CORRELATES OF ANTIRETROVIRAL THERAPY ADHERENCE AMONG HIV POSITIVE PATIENTS ATTENDING TREATMENT AND CARE SERVICES IN RUVUMA-TANZANIA

BY

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A Dissertation Submitted in Partial Fulfillment of the requirements for the Degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certified that he has read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled ***''Correlates of antiretroviral therapy adherence among HIV positive patients attending treatment and care cervices in selected health facilities in the Region of Ruvuma-Tanzania'.*** Presented for partial fulfillment of the requirements for the degree of Master of Public Health of the Muhimbili University of Health and Allied Sciences.



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Date.....9th NOV 2009

DECLARATION

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I Johnson Mali Yokoyana declare that this dissertation is my original work and has not been accepted for any degree in any other college or university.

Candidate's signature.....

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DEDICATION

This work is affectionately dedicated to my beloved daughter, Hope Nakamya Johnson who has always been my joy even during the difficult times

ABSTRACT

Since the introduction of free antiretroviral therapy in 2004, a country has witnessed a significant decrease in HIV associated morbidity and mortality for most of the patients who otherwise regarded themselves as on death sentence. However antiretroviral therapy adherence poses great challenges not only to patients but also to whole health care system.

An analytical cross sectional study was conducted to assess the level of antiretroviral therapy adherence and also to assess the sociodemographic and some psychosocial factors associated with ART adherence (as the dependent variable) in the region of Ruvuma. The study was carried out in mid July 2009 and involved a sample of 240 HIV positive patients receiving antiretroviral drugs in selected four HIV treatment and care clinics. Data were collected using a structured questionnaire with both closed and open ended questions. Antiretroviral therapy adherence was assessed based on proper dose taking, correct timing and appointment schedules adherence criteria. The three criteria were used to obtain the composite adherence.

The results revealed that the adherence rate was 95% although 32% of the respondents were not adherent. Long distance from CTC site was found to have significant effect on adherence (B 10, 95%CI 3.748-30.648). Other factors found to have significant effect on adherence were low service satisfaction, alcohol use and non status disclosure.

The study recommends the improvement of ART services in terms of bringing services closer to clients, encouraging status disclosure and prohibiting use alcohol as these were among most significant factors prohibiting good ART adherence.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral
CTC	Care and Treatment Clinic
DED	District executive director
HAART	Highly active antiretroviral Therapy
HIV	Human immunodeficiency virus
ICAP	International centre for AIDS care and treatment program
MEMS	Medication event monitoring system
MUHAS	Muhimbili university of health and allied sciences
NACP	National AIDS Control program
PI	Principal Investigator
PLWHA	People living with HIV and AIDS
RA	Research assistant
RAS	Regional Administrative Secretary
RHMT	Regional Health Management Team
UNAIDS	United National Program on HIV and AIDS
VAS	Visual assessment system
WHO	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the problem

It is estimated that 33.2 million people live with Human Immunodeficiency Virus (HIV) worldwide, 6,800 persons become infected with HIV and over 5,700 persons die from Acquired Immunodeficiency Disease Syndrome (AIDS) daily mostly because of inadequate access to HIV prevention and treatment services (UNAIDS/WHO, 2007). Sub-Saharan Africa remains the most seriously affected region of the world as AIDS has remained the leading cause of deaths (UNAIDS/WHO, 2007). Although sub-Sahara Africa has 10% of the world population it is a home for almost two thirds of the global total number of people living with HIV and AIDS (NACP, 2008a).

The first cases of HIV in Tanzania were reported in 1983, since then the epidemic has been on rapid spread in all districts affecting all segments of the society. In 2003 over 1.8 million persons were estimated to be living with HIV and AIDS and a total of 800,000 cumulative cases of HIV had already been reported to the National AIDS Control Program since 1983 when the first three cases were reported (NACP, 2005). About 5.7% of Tanzanians are estimated to harbor the HIV virus and AIDS is estimated to be the 2nd killer disease next to Malaria.

Until 1995, treatment for HIV-1 infection consisted mainly of single drug or dual-drugs therapy regimens that provided limited success (Marvin, 2003). Later the combination therapy consisting of three or more ARV drugs also known as Highly Active Anti Retroviral Therapy

(HAART) was introduced. This was seen as a break through as it led to reduction of mortality and improving the quality of life for HIV patients with access to the medication (Tadio and Davey, 2006). These drugs have transformed the disease from nearly universally fatal and catastrophic illness to what is now often a manageable chronic illness for those who can access the drugs (Alemayehu et al., 2008).

In the national health policy, HIV has been given a special consideration among other infectious diseases. It is clearly stated that the country will continue providing care of HIV and AIDS at the facility and community level. This is to include the provision of antiretroviral drugs and management of opportunistic infections (MOH&SW, 2007). With the estimates of 600,000 people in need of ARV out of estimated 2,636,785 Tanzanians living with HIV, the country had the operation plan of having 400,000 of eligible patients provided with ARV by the end of 2008 (NACP, 2008b).

The ART program in Tanzania started in 2004, and Tanzania was among few countries in sub Sahara Africa which took a lead in initiating a free ARV program through its five years comprehensive "National HIV/AIDS care and treatment plan 2003-2008" (Nduhura, Nanjakululu, Wasai and Bajenja, 2006).

The National AIDS control program (NACP) is an organ within the ministry of health which is responsible for overall coordination of HIV and AIDS treatment and care activities with the support of development partners, Non governmental organizations and Faith based

organizations. The NACP also is responsible to formulate guidelines, protocols and coordinating trainings for human resources required for treatment and care activities. By the end of 2007 a total of 172,736 HIV infected individuals had already been enrolled on ART and 136,700 were already started on ARV in 152 health facilities countrywide (NACP, 2008b). In July 2008 the ministry health announced its new plan of achieving a target of 440,000 by 2010 (AFRICA news, 2008). The ministry had to set this new plan following the failure of achieving the first plan of attaining 400,000 patients on ARV by end of 2008.

The first four years of implementation of HIV treatment and care has reported some achievements in terms of increased coverage, number of patients accessing services, staff capacities and infrastructure of the health systems (NACP, 2008a). The program has reported among the other challenges, the decreasing proportion of patients alive and still on ART at month 6, 12, and 24 following initiation of treatment. The reason mentioned for this situation includes, underreporting, poor clinic visits (adherence), attendance of different clinics without referral, lost to follow up and non attendance due to satisfactory recovery ,low family support and poor community environments (NACP, 2008a., Roura, 2009)

Lack of strict adherence to ARV drugs is considered to be one of the key challenges to AIDS care worldwide. Estimates of average rates of adherence with antiretroviral therapy ranges from 50%-90% (Sheri et al., 2003, Henry, 2005). The risks associated with non adherence are extensive at both individual and societal level (Chesney et al., 2005)

Successful long-term treatment of HIV and AIDS requires at least 95% adherence to combination ARV drug therapy in order to prevent emergence of drug-resistant HIV variants that lead to regimen failure and limit options for future therapy (Chesney et al., 2005, Rachel, 2008). Factors associated with sub optimal ARV adherence are diverse and this necessitates a multidisciplinary approach in order to enhance adherence among our patients. Tanzania like most of the other HIV devastated countries in sub-Saharan Africa strives to increase access of the drugs to more of its patients in desperate need of it. As the exercise of getting more patients on treatment with ARV continues, a better understanding of adherence and its determinants is important as this in turn will be reflected in Antiretroviral therapy adherence intervention programs

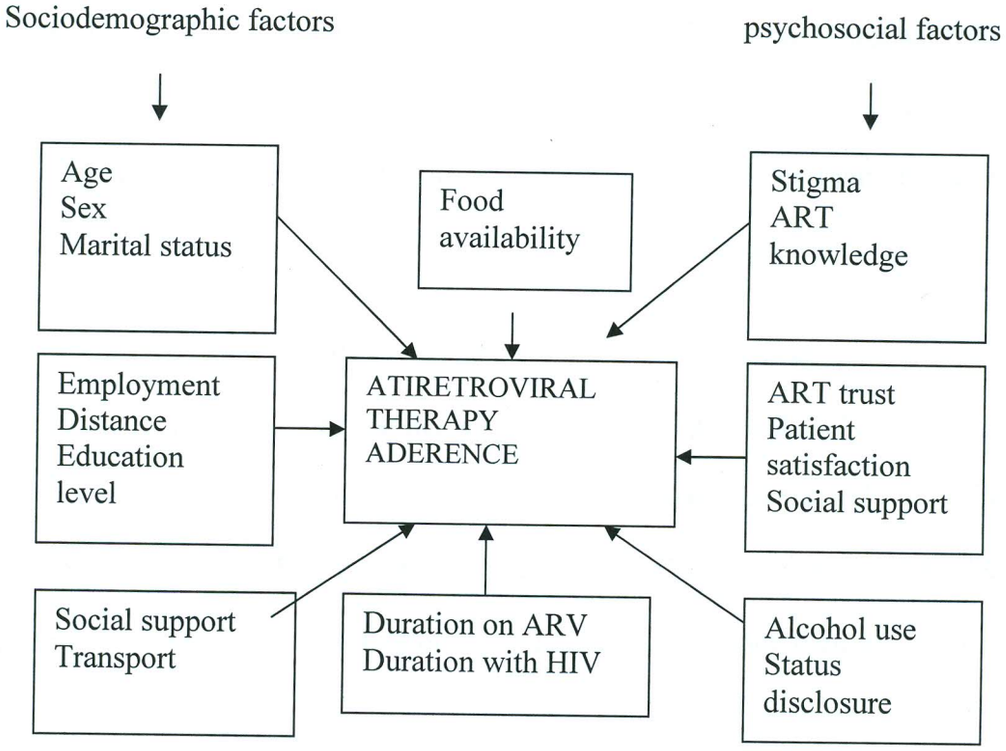
1.2 Problem statement

There has been a marked increase of HIV positive patients accessing ARV drugs over the past five years and scaling up of these services to more patients is on the national agenda (MOH&SW/NACP, 2008). Poor adherence to antiretroviral therapy remains a big challenge facing HIV/AIDS management efforts.

There is limited literature on ART adherence in Tanzania. Studies which attempted to investigate adherence in the country reported adherence rates ranging from 75% to 93% (Mugula, 2008., Irunde et al., 2005). These rates are relatively lower than the recommended adherence level of 95% and above although higher compared to most studies done in other countries (Marvin, 2003. Mills, 2006).

The gap with existing knowledge on ART adherence in the country is that most of these studies have been conducted in regions which are relatively better in terms of resources and other aspects. No evidence of such a study being conducted in a disadvantaged and very resource limited region like Ruvuma. Although the process may be the same throughout the country, patient characteristics which are important determinants of ART adherence are likely to differ due to different geographical locations and circumstances. So this study was conducted to investigate the extent of adherence and patient related factors that are associated with poor ART adherence in Ruvuma region.

1.3 CONCEPTUAL FRAMEWORK



1.4 Research questions

1. What is the ART adherence rate among adults living with HIV/AIDS in Ruvuma region?

2. What are sociodemographic and psychosocial factors associated with ART adherence?

1.5 Significance of the study

Assessment of adherence level and identification of the factors affecting it in a priority order is important as this increase our understanding of the factors affecting adherence most in the region. This will add up on the adherence literature which is still limited in the country. Also the knowledge gained will be used to influence health policies particularly those which aims at achieving maximum success of antiretroviral therapy to our patients.

As adherence is not a one day event the results obtained will provide a new insight on how ART adherence intervention strategies could be strengthened and modified. These will be incorporated into routine practices of health care providers particularly those in treatment and care clinics i.e. the ART counselors when assessing ART eligibility or when dealing with HIV patients who are already enrolled on ARV in order to enhance their ability of adhering to the prescribed medication.

1.6 Study objectives

1.6.1 Broad objective

To assess the antiretroviral therapy adherence and its correlates among HIV positive patients attending care and treatment clinics (CTC) in selected health facilities in Ruvuma region.

1.6.2 Specific objective

1. To assess the level of antiretroviral therapy adherence among the study participants.

2. To determine the association of sociodemographic factors (age, sex, education, occupation and marital status) and adherence among the study participants.

3. To assess the association of psychosocial factors (alcohol use, stigma experience, HIV status disclosure, services satisfaction, trust in ART, ART related knowledge and social support) and ART adherence among the study participants.

4. To determine the influence of food availability on adherence among the study participants

5. To study the effect of duration of HIV infection on ART adherence among the study participants

6. To determine the effect of distance from health facility on ART adherence among the study participants.

7. To investigate the reasons for poor ART adherence among the study participants

CHAPTER TWO

2.0 Literature review

2.1 Antiretroviral drug therapy adherence

Adherence to ARV drug therapy is a key factor for successful management of HIV and AIDS (Battaghon, 2007). Five years following the discovery of HIV in 1982, treatment strategies started (Piacent, 2006). Early regimens of HIV treatment consisted of one or two drugs which often led to treatment failure. The advent in 1995 of highly active antiretroviral therapy, which consist of at least three or more agents of ARVs made a dramatic improvement in a number of patients in terms viral load, improved CD4 counts

and improved survival (Piacent, 2006). This has transformed the disease from a often used to be seen as a dead sentence (HIV infection) to a chronic manageable condition for a significant proportion of people living with HIV (PLWH) with access to the treatment (Alemayehu et al., 2008).

ARV therapy is lifelong exercise which requires patience acceptance and high degree of commitment to follow the medical instructions. Adherence levels of > or =95% are required to maintain virological suppression. However, actual adherence rates are often far lower; most studies show that 40% to 60% of patients are <90% adherent (Bartlett, 2002, Mills, 2006). Missing even a few doses of drugs can cause treatment to fail and opportunistic infections or drug resistance to develop (International HIV and AIDS Alliance, 2006). In a study conducted by Fielden and his colleagues, it was found that sub-optimal adherence among HIV infected

patients taking ARV drugs was an important predictor of future hospitalization (Fielden et al., 2006).

2.2 Rate of adherence

Adherence to antiretroviral is contained within a continuum of total doses, frequency and timing (Fauci et al., 2000). Good adherence is defined as taking one's medicine as prescribed and agreed between the patient and provider. Poor adherence includes missing doses completely as well as taking drugs inappropriately (taking doses at the wrong times or not adhering to dietary requirements associated with a drug) (Knobel et al., 1998, Waters and Nelson, 2007).

Different studies have reported varying average levels of adherence in different populations. In a study which was conducted in cities of Dar es salaam and Arusha, ARV drugs adherence of 90% was noted among the study participants (Christopher et al., 2005 Talam et al., 2008). While in study done in Botswana (Sheri et al., 2003) the rate of adherence reported was 56%. Sub optimal ARV drugs adherence is reported to be a worldwide problem. In a comparative study, comparing adherence between African countries and North American countries, adherence of less than 90% was reported in both sides although African countries study showed greater adherence rate as compared to their counter part in northern America (Mills, 2006).

2.3 Factors associated with ARV drugs adherence

2.3.1 Sociodemographic factors

Studies reports contradicting information regarding the role of sociodemographic factors on adherence. A research by Grieson et al (2000) and Will (2006) illustrated that age, social support; Education level and sex were associated with ARV drug adherence. However, in another study (Talam et al., 2008) sex was found to have no influence on drug adherence. In his study, Joseph (2006) reported that occupation, level of income, family cohesion and perceived quality of services were among the factors with strong association with ARV drug adherence, and no significant difference was found between sex. In a study by Marcie and his colleague (2006) they found that among other factors male gender was significantly associated with good drug adherence. No study was found to have investigated about the association between marital status and adherence.

2.3.2 Psychosocial factors

More consistent association is reported to exist between certain psychosocial factors and drug adherence behavior. The commonly reported non adherence predicting psychosocial factors includes depression, active drug use or active alcohol use, stressful life events and lack of social support (Gordillo et al., 1999, Haubrich et al., 1999, Holzermer et al., 1999). In a study by Miller et al 2003, it was agued that antiretroviral drug dosing knowledge is another very important adherent factor and it tends to improve with time following drug initiation.

Good provider patient relation has been reported by a number of studies to enhance adherence (Jan, 2004, Altice et al., 2001). Treatment of HIV infection has shown that patient-provider collaboration can result in the selection of a lifestyle-tailored regimen characterized by convenient dosing, low pill burden, and tolerable side effects that enhances adherence, effectiveness, and the patient's willingness to remain on anti-HIV therapy on long term (Chesney, 2007).

2.3.3 Disease characteristics

Disease characteristics which include the stage and duration of HIV infection, associated opportunistic infections, and HIV-related symptoms, have been described by some studies to be associated with ARV drug adherence (Wagner, 2002., Holzermer et al., 1999)

2.3.4 Clinical setting

Aspects of the clinical setting that may influence adherence include access to ongoing primary care, involvement in a dedicated adherence program, availability of transportation, pleasantness of the clinical environment, convenience in scheduling appointments, perceived confidentiality, and satisfaction with past experiences in the health care system (Chesney, 2000)

However for the purpose of this study only the sociodemographic and psychosocial factors in relation to ARV drugs adherence will be investigated.

2.3.5 Assessment of ARV drugs adherence

Medicine adherence is commonly measured by employing a number of methods alone or in combination .This is reflected in the fact that there is no gold standard by which to measure adherence. Methods used in research and clinical set up to measure adherence include.

2.3.6 Medication event monitoring system (MEMS Caps)

This method utilizes a computer chip embedded in a specially designed pill bottle cap to record the time and duration of each bottle opening (Arnsten et al., 2001, McNabb et al., 2001). It is mentioned to be the most sensitive method to detecting non adherence, although a number of limitations to the accuracy and practicability of the system restrict its use. For our settings this method is not practicable.

2.3.7 Pill count

Done in a clinic or at unannounced home visit. Calculated by counting the remaining doses of medication and assuming that the remaining pills in excess of what is expected represent missed doses (Liu et al., 2001). Although this method is more accurate, it does not suit for this study because in most of the CTC clinics, patients do not bring the remaining doses of drugs when they visit clinics for drug refill, and given the resources available and time unannounced home visit can not be achieved.

2.3.8 Biological markers

This involves measuring the plasma concentration of ARV drugs (Liu et al., 2001)

2.3.9 Pharmacy refill data

These data serves as an adherence measure by providing information on which antiretroviral drugs were dispensed. In cases when refill are not obtained in a timely fasion,it is assumed that the patient is not taking medication between refills or is missing doses in a way that allows the medication to last longer than it should (Steiner, 1997., Turner, 2000) In one study it was demonstrated that patients who were adherent to ART, as measured by consistent pharmacy refills for > 4 months were significantly more likely to achieve virological control and benefit immunologically than were less adherent patients (Maher et al., 1999). This study will employ this method as one of the two methods which will be used to measure adherence. However instead of using the pharmacy records the patient CTC one card will be utilized to obtain the refill data.

2.3.10 Patient self report

This method is relatively simple and effective in assessing adherence especially in clinical practice. However this method is mentioned to be less sensitive when compared with to objective measures e.g. MEMS Caps and Pill count, it is because patients tend to overestimate. This is demonstrated in a study which was done by Liu et al, 2001 in which average adherence was found to be 93% by self report, 83% by pill count and 63% by MEMS Caps. Despite the weakness of self report method it still widely used.

Self-reported adherence measurement more accurate generally involve creating a more comfortable and trusting situation in which patients can honestly report non adherence, as

discussed above. Other ideas include having the adherence assessment performed by a "neutral" person, such as a clinic aide.

2.4 Self-Reported Adherence Assessment Tool

(Adapted from Chesney et al., 2000)

2.4.1 Introductory statement

Make a statement acknowledging that difficulties taking antiretroviral are common and inevitable at some point in treatment. State that one role of the clinician is to help identify these difficulties and try to make it easier for the patient to take the medication. The following is one example among many that can be used.

Taking pills every day is really hard. Most people have problems taking their pills at some point during treatment. I am going to ask you about problems that you have had taking your pills. Please feel comfortable telling me about pills you may have missed or taken late; I am asking because I want to make it easier for you to take them.

2.4.2 Confirm understanding of Regimen

Using a visual aid, such as a chart that shows color images of the available antiretroviral pills; ask the patients which medications they are taking. For each of the indicated pills, ask how many and exactly how often they are taking them. Ask if they have special instructions for any of the pills, such as dietary restrictions or extra fluid requirements. If any answers are

incorrect, it is important at this time to focus on clarifying the regimen prior to completing the adherence assessment.

2.4.3 Assess Adherence

Ask the patients about their adherence over the past 3 days, 1 day at a time. Start with the day prior to the interview (ie, yesterday) and ask them how many of their pills they had missed or taken late that day. Then ask about the 2 days prior to that, addressing each day separately. Next, ask about how many doses they had missed or taken late over the past 7 days and 30 days. If they report no missing doses, ask them how long it has been since a dose was missed. Alternatively, a VAS can be used to assess recent adherence using a more simple visual scale.

2.4.4 Ask about reasons for missing Doses

For patients that report missing any dose, ask them if they know the reasons why. Prompt them if they cannot offer an explanation. Common reasons why people miss medications include simply forgetting, being away from home, being too busy with other things, a schedule change, too many side effects, feeling sick or depressed, and running out of pills.

2.4.5 Ask about medication side Effects or Other Problems

Ask the patients about medication side effects or other problems that they may be experiencing. Prompts can be offered, such as asking about nausea, diarrhea, and difficulty swallowing the pills, headaches, fatigue, depression, or any other physical or emotional complaints.

2.4.6 Collaborate with the Patient to Facilitate Adherence

Reassure the patients again that problems with adherence are common. Explain that your concern is based on the fact that missing more than 5-10% of the doses in a month (eg, more than 3-6 doses a month in a twice-daily regimen) can lead to the medications not working well anymore, and that missing less than this would be a good goal. Take seriously all complaints about side effects or other physical or emotional problems and address them concretely. Offer suggestions to overcome specific obstacles the patients may have mentioned, such as the use of a watch alarm, medication organizer, extra packages of pills at work or in the car, or an unmarked bottle for enhanced privacy. Ask the patients if they have any ideas of their own to make it easier to take the medications. Finally, do not worry if the problem cannot be solved immediately; uncovering a problem with adherence is an important accomplishment and solutions to it can evolve in subsequent visits.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

This was a cross sectional study. The study was conducted from June to mid July 2009. Quantitative methods were used in the study. This design was chosen to enable the researcher to meet the main objectives of the study which were first to be able to determine the extent of adherence to antiretroviral drugs and second to determine the factors associated with antiretroviral drug adherence.

3.2 Study Area

The study was conducted in randomly selected health facilities providing ART services in Ruvuma region. The region is part of the Tanzania mainland where HIV Antiretroviral treatment program is also being implemented.Geographically Ruvuma is located at the most south western part of the country. The study area was selected on basis that the region is generally among the regions in the country with highest HIV prevalence rate. Ruvuma region was among the 6 regions with highest prevalence during the President Kikwete HIV testing campaign conducted in 2007 (MOH/NACP-AIDS NEWS, 2008). Also the region represents the areas of the country that are disadvantaged with very limited resources. Ruvuma and other regions of similar characteristic has had received little attention by other researchers who conducted related studies in the country. These factors gave justification for this study to be done in Ruvuma as they were directly assumed to affect patient characteristics which indirectly could affect adherence.

The region has a total population of 1,233,325 and the annual population growth is 2.5% (2002 population and housing census). According to the Regional health management team (RHMT) –Annual Health Report of 2007/2008 the HIV prevalence in the region stands at 7% and approximately 11,000 patients are already enrolled on ARV drugs. The region has a total of 219 health facilities including hospitals, health centers and dispensaries. Only 28 (13%) of all health facilities provides CTC services, the 8 sites started providing ART services earlier in 2004 and 2005. The rest of the sites are new sites and started providing ARV recently in 2008. Random sampling procedure was employed to select 4 health facilities out of 28 health facilities providing treatment and care services in the region to be used as study sites.

3.3 Study population

The study targeted HIV positive adult patients who ware on antiretroviral therapy and attending treatment and care cervices in the selected hospitals with CTC sites. Adult male and female patients with age from 18 years and above were involved in the study.

3.4 Inclusion criteria

-Adult HIV positive patients 18 years and above

-Willingly accepted to be involved in a study

-Patient on ARV therapy for not less than 6 months

-At least six months on ARV for reason that, it was assumed that at this period the patient already had gained much experience on the drugs and thus could give most of valuable information relevant for the study.

3.5 Sampling and sample size

Sample size was determined based on the following formula (Kothari, 2008)

$$n = \frac{z^2 p(100-p)}{\varepsilon^2}$$

Where n = the required minimum sample size

p = estimated prevalence of optimal ARV adherence, estimated to be 90% based on the study done in the regions of Dar as Salaam and Arusha (Irunde et al., 2005)

ε = margin of error on p (set at 4%)

z = standard normal deviate corresponding to 95% confidence level (=1.96)

$$n = \frac{1.96^2 \times 10\,(100-10)}{4^2}$$

n =216

Then 10% was added for those who would not attend the clinic or could reject to get involved in the study, thus 220 x10/100 =22

Total sample size 216 + 22 = 238, approximated at 240

A multistage sampling was employed. First by selection of four health facilities out of twenty eight and second the selection of 240 participants from the selected four health facilities. This

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was achieved first by obtaining the total study population (N) which meet the inclusion criteria during the period of the study, then the study units from each selected health facility were determined based on a single proportion (determined by study population from all study health facilities and the desired sample size i.e. n/N X100). Then this proportion was applied to each selected health facility to determine the number of patients to be involved in the study.

The sampling interval was calculated by (k = N/n). On each clinic day the list of patients expected to attend was obtained, the first patient was determined from k units by doing simple random sampling then every k^{th} patient was to be selected from the clinic day list for interview.

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3.6 Data collection techniques, scales and tools

The study used quantitative methods in data collection. Data were collected using semi structured questionnaire with both closed and open ended questions. The tool was designed to collect information on socio demographics data such as age, sex, marital status, education, occupation status, income, food security and length of time since diagnosed HIV positive, duration since stated started treatment and distance from health facilities) and some psychosocial factors identified as important for the study such as alcoholism, patient satisfaction, social support, HIV status disclosure, ART related knowledge and uncertain of ARV effectiveness (Questions were written in English; afterward translated in Kiswahili language prior so as to ensure that the questions are clear and easily understood to the participants. The questionnaire had four sections on:

- Background and sociodemographic information

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- Adherence status information
- Psychosocial characteristics in relation to ART adherence
- ART related knowledge

3.7 Dependent variable

ART adherence

3.8 Independent variables

Age, Sex, Marital status, Education, Distance from health facility, Social support, Occupation, Patient satisfaction, alcohol use, patient trust in ARV, ART related knowledge, stigma , Duration since tested HIV positive and duration on ART, Food availability and status disclosure.

3.9 ART adherence scale

Self report adherence (pill taken and correct use or proper timing) and patient attendance of drug refill appointment schedules methods were used together to give the composite adherence. The disadvantage of the self report method is that, it can overestimate adherence level due to recall bias and motivation factor to the interviewer.

The following ART adherence level scale was used to determine adherence status

1. Dose taking adherence scale

(i) Missed doses over the last 3 days

(ii) Missed doses in last 7 days

(iii) Missed doses in the past 30 days

Then dose taking adherence was calculated by

$$\frac{\text{Number doses prescribed in a month - Total Number of doses missed in 30 days} \times 100}{\text{Number of doses prescribed in a month}}$$

Missed doses in 30 days involved cumulative missed doses in 3, 7 and the other days in a month

- Adherent: if 95% or more of the prescribed doses taken
- Non adherent: if less than 95% of prescribed doses taken
- Reason for missing doses.....

2. Correct use adherence scale

Respondents were asked to report

(i) Doses not taken in proper time in past 3 days

(ii) Doses not taken in proper time in past 7 days

(iii) Doses not proper time over the past 30 days

The proper use adherence was calculated by formula

$$\frac{\text{No of Doses prescribed in 30 days - No of doses not taken in proper time in 30 days} \times 100}{\text{No of doses prescribed in a month}}$$

- A patient was considered adherent if 95 % or more of the prescribed doses taken in proper time
- A patient was considered non adherent if less than 95% of prescribed doses taken as late

- Reasons for not taking drug in time.....

3. Medication refill appointment schedule scale

Patient CTC 1 Cards were used to provide information on how the patient followed the the appointments in the last six months.

The appointment schedule adherence determined by

Number of appointments in 6 months

Number of appointment missed or not done in a desired fashion

If no visit missed 100% (Adherent)

If one visit missed 95% (Adherent)

If two or more visit missed 85% Adherent

-Reason for missed appointments.....

Then the combination of the three adherence measures provided the average or composite adherence for each individual respondent.

3.10 ART knowledge scale

ART related knowledge was assessed by asking the respondents a set of questions aiming at obtaining the patients understanding regarding ARV drugs, after marking the responses, the scores obtained by the participants were graded as follows

- Those who scored 80% and above were considered to have -High knowledge
- Those who scored 50%-70 % were considered to have – moderate knowledge
- Those who scored 0-40% were considered to have low knowledge

Then these scores were computed against the level of adherence to obtain the relation between the two variables.

Status disclosure, alcoholism, patient satisfaction, social support and uncertainty of ART effectiveness were assessed by asking questions with YES and NO options and addition one or more questions which probed how each item influenced the patient's ability to adhere to the ARV drugs as prescribed. Then the results were computed against the dependent variable (Adherence) to obtain the association. The same way for assessment of sociodemographic factors and how do they relate with the dependent variable. To assess the commonly mentioned factors for non adherence, the open ended questions were asked to let the respondents give answers.

3.11 Data analysis and procedures

On each day, the collected data were counterchecked by the principal investigator so as to ensure completeness and at the end of the fieldwork the open ended questions were coded and the data were entered into the SPSS version 13 statistical package. The analysis was carried out to assess frequency distribution in terms of level of ARV adherence, socio-demographic factors (age, sex, education, marital status distance to health facility and occupation), levels of knowledge on Antiretroviral therapy and psychosocial factors (alcohol consumption, status

disclosure, patient service satisfaction and social support). Then the rate of adherence (adherent and none adherent) as a dependent variable was cross tabulated with level of knowledge, sociodemographic and psychosocial factors (as independent variables) using chi square to determine the association. (P-value <0.05 was taken as significant and vice versa). To establish the strength of associations seen in cross tabulation the binary logistic regression analysis was done.

3.12 Ethical clearance

Muhimbili University of Health and Allied Sciences (MUHAS) ethical committee reviewed the proposal, issued ethical clearance for the study to be carried out. Research permission was further requested from relevant authorities at region level (RAS) and district level (DED). Also institutional consent was obtained from respective District Medical Officers and the respective medical officer in charge of the involved health facilities. The purpose of the study was clearly explained to study participants (patients) and the informed consent sought before the interview was carried out. Participants were assured confidentiality and asked to volunteer to participate. They were further notified that there was no risk of harm expected following their participation in the study. Just in case of any negative feelings the participant was free to withdraw from the study without any conditions.

3.13 Recruitment of research assistants

Three experienced nurses were recruited. They were trained for one day. The training content covered briefing of the study, familiarization of research tools and how to administer tools and

to conduct the whole exercise. They were also introduced to research ethics and other logistics.

The task of the research team was interviewing the patients taking ARVs regarding their drug adherence status and factors hindering their ability to adhere to the therapy.

3.14 Pre testing of the questionnaire

Pre testing of the study instrument was done prior to the commencement of the study, in Mwananyamala hospital, care and treatment clinic. It was administered to 20 patients and the results obtained were used to finalize the study tool.

CHAPTER FOUR

4.0 RESULTS

4.1 Description of the study participants

A total of 240 study participants were involved from four treatment and care clinics namely, Songea regional hospital 120 (50%), Peramiho mission hospital 60 (25%), Ruhuwiko health center 40 (16.7%) and Bombambili health center 20 (8.3). The response rate was 100%. Out of this total sample male constituted 31.3%. The mean age of the study participants was 39.9 with a range of 18 to 66 years. The mean ages of male and female were 44 years and 38 years, respectively. Majority of the participants were female 165 (68.7%) as shown in table 1.

Table 1: Distribution of respondents by sociodemographic characteristic, health facility, ART related knowledge, Distance to CTC site and Sex.

Characteristic	Sex						
	Male		Female		Total		P value
	N	%	N	%	N	%	
Age							
18-27	4	(5.3)	21	(12.7)	25	(10.4)	
28-37	16	(21.3)	62	(37.6)	78	(32.5)	
38-47	40	(53.3)	57	(34.5)	97	(40.4)	
48+	15	(20.0)	25	(15.2)	40	(16.7)	0.07
Marital status							
Married	40	(53.3)	49	(29.7)	89	(37.1)	
Single	5	(6.7)	37	(22.4)	42	(17.5)	
Widow/dower	9	(12.0)	43	(26.1)	52	(21.7)	
Divorced/separate	19	(25.3)	28	(17.0)	47	(19.6)	
Cohabiting	2	(2.7)	8	(4.8)	10	(4.2)	**0.000****
Education							
No formal education	4	(5.3)	13	(7.9)	17	(7.1)	
Primary	59	(78.7)	133	(80.6)	192	(80.0)	
Secondary	7	(9.3)	16	(9.7)	23	(9.6)	
Tertiary	7	(6.7)	16	(1.8)	8	(3.3)	0.247
ART related knowledge							
High	52	(69.3)	103	(62.4)	155	(64.6)	
Moderate	22	(29.3)	60	(36.4)	82	(34.2)	
Low	1	(1.3)	2	(1.2)	3	(1.2)	0.567
Occupation							
Student	0	(0.0)	6	(3.6)	6	(2.5)	
Peasant	52	(68.0)	106	(64.2)	158	(65.8)	
Housewife	0	(1.3)	13	(7.9)	13	(5.4)	
Employed	8	(10.7)	11	(6.7)	19	(7.9)	
Business	15	(20.0)	29	(17.6)	44	(18.4)	**0.04***
Distance from CTC							
Less than 10 km	40	(53.3)	109	(66.1)	149	(62.1)	
10 to 30 km	21	(28.7)	49	(29.7)	70	(29.2)	
More than 30 km	14	(18.7)	7	(4.2)	21	(8.7)	0.08
Health facility							
Songea	38	(50.7)	82	(49.7)	120	(50.0)	
Peramiho	15	(20.0)	45	(27.3)	60	(25.0)	
Ruhuwiko	12	(16.0)	28	(17.0)	40	(16.7)	
Bombambili	10	(13.3)	10	(6.0)	20	(8.3)	0.221

Key *p <0.05, **p<0.001

Majority of the study respondents (62.1%) were receiving ARV drugs at facilities within 10 km from their homes. More proportions of males 18.7% received care at facilities located more than 30 km from their homes as compared to female 6.1% as shown in table 1.

Antiretroviral therapy related knowledge assessments was done by asking the respondents a set of 10 questions related to antiretroviral drug adherence. The responses were marked and scores graded into high, moderate and low ranking. Of all the participants, 155 (64.6%) had high knowledge of ART related knowledge, 82 (34.2%) and only 3 (1.3%) had moderate and low level of knowledge respectively. Among the respondents who scored high, Males cored relatively higher (69.3%) as compared to female (62.4%).

4.2 Adherence assessment

Adherence was assessed by examining the extent to which the respondents, abided to the selected three aspects of antiretroviral therapy adherence. The first aspect assessed was pill taking, the second aspect assessed was timing consistence and the third aspect assessed was keeping the appointment schedules for drug refill as scheduled by the providers. The combination of the three assessment results was used to calculate the average adherence for each individual study participant.

The mean adherence by dose taking was 97%, while mean adherence by correct timing was 95% and mean adherence by appointment schedule keeping was 93%. Thus average or composite adherence was calculated as 97+95+93 =285/3=95

A total of 161(67.1%) were found to be good adherent and 32.9% non or poor adherence (see table 2).

Table 2: Frequency of composite adherence status of respondents

Adherence status	Frequency	%
Good adherence	161	67.1
Poor adherence	79	32.9
Total	**240**	**100.0**

4.3 Factors affecting ART adherence

4.3.1 Sociodemographic factors

Several sociodemographic factors (age, sex, marital status, education level and occupation were assessed and cross tabulated with adherence. Only education was found to have significant effect on adherence. Respondents with low level of education reported good adherence than those with higher levels of education as shown in table 3

4.3.2 CTC sites and adherence

The treatment and care sites used for the study were cross tabulated with adherence. The large and well established CTC sites were significantly associated with good adherence compared with the small and recently initiated sites as shown in table 3

Table 3. Distribution of respondent's sociodemographic characteristics, health facility and ART adherence

Characteristic	Adherence				Total		P value
	Good		None/poor				
	No	%	No	%	No	%	
Age							
18-27	12	(48.0)	13	(52.0)	25	(10.4)	
28-37	56	(71.8)	22	(28.2)	78	(32.5)	
38-47	65	(67.0)	32	(32.0)	97	(40.4)	
48+	28	(70.0)	12	(30.0)	40	(16.7)	0.167
Marital status							
Married	64	(71.9)	25	(28.1)	89	(37.1)	
Single	28	(66.7)	14	(33.3)	42	(17.5)	
Widow/wer	37	(71.2)	15	(28.8)	52	(21.7)	
Divorce/separate	26	(55.3)	21	(44.7)	47	(19.6)	
Cohabiting	6	(60.0)	4	(40.0)	10	(4.2)	0.342
Education							
No formal education	8	(47.1)	9	(52.9)	17	(7.1)	
Primary	139	(72.4)	53	(27.6)	192	(80.0)	
Secondary	11	(47.8)	12	(52.2)	23	(9.6)	
Tertiary	3	(37.5)	5	(62.5)	8	(3.3)	**0.006***
Occupation							
Student	3	(50.0)	3	(50.0)	6	(2.6)	
Peasant	105	(66.5)	53	(33.5)	158	(65.8)	
Housewife	10	(76.9)	3	(23.1)	13	(5.4)	
Employed	12	(63.2)	7	(36.8)	19	(7.9)	
Business	31	(70.5)	13	(29.5)	44	(18.3)	0.782
Sex							
Male	49	(65.3)	26	(34.7)	75	(31.3)	
Female	112	(67.9)	53	(32.1)	165	(68.8)	0.403
Health facility							
Songea	88	(73.3)	32	(26.7)	120	(50.0)	
Peramiho	41	(68.3)	19	(31.7)	60	(25.0)	
Ruhuwiko	27	(67.5)	13	(32.5)	40	(16.7)	
Bombambili	5	(25.0)	15	(75.0)	20	(8.3)	**0.000****

Key *p <0.05, **p<0.001

4.3.3 Psychosocial factors associated with adherence

Psychosocial factors (alcohol use, status disclosure, social support, service satisfaction, trust in ARV, stigma experience) and ART related knowledge were assessed and cross tabulated with ART adherence as shown in table 4.

Out of 240 respondents 76 (31.7%) reported to have been taking alcohol while on ARV drugs. Good adherence was much observed among those who did not take alcohol (84.8%) than among those who reported alcohol taking (28.9%).The observed difference was statistically significant (p= 0.000).

Status disclosure reported to have influence on adherence, was assessed by this study. Of the total study participants 214 (89.2%) reported to have shared their HIV status with other people close to them. A significant proportional (72.9%) of those who had disclosed their status were good adherent compared to those who did not (19.2%). This difference was statistically significant (p= 0.000). Figure one shows the HIV status disclosure preference

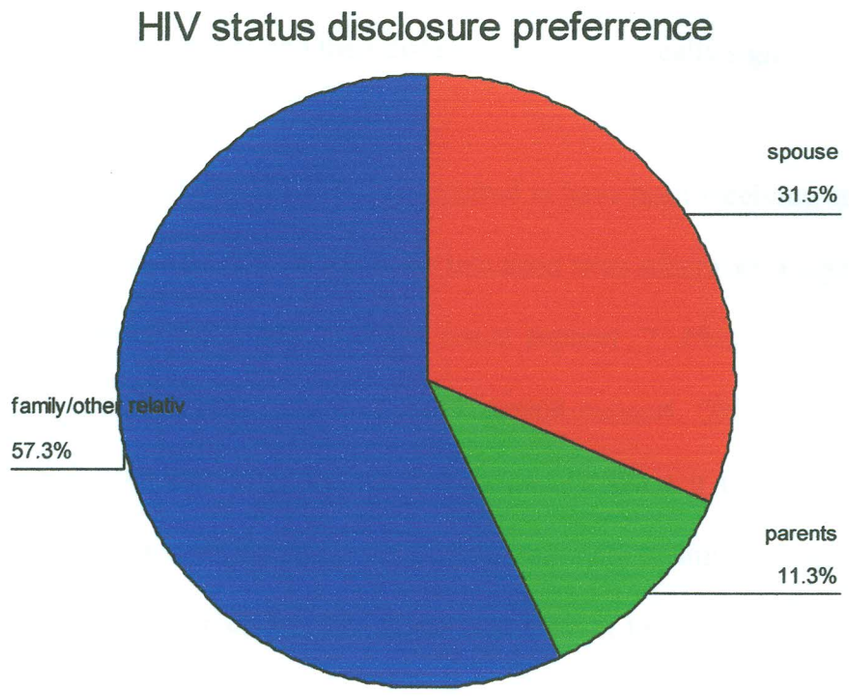


Figure one: Respondents preference to whom to disclose the HIV status

About 83% of the respondents reported that they trusted antiretroviral therapy in terms of its ability to keep them health and prolong their lives. Of these 77% were found to have good adherence compared to only 17.5% of those who did not trust ART. The difference observed was statistically significant ($p<0.01$).

Respondents were asked whether they are satisfied with the services provided. Majority 193 (80.4%) reported to be satisfied with the services. Reasons given for satisfaction were (simply good services 73.2%, health status improvement 13.9%, and other reasons (12.9%). When service satisfaction was compared with adherence, 155 (80.3%) of those who reported service

satisfaction had good adherence, while adherence was 6(12.8%) among those who reported not satisfied with services and their difference was statistically significant (p=0.001).

Most of the respondents 161 (67.1%) reported to have been receiving adequate social support from families and relatives. When cross tabulated with adherence a significant difference was observed between those who received social support (77.6%) compared to (45.6%) among those who reported not to have received social support. This difference was statistically significant (p=0.000). However, when respondents asked if they had received any support from any institution/organization apart from routinely health care services, only 20 (8.3%) reported to have ever received any support (in form of food (lishe) , money, cooking oil, soap etc).

Out of 240 study respondents, 92 (83.3%) reported to have been experiencing stigma from the family members or the surrounding communities. When asked whether stigma experience had affected their ability of adherence to drugs, only (15.2%) of them admitted stigma as problem to them on proper drug taking. When cross tabulated with adherence, majority of those who did not encounter stigma had good adherence 91 (74.0%) compared to 70 (59.8%) among those who encountered stigma. This difference observed was statistically significant (p=0.000) as shown in table 4.

Table 4: Distribution of respondent's psychosocial factors, ART related knowledge and ART adherence.

Characteristic	Adherent		Non Adherent		Total		P value
	No	%	No	%	No	%	
Service satisfaction							
Yes	155	(80.3)	38	(19.7)	193	(80.4)	
No	6	(12.8)	41	(87.2)	47	(19.6)	**0.000****
Alcohol use							
Yes	22	(28.9)	54	(71.1)	76	(31.7)	
No	139	(84.8)	25	(15.2)	164	(68.3)	**0.000****
Status disclosure							
Yes	156	(72.9)	58	(27.1)	214	(89.2)	
No	5	(19.2)	21	(80.8)	26	(10.8)	**0.000****
Trust in ART							
Yes	154	(77.0)	46	(23.0)	200	(83.3)	
No	7	(17.5)	33	(82.5)	40	(16.7)	**0.000****
Social support							
Yes	125	(77.6)	36	(22.4)	161	(67.1)	
No	36	(45.6)	43	(54.4)	79	(32.9)	**0.000****
Stigma experience							
Yes	47	(51.1)	45	(48.9)	92	(38.3)	
No	114	(77.0)	34	(23.0)	148	(61.7)	**0.0001****
ART related knowledge							
High	110	(71.0)	45	(29.0)	155	(64.6)	
Moderate	49	(59.8)	33	(40.2)	82	(34.2)	
Low	2	(66.7)	1	(33.3)	3	(1.3)	0.217

Key, * p <0.05, **p<0.001

4.3.4 Other factors associated with adherence assessed

Other factors assessed by this study and their influence on ART adherence were distance from the health facility or the CTC site, duration since tested HIV positive, duration since stated ARV and food availability.

Distance from the health facility (CTC site) and duration of HIV infection were found to have significant influence on antiretroviral therapy adherence as shown in table 5

Food shortage was assessed by asking the respondents whether they had difficulties in getting food for themselves and their families. When asked about food (48.8%) reported to have food shortage. Comparing food availability and adherence, (74.0%) of those who did not report food shortage had good adherence compared to 59.8% of those who reported food shortage. However the observed difference was not statistically significant, p=0.28 (see Table 5).

Of the 240 study respondents, 166 (69.2%) had more than a year since they knew they were infected. On comparing the duration of infection and adherence, majority 60(81.1%) of those who had less than a year since tested HIV positive had good adherence, than 101(60.1%) of those who had longer duration of HIV infection. This difference was statistically significant (p=0.02) as shown in Table 5.

Regarding the duration on ART and adherence, 98 (40.8%) of the study participants reported to have been on ARV for more than one year. There was no marked difference on adherence

between the two categories (over one year and less than one year on ARV) p=0.781 as shown on Table 5a.

Table 5: Distribution of respondents other selected factors associated with ART adherence and ART adherence

	Adherence						
Characteristic	**Good**		**Poor**		**Total**		**P value**
Duration on ARV	**No**	**%**	**No**	**%**	**No**	**%**	
More than 1 year	67	(68.4)	31	(31.6)	98	(40.8)	
Less or equal to 1 year	94	(66.2)	48	(33.8)	142	(59.2)	0.781
Duration of HIV infection							
>1 year	101	(60.8)	65	(39.2)	166	(69.2)	
≤ 1 year	60	(81.1)	14	(18.9)	74	(30.8)	**0.02***
Food availability							
Yes	70	(59.8)	47	(40.2)	117	(48.8)	
No	91	(74.0)	32	(26.0)	123	(51.2)	0.28
Distance to CTC site							
Less than 10 Km	110	(73.8)	39	(26.2)	149	(62.1)	
10 to 30 Km	46	(68.7)	21	(31.3)	67	(27.9)	
More than 30 Km	5	(20.8)	19	(79.2)	24	(10.0)	**0.0001****

Key, *P< 0.05, **P<0.001

4.4 Adherence analysis by Logistic regression

4.4.1 Binary logistic regression of factors associated with ART adherence.

Table 6a: Social demographic factors associated with non adherence by binary logistic regression analysis.

Variable	Exp B	95% CI	P Value
Education			
No formal education	Reference		
Primary education	0.339	0.124 - 0.925	0.350
Secondary education	0.970	0.276 - 3.403	0.962
Post secondary education	1.481	0.265 - 8.267	0.654
Distance			
Less than 10 km	Reference		
10 to 30 km	1.288	6.840 - 2.423	0.433
Over 30km	10.718	3.748 -30.648	**0.000****

Key ** means p<0.001

Following analysis of the variables Education and Distance by binary logistic regression, it was shown that those with post secondary education were more likely not to adhere compared to those reported lower levels of education although the difference was not significant. However distance was found a significant predictor of non adherence as those from 30 Km and above were ten times more likely to report non adherence (B=10.718, CI 3.748-30.648, p= 0.000) as shown in table 5a.

Table 6b Analysis results of psychosocial factors associated with ART non adherence by Binary Logistic Regression

Characteristic (n)	No of non adherence %	Exp B	95% CI
Stigma experience			
Yes (92)	45 (48.9)	3.1	1.77-5.39
No (148)	34 (23.0)	Reference	
Service satisfaction			
Yes (193)	38(19.7)	0.37	0.015-0.94
No (47)	41(87.2)	Reference	
ART trust			
Yes (200)	46(23.0)	0.65	0.027-0.157
No (40)	33(82.5)	Reference	
Socio support			
Yes (161)	36 (22.4)	0.250	0.141-0.444
No (79)	46 (54.4)	Reference	
Alcohol use			
Yes (76)	54(71.1)	13	6.80-24.92
No (164)	25(15.2)	Reference	
Status disclosure			
Yes (214)	58(27.1)	0.091	0.033-0.251
No (26)	21(80.8)	Reference	

After the bivariate analysis of psychosocial characteristics, those factors which were found to have significant association with adherence were analyzed further by binary logistic regression. These factors were stigma experience, social support, alcohol use, status disclosure, service satisfaction, and trust in ART.

Respondents who reported to heve experienced stigma because of their HIV positive status were three times more likely to report low adherence compared to those who did not report stigma experience (B= 3.1, 95%CI 1.77-5.39). Similarly respondents who reported alcohol use were thirteen times more likely to report low adherence as compared to those who did not report alcohol taking (B= 13, 95%CI 6.80-24.92) as shown in table 6b.

4.4.2 Multiple logistic regression analysis.

Several factors which showed association with adherence in the initial models (stigma experience, ART trust, alcohol use, service satisfaction, social support, status disclosure, duration since tested HIV positive, education level, distance from CTC sites to home and age) were run together in the final model. Alcohol use and social support emerged the most significant factors predicting low adherence among the others (B= 0.186, 95% CI 0.075-0.460, P =0.000) and (B= 13.704, 95%CI 4.301-43.662, P= 0.000) respectively

4.5 Commonly mentioned reasons for low adherence

Of the 240 study respondents 111 (46.3%) reported to have missed at least a doze in a period of 30 days prior to the interview date. The reasons given were mainly forgetting 60.4%, being on journey 27.7% and being too sick 18.9%.

75 (54.5%) reported to have taken at least a dose of drug late in the past one month, the main reasons given were forgetting 63.0%, being too busy 26.1% and late food preparation 10.9%.

138(57.5%) of the total respondents, reported to had missed at least one appointment schedule in the period of 6 months prior to date of study with different reasons as shown

in table 7

Table 7: Reasons for missing appointment schedules

Reason	Frequency	%
Being on journey	53	38.4
Forgetting	35	25.4
Lack of fare fore transport	29	21.0
Other reasons	21	15.2
Total	**138**	**100.0**

CHAPTER FIVE

5.0 DISSCUSSION

5.1 Level of ART adherence.

Patients often adhere incompletely and inadequately to highly active antiretroviral therapy (HAART) regimens used in the treatment of HIV infection. (Marvinday, 2003). Understanding of the factors which hinders or facilitate ART adherence is very important to prevent drug resistance, treatment failure and prolong the lives of HIV patients.

This study has shown that, although a considerable proportion of the study participants were non adherent, a level of adherence (composite adherence) reported was relatively higher (95%) compared to most of other studies done in Tanzania and some other parts of Sub-Sahara Africa. In a study done in cities of Dar es Salaam and Arusha 18 % of respondents were non adherent and the adherence level was 90%.(Christopher et al., 2005). Similarly in a Meta analysis study involving studies done in sub Sahara Africa countries and Northern America, 82% of patients were reported adherent while the adherence rate was averagely 77.1% for Africa countries (Mills, 2006).

Adherence by pill taking in this study was the highest while adherence by timing and appointment schedule lagged behind. It is important that patients understand well the context of adherence. To achieve good treatment results, adherence of ART has to be contained within a continuum of total doses, frequency and timing (Fauci et al., 2000). In many settings

adherence for a long time has been looked at mostly in the context of pill taking which is not proper and it might be the reason for these findings. The overall adherence rate being high in this study compared to most prospective studies may be attributed to continuing improvement in treatment and care services which includes adherence counseling which has been taking place in the region.

5.2 Sociodemographic characteristics and ART adherence

The study has shown that female were the most users of HIV treatment and care cervices in the region. This has also been the findings in most of other adherence studies (Baptiste 2008.,Nduru, 2006). The sex difference could be explained by the fact that female are the most affected group by HIV infection compared to male (MOH&SW and NACP, 2008). No significant difference in terms of adherence between the two sex categories ($p=0.4030$, although in a study conducted in Rwanda female gender was more associated with adherence by correct dose criteria ($p<0.0001$) (Baptiste, 2008).

This study found no significant association between age and adherence, a result which contradicts with other previous studies. For example in a study done in Switzerland, age was reported to have a significant influence on ART adherence. Young age was significantly correlated with low adherence (Glass T, 2006). This was also reported by a study done in India where it was shown that there was a considerably low level of adherence among people below 30 years. This was attributed to the occupation nature of most of young people being highly involved in different economic activities like farming, industrial works and traveling, which may make them forget drug taking (Sarna et al., 2008). As for this study majority of

participants regardless of their age were peasants (66.5%), the point of occupation for young people may not be the case to make them non adherent compared to those in older ages.

A trend of decreasing adherence with increasing education from primary education to tertially level of education has been shown in this study. This observed difference was statistically significant ($p<0.05$). However some other studies have reported association of education and adherence in a positive way contrary to findings from this particular study. For example in a study which was conducted in Brazil, it was found that low level of education was significantly associated with low Antiretroviral therapy adherence (OR =9.2, P=0.002) (Caraciolo, 2000). Similarly in a study which was conducted in Nigeria, respondents who had low level of education seemed not to adhere well compared to those with high level of education (Egieyesh et al., 2008).

The findings in this particular study are comparable to findings by a Botswana study where by respondents with primary education had 3.87 odds of good adherence compared to those with high level of education ($p=0.02$). It was further documented in that study that patients of lower socioeconomic status including education can achieve excellent adherence rate if access and free therapy are guaranteed (Weisersheri, 2003). For this study the good adherence observed among primary school respondents could probably be explained by the dominance for this group in this study. When education was run into logistic regression controlling for those with no formal education, respondents in primary education had the lowest odds of non adherence compared to those with secondary and post secondary education.

In this study ART related knowledge was not found to have significant association with adherence. These results differ from other studies which have reported significant association between knowledge and adherence. For example a study conducted in China found that patient with good knowledge of antiretroviral drug side effects were more likely to have good adherence to ART (OR 8.08, 95%CI 2.63-24.81 (Wang, 2007). Similarly in the study which was conducted in Coast region, it was observed that knowledge increase was associated with increase in ART adherence (Mugula, 2008). This was attributed to high level of understanding of patients on ART in terms of drug function, side effects and consequences of non adherence which makes them likely to abide to the instructions they receive from the providers. The contradiction of the results in this very study probably may be due to the reason that most of respondents had relatively good level of knowledge.

Distance was shown to strongly have association with adherence. Patients from areas close to health facilities showed greater proportional of adherence compared to those from distant places, a difference which was statistically significant ($p<0.01$). These findings are in line with a study which was conducted in Kenya (Mtitu, 2008) where by distance was reported among the significant burrier of adherence. This was also documented in studies done in Tanzania and another done recently in Uganda (Irunde et al., 2005, Tuller et al., 2009). These studies reported that although ARVs were provided free of charge, distance still poses unbearable addition costs to patients and this was noted as a very important reason for not visiting the health facilities for follow up or medicine refill. Distance and education level was run into the

logistic regression model, still distance appeared to have a significant influence on adherence (OR = 2.2, 95%CI 1.516 - 3.4287, P< 0.001).

Short duration of HIV infection has been shown by the study to have association with good adherence (p=0.02).These findings are comparable with findings in a study wich was done in United states, where fewer years of HIV disease and few years on ARV therapy was significantly correlated with adherence (Marcia et al., 2006). However contradicts with findings by a study conducted in Australia in which duration of HIV infection was not associated with ART success (Grierson et al., 2000). Good adherence among the recently diagnosed with the HIV infection could probably be explained by the fear of the disease in this group and thus abide to treatment instructions compared to those who had stayed with the disease for longer period and get used to it.

5.3 Psychosocial factors and ART adherence

Prospective studies on adherence have reported the importance of social support towards achieving the desired level of adherence (Bruno, 2007., WillBrog, 2006). Similarly this study has demonstrated a significant link between social support and adherence (p<0.01). Social support helps the patient to cope with the infection and enhance the patient's ability to take medication doses as per prescription. It very important that as early as patient gets enrolled for treatment and care, are given time to think of a person close to them who can save as their treatment supporters.

Lack of satisfaction with health care services provided was shown to have significant association with low adherence. The main reason provided for not satisfaction was few health care providers or providers not paying attention to their problems. Likewise in a study which was conducted in Kenya it was reported that perceived quality of services was a predictive factor for low adherence (Mtitu, 2008). Poor quality of services increase the gap between providers and patients and may lead to some patients missing follow up or medication refill appointment schedule, which in turn significantly affect adherence.

The study has shown that lack trust in antiretroviral drugs in terms of its ability to keep the patients healthy and prolonging their lives was significantly associated with low adherence. These findings are comparable to a study done in china (Wang, 2007), where by belief towards ART was reported to have significant prediction of low adherence (OR 3.2, 95%CI 1.24-8.26). In another study it was shown that negative attitude among AIDS patients towards antiretroviral therapy affected early health seeking behaviour causing delays in ART drug use (Schrimshaw et al., 2005). So lack of trust in medication which may be a square of negative attitude towards the medication developed by the patient even before the initiation of drug, has to be intervened before it affects the patient ability to take medications properly.

Many prospective adherence studies have reported association between stigma and ART adherence. For example a study which was done in United States which reported that stigma was associated with depression and consequently low adherence. This was more experienced in people who disclosed their serostatus to a wide range of social contact (Valuable, 2006). Similarly in a study which was conducted in Kenya-Moi teaching and referral hospital, stigma

was mentioned by almost 29% of respondents as a burrier to drug adherence (Talam, 2008). Similary in this present study stigma was found to significantly associated with low adherence ($p<0.01$). Stigma makes adherence difficult as patients don't want to disclose their status to every body around. Despite the association observed a good number of respondents who reported stigma experience did not recognize it as a burrier to them for good adherence. This is probably because most of participants in this study were peasants with wide range of privacy compared to few with exposure to other settings like offices, schools or business where privacy may be limited for medication taking.

A very unexpected and striking feature in this study is lack of association between adherence and food availability, although a significant number of respondents reported to have been experiencing food shortage. Prospective reports on adherence have reported the significant effect of food shortage on ART adherence (Irine plus news, 2009). Food is very crucial in ART adherence as some of the medications are recommended to be taken with food. Results in this study may be explained by reason that Ruvuma is among the known four regions most producer of maize, and since the study was conducted in harvesting season, those who reported poor adherence may had achieved good harvest during that period.

The study found that lack of HIV status disclosure was significantly associated with low adherence ($p<0.01$), These findings are comparable to findings by a study conducted by Stirratt and his colleague 2006, which reported that 19% of the patients reported missed doses in past two months due to concern of serostatus disclosure. HIV Status disclosure enhances social support and adherence as well. Valuable 2006, in his study suggested that disclosure

should be limited to few people who can support the patient other wise it may result into stigma which again has negative effect on adherence.

Alcohol consumption behavior poses a serious problem as far as adherence is concerned. This study has found that most of the alcohol user reported low level of adherence compared to those who did not report alcohol taking. The difference was statistically significant ($p<0.01$). The results was comparable to a study conducted in United States which reported that hazardous alcohol use was independently associated with decreased ART utilization (OR 0.65, 95% CI 0.51 - 0.82) (Geetangali, 2006).

5.4 Other factor found to associate with adherence

ART adherence was shown to increase with the size and the duration the clinic has been in operation. Low adherence was significantly noted in clinics which were recently initiated and located in low level health facilities compared to those in large hospitals. This difference could probably be attributed to low capability and experience of health care providers and poor operations in these small facilities as compared to big hospitals.

Forgetting, being too busy, being on journey, lack bus fare or transport problems, are the most mentioned reasons for not adhering to prescribed medications. These reasons have been also reported in most of other prospective adherence studies (Talamm et al., 2008, Mtitu, 2006., Mugula, 2008). Unreliable transport means in some of areas and lack of fare are problems still affecting majority of patients especially those reported living more than 30 km from health facilities, these problems are beyond the capability of most of ART users and significantly effect adherence.

CHAPTER SIX

6.0 CONCLUSION

Antiretroviral therapy adherence in Ruvuma region although was found to be within the acceptable level (95%), still is a serious problem as a considerable proportion of respondents were found non adherent (32.9%). Lower level facilities and newly initiated treatment and care sites had higher proportional of non adhering respondents compared to clinics in big hospitals and with long duration of operation HIV care service delivery, This calls for urgent structural and process improvement in these facilities.

Among all sociodemographic factors, distance and education were found to have significant influence to adherence. Age, marital status and occupation were not found to have significant associated with adherence.

Stigma experience, no satisfaction with services provided, long duration with HIV infection and lack of status disclosure were found to be associated with low adherence. Duration on treatment, ART related knowledge and food availability were not associated with adherence.

6.2 RECOMMENDATIONS

This study addresses the following recommendations to the Ministry and other stake holders.

6.2.1 Recommendations at facility level

- As about 32% of patients were found non adherence. Providers in clinics have to keep on providing continuing education on ART through adherence counseling sessions.
- Close monitoring of patients should be maintained for early detection of patients who does not adhere to treatment so that measures can be taken. Patients should be given skill of how to overcome some of factors leading them to poor adherence. For example alcohol drinkers can be encouraged to engage into alternative activities like games, which can keep them busy and divert their desire for drinking.
- ''They don't pay attention to our problems'' This was the main reason given for not satisfied with services received and this was associated with low adherence. Providers and patients have to listen to each other and reach an agreement. This is because adherence is different from complying to treatment instructions. To be effective both parties must equally participate e.g. when planning for drug refill appointment.

6.2.2 Recommendations at Ministry or policy making level

- As the exercise of scaling up HIV care and treatment services in the regions continues, the ministry needs to ensure that the newly established CTC sites are in good conditions structurally and also have enough and well qualified providers. The high proportional of non adherence noted in these facilities is likely to be attributed to incompetence of providers and poor structural settings.

- As distance is still a significant burrier to ART access to most patients, outreach programs have to be scaled up and maintained, and for some of patients from areas with transport difficulties, two months doses on every medication refill visit could be supplied to these patients to reduce the frequent traveling to health facility for medication refill. For some few patients who still have to travel along distance to access treatment, arrangement should be done at list to provide them with half of transport cost they incur while looking for a long term solution. This will reduce the burden of transport cost to these patients and enhance adherence.

- Disclose serostatus at least to a single person who can also serve as a treatment supporter should be made a mandatory rather than being an option prior to commencement of antiretroviral therapy.

- NGO dealing with home based activities should extend their activities to rural areas where most of patients live, instead of concentrating into towns. Most of patients reported never to have received any support from these institutions.

- As forgetting was the dominant reason for missing doses, patient need to be encouraged to use time management aids like alarm clocks and calendar. And for those who can not afford to have these equipments, they should be provided free of charge to enhance adherence.

6.2.3 Recommendation for future research

Apart from the psychosocial characteristics which some how appear to consistently affect adherence, still most of sociodemographic factors as investigated by different studies do not consistently result into similar findings in relation to adherence. So studies on adherence are recommended. Probably close investigation of the household factors could result into better understanding of factors affecting antiretroviral therapy adherence most.

6.3 STUDY LIMITATIONS

- This study primarily relied on self reported adherence data which may be exaggerated by the patient as it is reported by different studies that self reported data are subject to social desirability and recall bias (Liu et al 2001). The main problem with self adherence measure is that a patient may forget the exact doses missed in the past days and thus provide the response which is not accurate. Some patients may be remembering the doses missed but simply to impress the investigator, they may give positive responses. Despite all these short comings this method is still the most widely used adherence measure.

- This study was conducted only in four sites out of the total 28 facilities providing treatment and care services in the region. So the results may not be generalized to whole region. The study involved only about 3% of the target population and it involved only those patients who were available during the study period. Possibly those were not available could give a different picture

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