2.5 Objective 5: To assess the impact of motivation to HAART adherence on adherence behavioural skills that patients need in order to adhere to HAART dosage schedules in the Adama district of Ethiopia

5.2.5.1 The impact of motivation to HAART adherence behaviour on HAART adherence behavioural skills that patients need in order to adhere to HAART dosage schedules

5.2.5.1.1 Personal motivation to adhere to the requirements of ARV therapy impact on adherence behavioural skills of patients to adhere to the requirements of the HAART dosage schedules

5.2.5.1.1.1 HAART adherence behavioural skills in the light of the statement: "I am worried that other people might realize that I am HIV+ if they see me taking HIV medications"

The result shows that there were significant differences in the HAART adherence behavioural skills of respondents based in the degree of worry that they felt lest other people should realize that they were HIV+ if they were seen to be their HIV medications. This indicates that the level of worry that others might see them taking their HIV medications will have an impact on HAART adherence behavioural skills.

5.2.5.1.1.2 HAART adherence behavioural skills in the light of the statement: "It frustrates to take HIV medications because I have to plan my whole life around the dosage requirements of HAART therapy."

The results of this study show that there were significant differences in the HAART adherence behavioural skills of respondents in terms of the level of frustration they felt on account of the fact that they needed to plan their whole lives around the taking of their HIV medications. The results of this study show that it is important for respondents not to become frustrated by the necessity of having to plan their whole lives around the taking of their HIV medications because this will bring significant differences in their HAART adherence behavioural skills.

5.2.5.1.1.3 HAART adherence behavioural skills in the light of the statement: "I don't like taking HIV medications because they remind me that I am HIV+."

The results of this study show that there were significant differences in HAART adherence behavioural skills of respondents on the basis of whether or not they did not like to take their HIV medications because it reminded them of their HIV status. These results from the study show that interventions need to be devised so that respondents will be emotionally unaffected by having to take their HIV medications. A more positive attitude to taking HIV medications on the part of some patients will bring significant differences in their HIV adherence behavioural skills.

5.2.5.1.1.4 HAART adherence behavioural skills in the light of the statement: "It frustrates me to know that I will have to take HIV medications for the rest of life."

The results of this study show that there were significant differences in the HAART adherence behavioural skills of those respondents who were frustrated by the realisation that they would have to take their HIV medications for the remainder of their lives. These results from the study indicate that interventions are needed to address the problems of patients who become frustrated by the realisation that they will have to take their HIV medications for the rest of lives.

5.2.5.1.1.5 HAART adherence behavioural skills in the light of the statement: "It upsets me to think that HIV medications can affect the way that I look."

The results of this study show that there were significant differences in the HAART adherence behavioural skills of respondents who became upset because they felt that the HIV medications could affect their appearance. It is therefore important to make use of those ARV medications that are much less likely to affect the way that respondents look, and interventions are needed to enable patients to feel less upset about taking their HIV medications and the possible effect of these medications on their appearance.

5.2.5.1.1.6 HAART adherence behavioural skills in the light of the statement: "I am upset by the side effects of HIV medications."

The results of this study show that there were significant differences in the HAART adherence behavioural skills of those respondents who became upset because of the side effects of the HIV medications. It is therefore necessary to inform patients about the side effects of HIV medications in advance so that they will become less upset about the side effects of the HIV medications. If they are properly informed about the possible side effects in advance, this will bring significant difference in their HAART adherence behavioural skills.

5.2.5.1.1.7 HAART adherence behavioural skills in the light of the statement: "I am worried that the HIV medication may harm my health."

The results of this study show that there were significant differences in adherence behavioural skill of respondents who felt worried and didn't feel worried that the HIV medications would harm their health. It is therefore important to address the concerns of respondents who are worried that the HIV medications will harm their health. If this is done, it will bring significant difference in their HAART adherence behavioural skills of patients in general.

In conclusion, it should be said that interventions are needed to address the personal motivation of HIV+ patients to adhere to their prescribed HAART dosage requirements in order to bring significant differences in their HAART adherence behavioural skills.

5.2.5.1.2 HAART adherence behavioural skills and the effect of social motivation

5.2.5.1.2.1 HAART adherence behavioural skills and the support of significant others who encourage patients to take HIV medications

The results of this study show that there were significant differences in the HAART adherence behavioural skills among those respondents who received support from significant others and those that did not. That means that one needs to address the needs of that group of the HIV-positive who receive no support or encouragement to take their ARV medications to bring significant differences in their HAART adherence behavioural skills.

5.2.6 Objective 6: To explore the impact of motivational factors to the HAART dosage schedules adherence on self-reported HAART adherence behaviour of patients who are taking ARV drugs in the Adama district of Ethiopia

5.2.6.1 HAART adherence behaviour and motivation to adhere to prescribed HAART dosage schedules

5.2.6.1.1 HAART adherence behaviour and the personal motivation of patients to adhere to the HAART dosage schedules

The results of this study show that there were significant differences in the HAART adherence behaviour of those patients who were better motivated to comply with the HAART dosage schedules than they were in those patients who were less motivated to comply with the required HAART dosage schedules. This indicates that the motivation of individuals is important if they are to practise optimal adherence to the requirements of HAART. This study has therefore revealed that it is extremely important to invest effort in the motivation of patients so that they can adhere to their required dosage. It may be necessary to devise and present motivational sessions that will help less motivated patients to adhere to their HIV medications. That indicates that a number of creative interventions are required to increase the personal motivation of patients to adhere to the HAART dosage schedules, and such interventions should form part of the overall effort to improve HAART adherence.

5.2.6.1.2 HAART adherence behaviour and the social motivation to adhere to the requirements of the HAART dosage regimen

5.2.6.1.2.1 HAART adherence behaviour and the importance of the part played by the support and encouragement of significant others for patients who are taking ARV medications

The result of this study show that there were no significant differences in HAART adherence behaviour between those who said they received and those who said that they did not receive support and encouragement from significant others to take their HIV medications. In other words, the mere presence of social support to adhere to HAART didn't make any difference on HAART adherence behaviour directly.

The conclusions of objective 5 and 6 show that the personal motivation of patients to adhere to their HAART dosage schedules directly influenced the both HAART adherence behavioural skills and HAART adherence behaviour. However, social motivation only makes a difference to the HAART adherence behavioural skills but not to the making direct difference to HAART adherence behaviour.

5.2.7 Objective 7: To determine the impact of HAART adherence behavioural skills on self-reported HAART adherence behaviour of patients who are taking ARV drugs in the Adama district of Ethiopia

5.2.7.1 HAART adherence behaviour and the behavioural skills to adhere to HAART

The results of this study show that their adherence behavioural skills made a significant difference to optimal adherence behaviour to HAART in the month before the data was collected. This shows that patients who feel that they have the behavioural skills required to adhere to HAART will be significantly different to adhere to their HIV medications dosage schedule. According to the result of this study, it is therefore important to improve the adherence behavioural skills of patients so that they will be more likely to adhere to their HAART dosage requirements. The perceived efficacy of such patients that they have the skill to adhere to the requirements of the HAART schedule will also contribute to the removal of obstacles that undermine compliance

and will therefore improve HAART dosage adherence. That indicates that a number of interventions could be increased to improve the behavioural skills of patients and strengthen their perceived efficacy in the taking of their ARV medications. Once this has been done, they will be able to apply their skills to improve their compliance with HAART dosage schedules.

By way of summary, the first objective of the study was to assess the effect of having knowledge on ARV drugs and importance of adherence to it on adherence behavioural skill and adherence to HAART. Other objectives of this study were to assess the impact that personal and social motivation had on the levels of HAART adherence behaviour and HAART adherence behavioural skills. To assess the effect of HAART adherence behavioural skills on actual HAART adherence behaviour was one of the objectives of the study as well.

The results of this study show that knowledge exerted a significant effect on HAART adherence behavioural skills – but not on HAART adherence behaviour. A personal motivation to adhere to the requirements of HAART makes a significant difference both to the HAART adherence behavioural skills and to levels of HAART adherence behaviour while social motivation to adhere to the requirements of HAART makes a difference to levels of HAART adherence behavioural skills but not to actual HAART adherence behaviour. Adherence behavioural skills make a significant difference to HAART adherence behaviour.

It is therefore important to help patients who are being treated by HAART to obtain adequate and appropriate information because these create a difference in an individual's behavioural skills when it comes to HAART. The motivation provided by social factors should also be improved because it indirectly affects adherence behaviour by changing an individual's behavioural skills with regard to HAART adherence. A personal motivation to comply with the requirements of HAART can make a significant difference in the HAART adherence behaviour directly and it also exerts an indirect effect through behavioural skills that directly affects adherence behaviour. It is also important to develop both the objective skills of patients and the perceived self-efficacy of patients with regard to their adherence behavioural skills as HAART adherence behavioural skills brings significant differences in HAART adherence behaviour. Having appropriate knowledge as well as both personal and social

motivation for HAART adherence also brings significant HAART adherence difference by improving their HAART adherence behavioural skill.

5.3 LIMITATIONS OF THE STUDY

Because this study was conducted in only one health facility in Ethiopia, it would be problematic to attend to generalize the results of this research to the whole country. Even though the data was collected by making use of a structured questionnaire, one cannot discount the existence of a social desirability bias as well as a recall bias. Respondents may therefore not have reported their actual adherence rates accurately because they self-reported with information in interviews with their own health care providers. Another limitation is that a cross sectional study of this kind that addresses adherence behaviour in the month prior to the collection of data, may be problematic because it is accepted that adherence can vary considerably for different people at different times. A more accurate set of figures about adherence would be more likely to emerge from a longitudinal prospective study than from any cross-sectional studies. Self-reported adherence measurements are known to increase adherence rates. This might be one of the limitations of this study because the study did not make use of objective measures of adherence.

The study does, however, provide important information about a variety of factors that affect HAART adherence in the district in which the study was performed – despite all of its potential limitations. It also supplies important information about the current status of the level of optimal adherence behaviour in the Adama district of Ethiopia.

5.4 RECOMMENDATIONS

On the basis of the findings of this study, the researcher makes the following recommendations that might be useful for addressing the factors that impede adherence and a variety of other factors that might be useful in actual practice and for further research.

5.4.1 Practice

The IMB model asserts that adherence to HAART is determined by individual information about HAART, by a person's knowledge of the importance of adhering to the requirements of HAART, by the level of a person's individual motivation (whether merely personal or both social and personal) to adhere to the requirements of HIV medications, by the behavioural skills that are required to perform adherence-related tasks, and by the perceived self-efficacy that people have when they see themselves as having the necessary skills to adhere to HAART.

According to the IMB model, it is important to have information about ARV drugs and to know why it is important to maintain strict compliance with its dosage requirements. Although this knowledge may not exert a direct influence on adherence behaviour, it will exert through the acquisition of the necessary behavioural skills. The results of this study showed that the possession of the necessary information about ARV drugs and the importance of strict adherence to the requirements of the HAART dosage schedules, did not make any significant difference to adherence behaviour. But even though it did not make a direct impact on HAART adherence behaviour, it nevertheless remains important to give patients adequate information about their HIV medications and the importance of adhering strictly to their dosage schedules because this will have an effect on HAART adherence behavioural skills.

According to the model, the personal and social motivation of individuals to adhere to the requirements of HAART is an important determinant of HAART adherence behaviour. The result of the study showed that a personal motivation to adhere to HAART makes a significant difference both to behavioural skills and to HAART adherence behaviour while social motivation makes a difference to behavioural skills alone – but not directly to HAART adherence behaviour. It is therefore important to improve the personal and social motivation of patients so that they will adhere to HAART both before and after starting HAART. By implementing these measures, it might become possible to improve current HAART adherence levels.

The behavioural skill to adhere to HAART and the perceived personal efficacy of patients that they are able to adhere to HAART is another important component of the IMB model. This study also showed that HAART adherence behavioural skills make a

significant difference on HAART adherence behaviour. If one therefore wishes to remove the factors that impede adherence and to improve the level of adherence of patient adherence to HIV medications, it is important to increase both the necessary behavioural skills and the perceived self-efficacy of patients that they are able to adhere to their HIV medications by making use of a variety of creative interventions.

In this study, the demographic factors of respondents showed no significant correlation with their adherence behaviour. This tells us that when we attempt to address adherence barriers, it will be preferable for us to focus on supplying patients with appropriate information about ARV drugs and about the importance of HAART adherence while we also improve the patients' motivation and behavioural skill to adhere to HAART. We should give such efforts of priority over any attempt to focus on demographic factors in interventions that address barriers to adherence.

The HAART adherence level reported in this study (80.2%) is better than that reported in many previous studies. But it also indicates that significant numbers of people are still not taking their HIV medications as required. This poses a serious threat to both the community and to the individual because it is a possibility that these medications will develop resistance unless urgent measures are taken to improve the current levels of adherence behaviour.

5.4.2 Further research

Further research needs to be conducted on the following topics:

A. The factors that affect adherence to HAART in Ethiopia. But such a study will have to be undertaken in a different province so as to ensure that it will be more representative and so that the findings of both studies together might possibly be generalized to the larger situation that prevails in the country.
B. Levels of HAART adherence behaviour by making use of multiple methods of subjective and objective measures
C. Prospective (longitudinal) studies (or randomized, controlled intervention outcome research) to assess the level of HAART adherence and the factors that affect it

D. Factors that affect the level of adherence by objectively measuring the information, motivation and behavioural skills of patients who adhere to HAART
E. The effect of levels of adherence on health outcomes and vice versa
F. The effect of depression on HAART adherence behaviour
G. The levels of resistance to HAART in Ethiopia and its association with the subjective and objective measurements of adherence to HAART
H. The multivariate model testing of the information-motivation-behavioural skills (IMB) model of HAART adherence

5.5 CONCLUSION

This chapter concluded the study by discussing its limitations and by making a variety of recommendations on the basis of the results obtained from the study. These can be used to address the factors in the HAART adherence and they can also be used in further research that addresses levels of HAART adherence behaviour.

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Annexure

Annex A: Informed consent form

Annex B: Questionnaire

Annex C: UNISA application to conduct research

Annex D: Oromia health bureau application to conduct research

Annex E: Amharic translated informed consent form

Annex F: Amharic translated questionnaire

Annex G: UNISA Ethics Clearance letter

Annex H: Oromia health bureau ethics clearance letter (translated to English)

Annex I: Oromia health bureau ethics clearance letter (in Local language)

Annex J: Adama zone health office ethisl clearance letter (translated to English)

Annex K: Adama Zone Health Office ethics clearance letter (in local language)

Annex L: Adama hospital ethical clearance