ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDS IN VIETNAM: EVIDENCE FROM A CLINICAL – BASED STUDY IN 2009

NGUYEN THI DUNG

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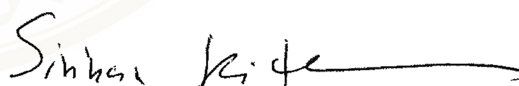
ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDS IN VIETNAM: EVIDENCE FROM A CLINICAL – BASED STUDY IN 2009

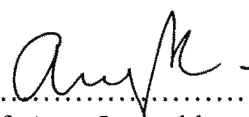
....
Mrs. Nguyen Thi Dung
Candidate

....
Assoc. Prof. Patama Vapattanawong, Ph.D.
Major advisor



....
Assoc. Prof. Sirinan Kittisuksathit, Ph.D.
Co-advisor

....
Prof. Banchong Mahaisavariya,
M.D., Dip. Thai board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University



....
Assoc. Prof. Aree Jampaklay, Ph.D.
Program Director
Master of Arts Program in Population and Reproductive Health Research
Institute for Population and Social Research
Mahidol University

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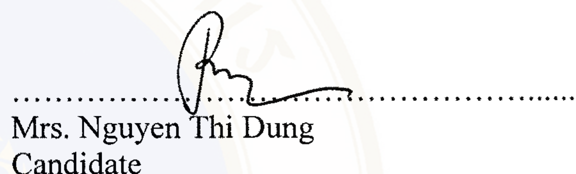
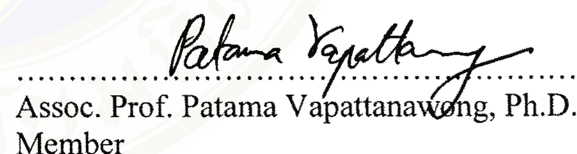


Mrs. Nguyen Thi Dung
Candidate

Asst. Prof. Pimonpan Isarabhakdi, Ph.D.
Chair



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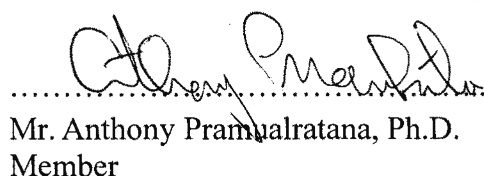
Member



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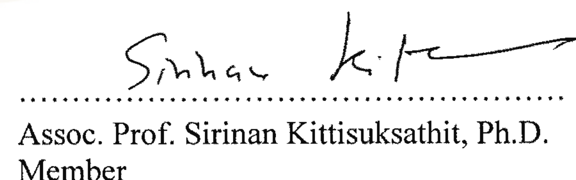
Member



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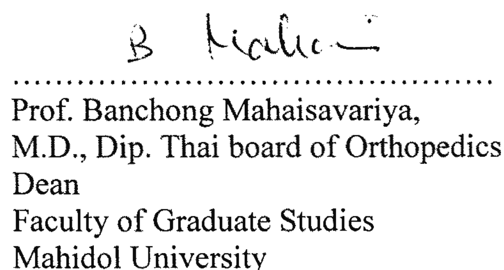
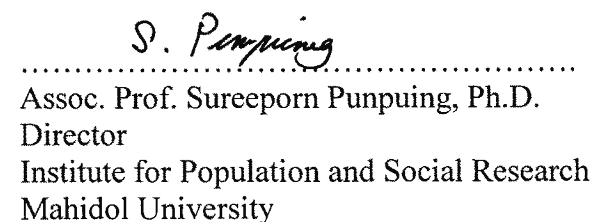
Member



Prof. Banchong Mahaisavariya,
M.D., Dip. Thai board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University



Assoc. Prof. Sureeporn Punpuing, Ph.D.
Director
Institute for Population and Social Research
Mahidol University

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Nguyen Thi Dung

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ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDS IN VIETNAM: EVIDENCE FROM A CLINICAL – BASED STUDY IN 2009

NGUYEN THI DUNG 5338717 PRRH/M

M.A (POPULATION AND REPRODUCTIVE HEALTH RESEARCH)

THESIS ADVISORY COMMITTEE: PATAMA VAPATTANAWONG, Ph. D., SIRINAN KITTISUKSATHIT, Ph. D.

ABSTRACT

Optimal adherence to antiretroviral therapy (ART) is required to achieve the best HIV load response, lower HIV drug resistance development, decreased HIV mobility, and decreased mortality. Adherence to ART and the factors affecting it are not known yet in Vietnam, therefore this study aims at examining adherence to ART and exploring the factors affecting this adherence.

The data used were based from the 'Evaluation Adherence and Relationship between Adherence to Outcomes of ART' survey was conducted by the National Hospital of Tropical Diseases in Vietnam in 2009 (n=1276). Time adherence for three previous days in terms of the people living with HIV/AIDS (PLWHA) self-reports was used to examine the adherence to ART. The binary logistic regression model was used to investigate the association between adherence with the condition-related factor (recent CD4 count) and the PLWHA-related factor (drugs users) controlling for socioeconomic-related factors.

According to the adherence definition, the percentage of the optimal adherence among the study samples was 69.9%. Common reasons were given for missing to take ART on time that were: 'being busy with other things, being away from home, and simply forget'. There was a significant decrease in adherence among PLWHA who were drugs users and unstable occupation compared to non dugs users and workers at 0.63 (95%CI, 0.44-0.60), and 0.58 (95%CI, 0.36-0.95) time, respectively. In contrast, the adherence shows a significant increase among those who had recent CD4 count ≤500cells/ml, were education at college or university and were aged between (30-39) years old compared to those who had recent CD4 count >500cells/ml, were education at a primary level only and aged between 20-29 years old at 1.44 (95%CI, 1.03-2.01), 1.95 (95%CI, 1.04-3.63) and 1.43(95%CI, 1.08-1.90) time, respectively.

The optimal adherence found in this study was similar to other studies. Drugs users, unstable occupation, having recent CD4 count >500cells/ml, low attainment at primary school and less than primary school, and younger adults aged between 20-29 years old were the factors that should be paid attention to when solving adherence problem in Vietnam.

KEY WORDS: ADHERENCE/OPTIMAL ADHERENCE/SELF- REPORT/ ANTIRETROVIRAL THERAPY

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretroviral
ART	Antiretroviral Therapy
FHI	Family Health International
HIV	Human Immune-deficiency Virus
HARRT	Highly Active Antiretroviral Therapy
HAIVN	Harvard Medical School AIDS Initiative in Vietnam
IDUs	Injecting Drug Users
MOH	Ministry of Health of Vietnam
MEMS	Medication Event Monitoring Systems
NHTD	National Hospital of Tropical Diseases of Vietnam
OPC	Out-patient Clinic
PLWHA	People Living with HIV/AIDS
UNAIDS	United Nations Joint Program on HIV/AIDS
VAAC	Vietnam Administration of HIV/AIDS Control
WHO	World Health Organization

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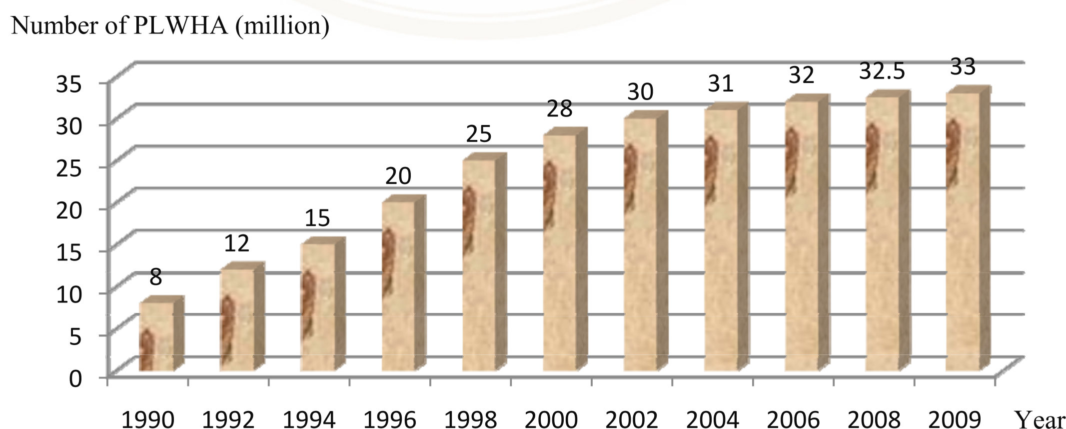
CHAPTER I
INTRODUCTION

1.1 Background

According to Joint United Nations Program on HIV/AIDS (UNAIDS), the number of people living with HIV/AIDS (PLWHA) worldwide continued to grow in 2009, reaching an estimated 33 million. The number of newly infected people with HIV in 2009 was 2.6 million. The number of PLWHA rose from around 8 million in 1990 to 33 million by the end of the year 2009 (Figure 1.1). The annual number of the newly infected people with HIV and the number of AIDS-related deaths have steadily declined as the result of the significant increases in PLWHA receiving antiretroviral therapy (ART) (UNAIDS, 2010).

According to the World Health Organization (WHO), an estimated 4 million of the PLWHA were receiving ART in low and middle–income countries by the end of the year 2008. Antiretroviral therapy coverage rose from 7% in 2003 to 42% in 2009 the world. AIDS-related deaths also decreased from approximately 2.8 million in 2003 to 1.9 million in 2008 (WHO, 2010).



Source: UNAIDS, 2010

Figure 1.1 Global Estimated Number of PLWHA, 1990-2009

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Vietnam is also affected by the HIV/AIDS pandemic. The prevalence of HIV infection in this country concentrates on injected drug users (IDUs) with a rate around 50% that is reported by the Vietnam Administration of HIV/AIDS Control (VAAC) every year (VAAC, 2010). Since the first HIV infection case was diagnosed in 1990, the number of the newly infected people with HIV, PLWHA and AIDS-related to deaths had increased dramatically from 1990 to 2006 (Figure1.2).

According to VAAC, the trend of total number of the PLWHA in Vietnam had changed since 2006 attributed to the result of broadening ART in this country since 2005. Estimated total number of the PLWHA in Vietnam declined from around 260,000 cases in 2006 to around 200,000 cases in 2009. The newly infected people with HIV and AIDS-related deaths also reduced two times from 2006 to 2009. The number of newly infected people with HIV and AIDS related death in 2009 was 5,785 and 2,017 cases, respectively (VAAC, 2010) (Figure 1.2).

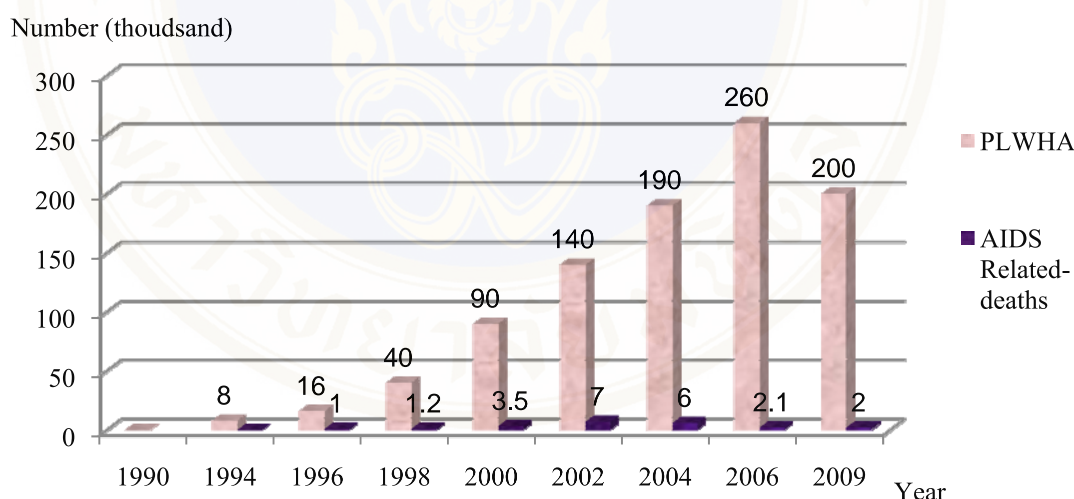

Figure 1.2 Estimated Number of the PLWHA and AIDS Related-deaths in Vietnam, 1990-2009

Thus, the number of the PLWHA in Vietnam on ART increased from less than 10% in 2003 to 45% in 2009 and the National Strategy of HIV/AIDS Prevention and Control up to 2010 with a vision to 2020 had set an objective of 70% of the PLWHA receiving ART by 2010 (VAAC, 2010).

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1.2 Problem Definition

Scaling up the availability of ART is crucial for reducing mortality and HIV-transmission (WHO, 2003). Antiretroviral therapy offers an opportunity to prolong a lives of the PLWHA and revive societies that are being affected by the epidemic, but these offerings require an optimal adherence to ART (Lucas, 2005; WHO, 2003).

Adherence to ART is defined as the ability of the PLWHA to take all ARVs as prescribed-no missed doses as follows: the right drug, the right dosage, the right time and in right way (WHO, 2003; Harvard Medical School AIDS Initiative in Vietnam – HAIVN, 2007; FHI, 2005).

The optimal adherence is defined as taken ARVs for a one time period that reached of at least 95% in total of the prescribed ARVs–no missed dose as follows: the right drug, the right dosage, the right time and in right way as well. On the other hand, if total ARVs were taken to be less than 95% that will be the sub-optimal adherence (WHO, 2003; HAIVN, 2007; FHI, 2005).

For example, there were six kinds of ARV regimens which were used in this study as follows: 1a= D4T/3TC/NVP; 1c= AZT/3TC/NVP Others = D4T/3TC/EFV; AZT/3TC/EFV; TDF/3TC/NVP; and TDF/3TC/EFV. These ARVs have to be taken 2 times per day, so, total ARVs which have to be taken for a period of 3 days were maxima of 6 doses. If a single dose was forgotten, the proportion of adherence would be equal to 5/6=83%, it is lower than the requirement of the optimal adherence, therefore, the optimal adherence for the last three days period in this study has to define as all of ARVs were taken on time.

Perfect adherence or optimal adherence is required for long-term viral suppression to delay progression to AIDS (Lucas, 2005). The sub-optimal adherence to ART increases the risk of HIV drug resistance. The emergence of HIV drug resistance is a serious concern, especially in settings where the options for the second-line ARV regimen which is needed for treating HIV drug resistance people is limited (Bangsberg and Perry, 2001). Monitoring the PLWHA's adherence to ART is a requirement for adequate HIV care provision and research.

Accurate measurement of adherence is a challenge. It's believed that there is no gold standard adherence measurement. Five basic techniques have been

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developed for quantifying adherence which included: Medication Event Monitoring Systems (MEMS); pill counts; biological markers; pharmacy refill; and the PLWHA self-reports. All of these methods have limitations in the measurement.

The PLWHA self-reports is an appropriate tool which had been developed to measure adherence in Vietnam in recent years. Particularly, in the study 'Evaluation Adherence to ART and Relationship between Adherence to ART and Out-comes of ART in Vietnam in 2009' which was conducted by National Hospital of Tropical Diseases (NHTD).

Ninety four percent of the optimal adherence found in that study that was higher than the adherence indicator was reported by VAAC in 2009 at 67% (VAAC, 2009). The reason of such high of the optimal adherence was in the use definition of time adherence that was more likely to over in the measurement of the optimal adherence for the last three days period.

The question which was used to measure adherence in that study was 'In the last three days period, how many times did the PLWHA take ARV on time?' and the optimal adherence was defined by the PLWHA who took ART 'almost' and 'at all times'. 'Almost' meant that at least one dose was forgotten, so the optimal adherence in this study should be defined as the PLWHA who took all ARV on time.

1.3 Problem Justification

People on ART increased quickly and the clinical benefits have been dramatic. Far fewer people are progressing to AIDS, hospital AIDS wards have practically emptied and the age–adjusted death rate from HIV/AIDS has declined. The virologic failure attributed to the sub-optimal adherence to ART (Lucas, 2005). The resulting virologic failure diminishes the potential for long-term clinical success. Drug-resistant strains of HIV selected through ongoing replication in the presence of ART that also can transmit to uninfected or drug-naive people, leaving them with fewer treatment options.

Moreover, the human and financial implications of HIV drug resistance have shown a significant; the average annual cost of a second-line ARV regimen can reach up to three times of a first-line ARV regimen (Bautista et al., 2006; Over et al.,

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2007). For the PLWHA, HIV drug resistance limits treatment options, and the need for the second-line regimens that are generally more difficult to take. Although the proportion of the PLWHA on the second-line therapy continues to be low in low and middle income-countries (less than 2%), but the number and the proportion of the PLWHA requiring the second-line ARV regimen will continue to rise as countries scale up ART and maintain thousands on treatment over long periods of time.

Although, all of the PLWHA on ART in Vietnam have already known about the advantages of the optimal adherence to ART, and the consequences of the sub-optimal adherence to ART before starting ART. However, adherence to ART and the factors affecting this adherence were known in Vietnam were questionable. It is essential to examine adherence to ART in Vietnam by using more rigid measurements and explore the factors affecting this adherence to develop the suggestions for the health care providers and Vietnam Government to help the PLWHA achieve the best of the optimal adherence among them in the future.

1.4 Research Questions

1.4.1 What will adherence to ART among PLWHA in Vietnam in 2009 be if the more rigid measurements in terms of the PLWHA self-reports for the last three days are used?

1.4.2 Which factors affected adherence to ART among PLWHA in Vietnam in 2009?

1.5 Research Objectives

1.5.1 Ultimate Objective

To develop recommendations to the Vietnam Government to support the PLWHA through use of ART

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1.5.2 Immediate Objectives

1.5.2.1 To examine the adherence to ART among PLWHA in Vietnam in 2009 by using more rigid measurements in terms of the PLWHA self-reports.

1.5.2.2 To explore factors affecting adherence to ART among PLWHA in Vietnam in 2009.

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CHAPTER II
LITERATURE REVIEW

2.1 Related Concepts

2.1.1 Highly Active Antiretroviral Therapy (HAART)

2.1.1.1 Antiretroviral Therapy (ART) Definition

Antiretroviral therapy is the treatment of the people infected with HIV using anti-HIV drug. The standard treatment consists of a combination of at least three drugs that often call 'highly active antiretroviral therapy' or 'HAART' to suppress HIV replication. Three types of medications are used in order to reduce the likelihood of the HIV virus developing drugs resistances. Antiretroviral therapy has the potential both to reduce mortality and morbidity rates among PLWHA, and to improve their quality of life that is classified into three following groups:

- Group 1-Nucleoside analogue reverse transcriptase inhibitors
- Group 2-Non-nucleoside reverse transcriptase inhibitors
- Group 3-Protease Inhibitors

2.1.1.2 Kinds of ARV Regimen

According to guidelines for HIV/AIDS diagnosis and treatment of the World Health Organization (WHO) in 2010, there are two main kinds of ARV regimens are as follows: the first-line and second-line regimen (WHO, 2010). The recommendation was given for choosing the first-line regimen to start ART and second-line regimen to treat the PLWHA who had HIV drug resistance (WHO, 2010).

First-line regimen was defined as using at least two ARVs in group 1 combined with one ARV in group 2 and the second-line regimen includes two ARVs in group 1 or one ARV in group 2 combined with one boosted ARV in group 3. There are several kinds of the first-line regimens into the first-line therapy. Similarly, the second-line therapy also has several kinds of ARV regimens (WHO, 2010).

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2.1.2 Adherence in General Chronic Diseases and Adherence to ART

2.1.2.1 Definition of Adherence

Adherence is defined as "the extent to which person's behavior–taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" (WHO, 2003).

Normally, the concept adherence is more important in case of chronic diseases such as: asthma, diabetes and hypertension or some other infectious diseases such as tuberculosis bacteria (TB), hepatitis B or hepatitis C and especially HIV/AIDS. According to WHO, the percentage of the adherence to general chronic diseases was documented approximately 50% (WHO, 2003).

2.1.2.2 Definition of adherence to ART

Adherence to ART is defined as using antiretroviral (ARV) in terms of time, doses and foods adherence or adherence to ART is the ability of the PLWHA to take all ART as prescribed–no missed doses as follows: the right drugs, the right dosage, the right time and in right way (Harvard Medical School AIDS Initiative in Vietnam-HAIVN, 2007; FHI, 2005).

The consequences of HIV epidemic and the bad results of the sub-optimal adherence to ART are well known (WHO, 2003) so, all health care providers have paired much attention on maintaining adherence to ART by providing comprehensive ART knowledge as well as the necessity of adherence to ART for the PLWHA before starting ART and during the treatment time as well (WHO, 2010; HAIVN, 2007; FHI, 2005).

The optimal adherence requires take at least 95% of total prescribed ARV–no missed dose as follows: the right drugs, the right dosage, the right time and in right way (HAIVN, 2007; FHI, 2005). The PLWHA who is taking the first-line regimen should not forget more than two doses per month (FHI, 2005; HAIVN, 2007).

2.1.2.3 The Percentage of the Optimal Adherence to ART

Actually, all of the PLWHA on ART have already known about good results, bad consequences and how much adherence is good enough for controlling HIV viral in their body. However, the percentage of the optimal adherence which was documented by several studies varied from method to method

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(measurement adherence method) approximately 70% (Edward et al., 2006; Bangsberg, 2006; Golin et al., 2002, Tiyou et al., 2010; Paterson et al. 2000).

The difference of adherence to ART among studies using different methods was claimed. In a large multicenter clinical trial, which used the PLWHA self-reports method for measuring adherence to ARV reported that the percentage of the optimal adherence among PLWHA who had followed up in one month was 74%, four months was 68% and eight months was 67% (Mannheimer et al., 2002).

Similarly, a study in Ethiopia that used the PLWHA self-reports method demonstrated 72.4% of the mean adherence to ART (Tiyou et al., 2010). Another study in one of university hospital used Medication Event Monitoring Systems (MEMS) also indicated 75% of the optimal adherence (Paterson et al. 2000). A combination study documented the median of the percentage of the optimal adherence of the PLWHA self-reports, pills count and MEMS was 89, 73 and 67%, respectively (Bangsberg et al., 2000).

2.2 Measuring Adherence to ART

In both clinical trials and clinical practices, the sub-optimal adherence to medications in terms of general chronic diseases and particular HIV/AIDS, is widespread among PLWHA but it is difficult to measure accurately of the adherence. Several methods used to measure adherence to ARV that have been developed as follows: measuring adherence in research studies, and measuring adherence in clinical practice or the PLWHA self-reports.

2.2.1 Measuring Adherence in Research Studies

There are four methods used to measure adherence in research studies which are as follows: ***Medication Event Monitoring Systems (MEMS), pill counts, biological markers and pharmacy refill data.*** Nowadays, there is no gold method for measuring adherence. Those methods are more sensitive to recognize the sub-optimal adherence than the PLWHA self-reports, but that require many difficult things to apply to clinical practice due to high technology, cost and time. The PLWHA self-

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reports is the common measurement adherence to ART method especial in the limited income countries.

2.2.2 Measuring Adherence in Clinical Practice or the PLWHA Self-reports

Objective measures used in research settings, a relatively simple and efficient method of measurement in clinical practice is the PLWHA self–reports compared to other methods such as MEMS, pill counts, biological markers and pharmacy refill data. The PLWHA self-reports is a more sensitive measure of the optimal adherence (over estimates adherence).

As reported in a study in USA, which used all of three methods for measuring adherence among 134 of the PLWHA with a median of 12 months on ART indicated that by the PLWHA self-reports, pill count, and MEMS with the median of the optimal adherence was 89, 73 and 67%, respectively (Bangsberg et al., 2000). Similarly, another cohort study that was conducted by sampling 108 of the PLWHA on ART for 48 weeks found the mean the optimal adherence was 93% by the PLWHA self-reports, 83% by pill count, and 63% by MEMS (Liu et al. 2001).

Less sensitive of recognized the sub-optimal adherence by the PLWHA self-reports compared to MEMS and pill counts that was also reported in a study (Arnsten et al., 2001). Nonetheless, these studies and others have documented that viral success (or HIV load reduce to undetectable after 6 months on ART) was shown a significant to be related with the results of the PLWHA self-reports the optimal adherence. The virologic failure (or HIV load is still over 1000 copies/ml after 6 months on ART) was shown a significant to be associated with the consequences of the PLWHA self-reports the sub-optimal adherence (Gifford et al., 2000; Arnsten et al., 2001). Although less sensitive than other measures used in research, the self-report adherence is clinically relevant. The main task of the clinician is to elicit the self-report in a manner that maximizes its likelihood of revealing the sub-optimal adherence.

A commonly used method for measuring adherence by the PLWHA self-reports which was developed by a multidisciplinary team at the Adult AIDS Clinical Trials Group has been validated repeatedly, and has been modified in a number of

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ways to increase its sensitivity and accuracy (Chesney et al., 2000). The PLWHA self-reports also was explained the following five steps in a document of the California University: (1) introduction statement; (2) confirm understanding of regimen; (3) assess adherence; (4) ask about reason of missing doses; and (5) ask about medication side effects or other problems (Edward et al., 2006). The instrument of this method, which was claimed by several studies was comprised of two questionnaires in terms of the PLWHA self-reports (Chesney et al., 2000; Tiyou et al., 2010). The adherence over more recent periods of time as past 3 days or past 7 days and over longer periods as past 1 month is common now (Walsh et al., 2002).

2.3 Factors Affecting Adherence to ART

Adherence to ART was affected by several factors. Understanding these factors can increase a clinician's attention to help the PLWHA improve adherence and can inform the development of interventions for improving this adherence. Factors affecting this adherence have been published as follows five categories (Ickovics et al, 2002; WHO, 2003; Edward et al., 2006).

2.3.1 Socioeconomic-related Factors

Socioeconomic-related factors are as follows: age, gender, race/ethnicity, income, educations, literacy, housing status, insurance status, HIV risk factors and psychosocial factors such as mental health, substance use, social climate and support of family and friends, knowledge and attitudes about HIV and its treatment.

Studies report conflicting evidence about the association between socioeconomic-related factors with the adherence behavior. Nonetheless, when an association is found, the direction is consistent: younger age, nonwhite race/ethnicity, lower income, lower literacy, and unstable housing are associated with the sub-optimal adherence in resource-rich settings. Gender, educational level, insurance status, and HIV risk factors generally are not associated with adherence behavior (Gifford et al., 2000; Mannheimer et al., 2002; Tiyou et al., 2010).

More consistent associations are found between certain psychosocial factors and the adherence behavior. Common factors were claimed to be associated

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with the sub-optimal adherence that were depression, active drug or alcohol use, stressful life events and lack of social support (Gifford et al., 2000; Paterson et al., 2000; Mannheimer et al., 2002; Tiyou et al. 2010).

The PLWHA family relationship affected adherence to ART in the cultural context extolling familial responsibility and family support. Adherence to ART was reported in a cross sectional study in China that was superior among the PLWHA who had a good family support (Fredriksen et al., 2011).

2.3.2 Therapy-related Factors

Antiretroviral regimen was also related to adherence by the pills burden, dose frequency, foods instructions, kinds of ARV regimen and short and long term of ARV side effect. The pills burden, ARV side effects and the complexity of ARV regimen was recognized to be associated with the sub-optimal adherence (Bartlett et al., 2001). On the other hand, the specific type of pills prescribed was not imparted to adherence to ART (Stone et al., 2001; Roberts, 2000).

2.3.3 Condition-related Factors

Stage of HIV, duration of HIV infection, opportunistic infections (OIs), HIV-related symptoms and a CD4 count are the condition-related factors. The association between the PLWHA' symptomatic with the optimal adherence to ART was reported. The PLWHA's illness experience was recognized a significant care about the chances of developing complication if they did not adhere to their ARV. In contrast, the PLWHA's asymptomatic was shown a significant to be associated with the sub-optimal adherence (Gao et al., 2000).

Another condition was claimed having the relationship with the optimal adherence to ARV that was good understanding about the optimal adherence and it's effective. There was a significant to be recognized between lower of the optimal adherence and the PLWHA who were less sure of the link between the sub-optimal adherence and the development of HIV drug resistance (Chesney et al., 2000).

Aspects of the availability of ART that may influence adherence include as follows: access to ongoing primary care, involvement in a dedicated adherence program, availability of transportation and childcare. The distance from the PLWHA's

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home to the hospital where they get ARV may affect adherence by the travelled, but this factor was showed no effect on adherence in a study (Cauldbeck et al., 2009).

2.3.4 Health Care Team/ Health System- related Factors

Lack of clear instructions from health care providers and poor knowledge about ART were the factors which were recognized a significant to be associated with the sub-optimal adherence were reported by a study (Chesney et al., 1999).

The PLWHA overall satisfaction and trust in their doctor or the medical staffs may impact adherence to ART. The health care providers can encourage the PLWHA to improve adherence by their attitude such as: non-discrimination, openness and cooperation. Two studies of incarcerated women believed that the PLWHA was trust in the physician had been associated with an increased adherence. The adherence rate also was claimed to be greater if the PLWHA has a longstanding and trusting relationship with a single health care provider in a qualitative study (Stone et al. 1998).

2.3.5 The PLWHA-related Factors

The PLWHA was forgetfulness, life stress, using alcohol, using drug, depression and negative felling who was reported a significant to be associated with the sub-optimal adherence to ART (Paterson et al., 2000; Chesney et al., 2000).

On the other hand, the positive regarding the efficacy of ART, memory aids and telephone counseling were the factors which were documented a significant to be associated with the optimal adherence to ART (Ngo, 2007; Chesney et al., 1999).

2.3.6 Summarization

Adherence behavior was affected by many factors. Some of these factors are largely immutable by the clinician such as: older age, low income, low literacy, and the PLWHA social milieu. Immutable factors can be used by clinicians that help identify those PLWHA who are at high risk for the sub-optimal adherence, so they can receive the most intensive adherence support. Other factors were associated with the sub-optimal adherence were potentially alterable such as: depression, substance abuse, homelessness, regimen complexity, ARV side effects, and the therapeutic relationship between the PLWHA and health care provider. Alterable factors that affecting

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adherence should be attended to, if possible, prior to starting ART, and in a proactive and ongoing way throughout therapy.

2.4 Adherence to ART and Factors Affecting this Adherence among PLWHA in Vietnam

Vietnam has been broadening ART since 2005. The number of the PLWHA on ART by the end of 2009 that was reported by VAAC was over 36,000 cases. Vietnam Ministry of Health (MOH) pays much attention on improving adherence to ART through HIV/AIDS diagnosis and treatment guideline. Before starting ART, the PLWHA has to learn about what is adherence to ART; how to adhere; how to maintain adherence to ART; and the good results of adherence to ART and bad consequences of the non-adherence as well (MOH).

In 2007 and 2008, VAAC conducted the first and second rounds of the 'Data Collections for ART Cohorts and HIV Drug Resistance Early Warning Indicators' survey. The most important adherence indicator was shown approximately 67% in several provinces (VAAC, 2007). The study about the adherence to ART in Vietnam is still limited. Some studies concerned with the adherence to ART indicated that the adherence to ART increased by using memory aids such: as pills boxes, mobile phone, and clock alarm to remind the PLWHA of taking ARV on time (Ngo, 2007).The PLWHA who had good family support and no addiction to using drugs was more likely to adhere to ART compared to those who didn't have family support and addicted to using drugs, was claimed in one study (Le, 2008). One of the strong barriers for the optimal adherence to ART that was mentioned by a study in Quangninh province was the stigmatization. The PLWHA feared that taking medications in the presence of other persons would lead to suspicion or inadvertent disclosure of their HIV status (Van Tam et al., 2011).

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2.5 Conceptual Framework

From the literature review it has been found that adherence to ART varied by the socioeconomic-related factors, health care team/health system-related factors, condition-related factors, therapy-related factors and the PLWHA-related factors. In this study, the research concerns the 'Evaluation Adherence to ART and Relationship between Adherence and Outcome of ART'.

After exploring dataset, three factors are considered as independent variables in this study which were socioeconomic-related factors, condition-related factors and the PLWHA-related factors.

All of the PLWHA in this study were on the first line ARV regimen. They had the same of ARV bills burden, the same frequency of ARV dose so, the therapy-related factors in this study is considered to treat as controlling variable.

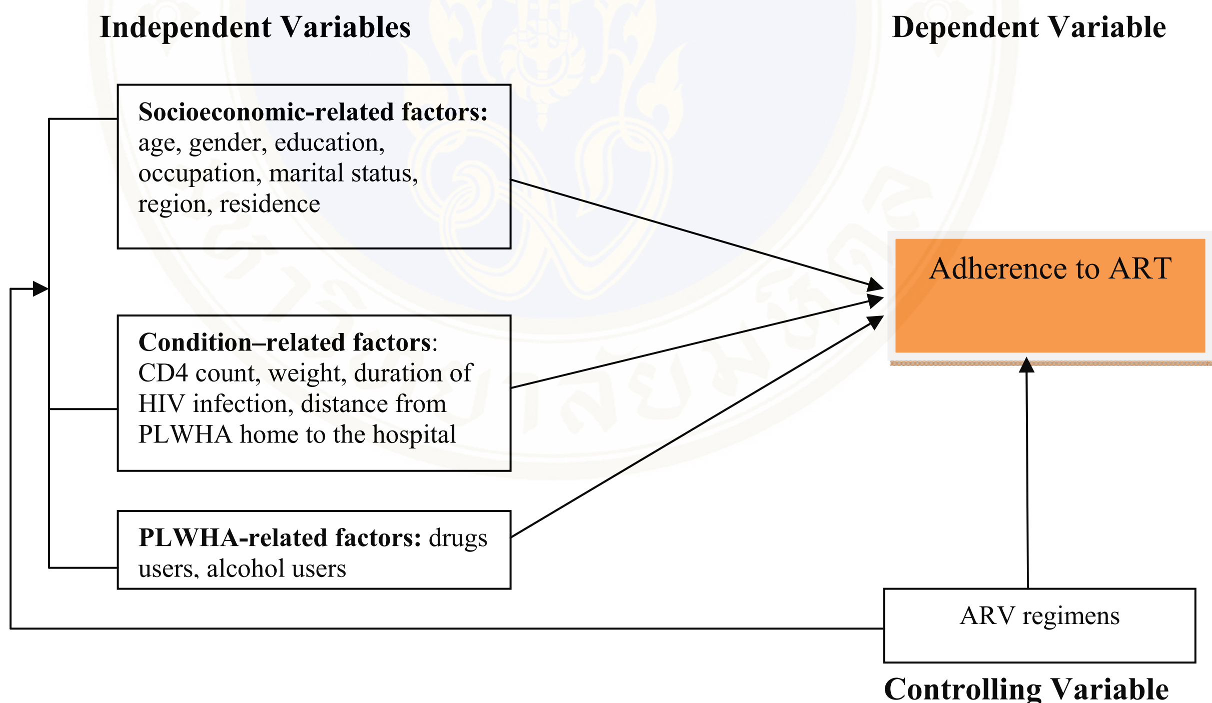

Figure 3.1 Conceptual Framework

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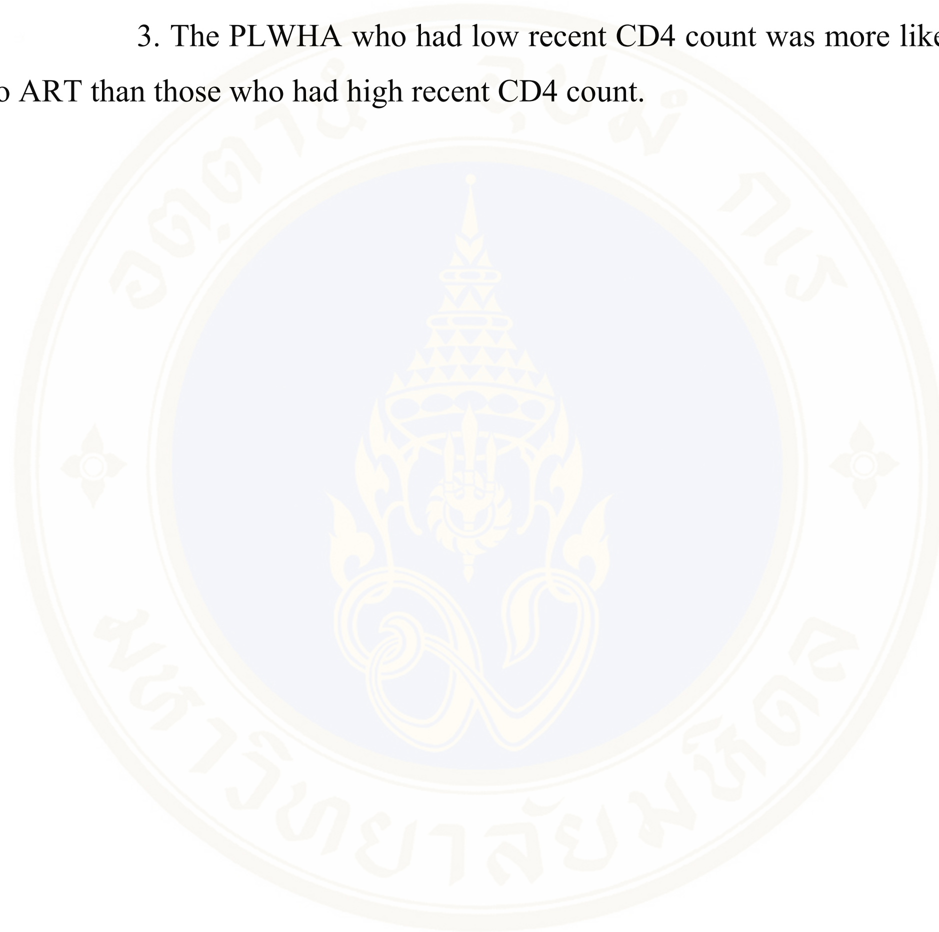
2.6 Research Hypotheses

1. The PLWHA who used drugs was less likely to adhere to ART than those who didn't use drugs for the last month.

2. The PLWHA who was unstable occupation was less likely to adhere to ART than those who were workers.

3. The PLWHA who had low recent CD4 count was more likely to adhere to ART than those who had high recent CD4 count.



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CHAPTER III
RESEARCH METHODOLOGY

3.1 Source of Data

This study used the secondary data from the 'Evaluation Adherence to ART and Relationship between Adherence and Outcomes of ART' in Vietnam in 2009. A cross- sectional study conducted by National Hospital of Tropical Diseases (NHTD) in 2009 in out-patient clinics (OPCs) in sixteen cites, which was divided into two parts as follows: (1) In the North Hanoi, Haiduong, Thainguyen, Langson, Caobang, Quangninh, Haiphong, Thanhhoa, Nghean, Phutho, and Namdinh. (2) In the South Ho Chi Minh City, Tayninh, Angiang, Kiengiang, and Cantho.

A total of 1, 276 of the PLWHA were chosen randomly at those OPCs who had been taking ARV for more than six months. All of the PLWHA were on ARV at the first line regimen with six kinds of ARV which were: stavudine (D4T), tenoforvir (TDF), zidovudine (AZT), lamivudine (3TC), nevirapine (NVP) and, enfavirenf (EFV). They arrived for an appointment at those OPCs, and were provided informed consent to interview.

The question was used to examine adherence to ART in that study that was: In the last three days period, how many time did the PLWHA take ARV on time? There were five categories of the answer as follows: (1) never, (2) sometimes, (3) half on time, (4) almost, and (5) all at on time. The optimal adherence in that study was defined as the PLWHA who took almost and all ARVs on time. But, to reach 95% of adherence, the PLWHA should not forget even single dose. Presence study defined the optimal adherence to ARV as the PLWHA who took all ARV on time.

3.2 Data Analysis

The first one, descriptive statistics was used to describe the distribution of the PLWHA's characteristics of this study. The second, bivariate analyses were done

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by using chi squared test to explore whether there was any difference in adherence among each characteristic (ignoring the co-affecting of each others). Finally, binary logistic regression was used to examine the association among its factors affecting and adherence to ART.

3.3 Operational Definition of Variables

3.3.1. Operational Definition of Dependent Variable

The dependent variable in this study was adherence to ART. It was defined as the using ARV in terms of time adherence in the last three days period that included two components which were:

The optimal adherence was defined as all ARVs were taken on time for the last three days period that was coded by 1= optimal adherence (at all time).

The sub-optimal adherence was defined as even single dose of ARV was forgotten that was coded by 0= sub-optimal adherence (never, sometime, half a time, and almost take on time).

Table 3.1 Categories and Level Measurement of Dependent Variable

Variable	Description	Categories	Measurement
Adherence to ART	Refers to the using ARV in terms of time adherence in the last three days	1 = optimal adherence 0= Sub- optimal adherence	Nominal

3.3.2. Operational Definition of Independent Variables

A total 16 independent variables with the categories and level measurement are shown in Table 3.2.

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Table 3.2 Categories and Level Measurement of Independent Variables

Variables	Descriptive	Categories	Measurement
Socioeconomic-related factors			
Age	Refers to age of PLWHA in this study in 2009	0=20-29; 1=30/39; 2≥40	Ordinal
Gender	Refers to gender of PLWHA in this study in 2009	1= male; 0= Female	Nominal
Marital status	Refers to the marital status of PLWHA of this study in 2009	0 = not spouse (single/separated/ divorced/widowed) 1= spouse (married /cohabit)	Nominal
Residence	Refers to the residence of PLWHA in this study in 2009	0 = rural; 1= urban	Nominal
Region	Refers to the region of PLWHA in this study	0= south; 1= north	Nominal
Occupation	Refers to current occupation of PLWHA in this study in 2009	0= worker, 1=farmer, 2=unstable occupation, 3= others (government staff, small businesses, house work)	Nominal
Education	Refers to the highest education of PLWHA in this study in 2009	0= primary school and less; 1=secondary & high school; 2=college and university	Ordinal
PLWHA-related factors			
Alcohol users	Refers to whether PLWHA in this study used alcohol or not for the last one month period from the interview time	0 = no; 1= yes	Nominal
Drug users	Refers to whether PLWHA in this study used drug or not for the last one month period from the interview time	0= never use ; 1 = yes	Nominal
Health care systems related factors			
Satisfaction with health care provider	Refers to whether PLWHA in this study were satisfied with the support from a health care provider or not	0= dissatisfied (very dissatisfied and dissatisfied) 1= satisfied (satisfied and very satisfied)	Nominal
Satisfaction with family support	Refers to whether PLWHA in this study were satisfied with their family support or not	0= dissatisfied (very dissatisfied and dissatisfied) 1= satisfied (satisfied and very satisfied)	Nominal
ART access availability			
Distance	Refers to the distance from the respondent's home to the hospital	0≤12km 1≥12km	Nominal
Disease characteristics			
Duration	Refers to the duration of HIV infection of PLWHA in this study	0≤3 years 1≥4years	Ordinal
Recent CD4 count	Refers to the number of CD4 at the nearest interview time	1=(≤500cells/ml) 0=(>500 cells/ml)	Ordinal
Weight	Refers to the respondent's weight at the nearest interview time	0= (≤51kg) 1= (≥52 kg)	Ordinal
ART regimen	Refers to the recent ARV regimen of the respondent	0=1a 1=1c; 3= others	Nominal

(Note: 1a=D4T/3TC/NVP; 1c=AZT/3TC/NVP; others (TDF/3TC/NVP, AZT/3TC/EFV, TDF/3TC/EFV, D4T/3TC/EFV).

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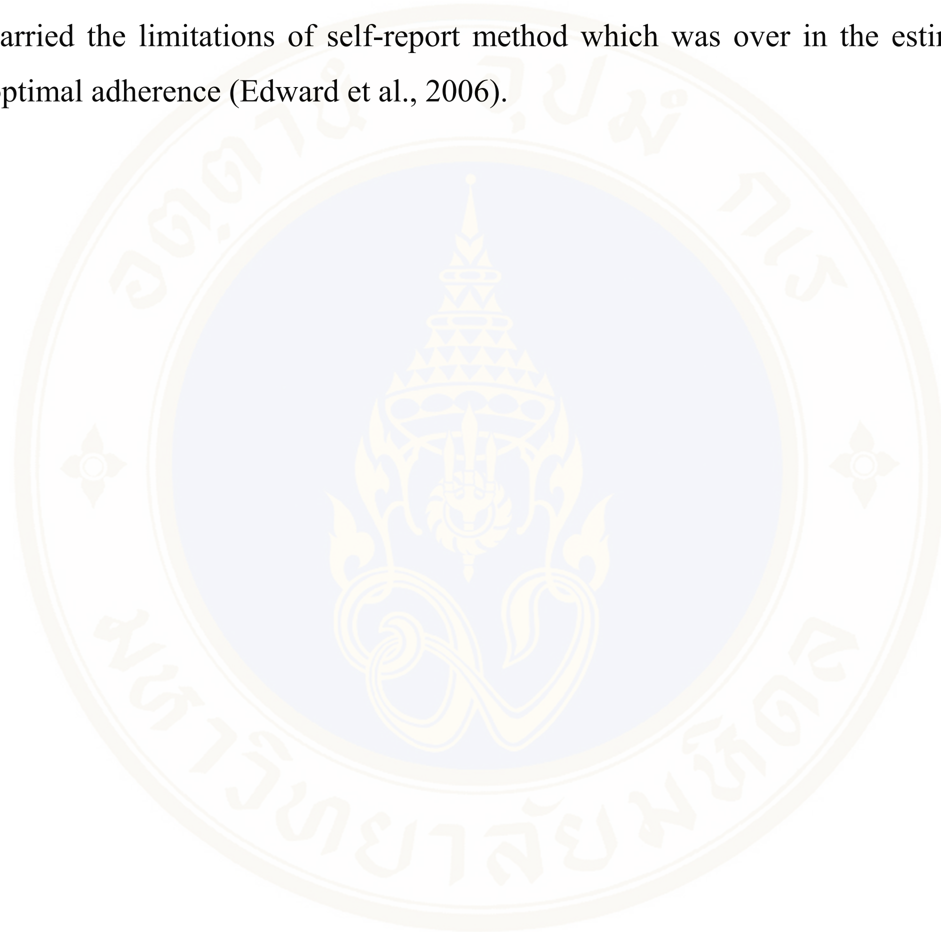
3.4 Limitations

This study used the secondary data came from a previous study is 'Evaluation Adherence to ART and the Relationship between Adherence and Outcomes of ART in Vietnam in 2009', which provided only time adherence for the last three days in terms of PLWHA self-reports. Therefore, the adherence in this study carried the limitations of self-report method which was over in the estimates of the optimal adherence (Edward et al., 2006).



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CHAPTER IV
FINDINGS AND DISCUSSION

The results of data analyses are presented in three sections. Firstly, the univariate analysis provides an overview all characteristics of the PLWHA in this study, adherence to ART, and the reasons for missing to take ART on time. Secondly, the bivariate analyses show whether there was any difference in adherence between each characteristic (ignoring other). Finally, the multivariate analyses show the factors affecting adherence to ART by using binary logistic regression models.

4.1 Characteristics of the PLWHA in this Study

All characteristics of the PLWHA in this study were as follows: the socioeconomic-related characteristics, condition-related characteristics, PLWHA-related characteristics, health care team and PLWHA's family relationship-related characteristics, and therapy-related characteristics are shown in this section.

4.1.1 Socioeconomic-related Characteristics

This section shows the socioeconomic characteristics including: age, gender, education, occupation, marital status, region and residence of the PLWHA in this study.

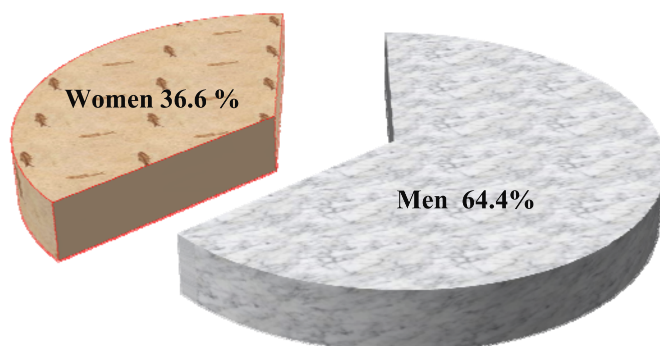

Figure 4.1 Distribution of PLWHA in Vietnam in 2009 by Gender

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There were 1206 of the PLWHA who participated in this study. Seven hundred and sixty six (64%) were male and 440 (36%) were female. The mean age male and female was similar at 33.1 (5.8) and 32.2 (5.9), respectively (Figure 4.1).

Table 4.1 Number and Percentage of the PLWHA in Vietnam in 2009 by Socioeconomic-related Characteristics

Characteristics Total	Numbers N=1206	Percentages 100%
Age group		
20-29	382	31.7
30-39	680	56.5
≥40	144	11.9
Mean = 32.7; SD = 5.9 ; Min = 20; Max = 55		
Education		
Primary school and less	160	13.3
Secondary and high school	953	79.0
College and university	93	7.7
Occupation		
Worker	132	10.9
Famer	261	21.6
Unstable occupation	328	27.0
Other	485	40.2
Marital status		
Spouse	503	41.7
Other	703	58.3
Residence		
Rural	632	52.4
Urban	574	47.6
Region		
North	345	28.6
South	861	71.4

The majority 953 (79.0%) of the PLWHA in this study who had attended at secondary school and high school, while there were only 93 (7.7%) of the PLWHA had attended at university or college (Table 4.1). The majority 328 (27.2%) of the occupation of the PLWHA was unstable occupation and there were 261 (21.6%) of the PLWHA who were farmers (Table 4.1).

The other of the PLWHA's socioeconomic characteristics are shown in Table 4.1 as follows: 703 (68.3%) of the PLWHA were not living with their partner at that time, while 503 (41.7%) of those who were living with their partner; There were

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632 (52.4%) of the PLWHA who were living in rural; and most of the PLWHA 861 (71.4%) in this study were living in the North of Vietnam (Table 4.1).

4.1.2 The Condition-related Characteristics

The condition-related characteristics were as follows: recent CD4 count, weight, duration of HIV infection and distance from home to the hospital of the PLWHA. In this study these are shown in Table 4.2.

Firstly, there were 999 (82.8%) of the PLWHA had a CD4 count, which was ≤500 cells/ml at that time and the mean (SD) of 330 (196) cells/ml (Table 4.2). Secondly, the mean (SD) weight of the PLWHA was 51.5 (6.3) kg (Table 4.2) and 629 (52.2%) of those who were ≤51 kg. Thirdly, 743 (61.6%) of the PLWHA in this study had diagnosed as being infected with HIV within ≤3 year and the mean (SD) of 3.5 (2.1) years. Finally, most of the PLWHA was living near the hospital with the distance from their home to the hospital of ≤ 2 km (Table 4.2).

4.1.3 The PLWHA-related Characteristics

The characteristics of the PLWHA in this study were expressed by risk behavior as follows: use of alcohol and drugs in the last month. Based on the PLWHA self-reports, there were 582 (48.3%) of those who reported using drugs within the last month. Likewise, 634 (52.6%) of the PLWHA said that they drank alcohol in the previous month.

4.1.4 Health Care Team and the PLWHA's Family Relationship-related Characteristics

The percentage of the PLWHA's satisfaction with support from the health care providers and their family are shown in Table 4.2. Most of the PLWHA in this study (>96%) was satisfied with both the health care providers as well as support from their family (Table 4.1), which was attributed to the PLWHA in Vietnam in 2009 receiving a very good care from their family as well as from the health care providers. Those characteristics will be not treated as the factors affecting to adherence to ART among PLWHA in this study as well as can't become the variables in this study.

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Table 4.2 Number and Percentage of the PLWHA in Vietnam in 2009 by Selected Characteristics

Characteristics Total	Numbers N=1206	Percentages 100%
Condition-related characteristics		
Recent CD4 count		
>500 cells/ml	999	82.8
≤500 cells/ml	207	17.2
Mean = 330; SD = 196 ; Min = 2; Max = 983		
Recent weight		
≤51 kg	629	52.2
≥52 kg	577	47.8
Mean = 51.5; SD = 6.3 ; Min = 32; Max = 70		
Duration of HIV infection		
≤3 years	743	61.6
>3 years	463	38.4
Mean = 3.5; SD = 2.1 ; Min = 1; Max = 14		
Distance from the PLWHA home to the hospital		
≤12 km	910	75.5
>12 km	296	24.5
PLWHA-related characteristics		
Drugs use		
No	624	51.7
Yes	582	48.3
Alcohol use		
No	572	47.4
Yes	634	52.6
Health systems-related factors & family-related factors characteristics		
Level satisfaction with health care provider		
Satisfied	1200	99.5
Dissatisfied	6	0.5
Level satisfaction with their family support		
Satisfied	1160	96.2
Dissatisfied	46	3.6

(Note: 1a=D4T/3TC/NVP; 1c=AZT/3TC/NVP; other (TDF/3TC/NVP, AZT/3TC/EFV, TDF/3TC/EFV, D4T/3TC/EFV).

4.1.5 Therapy-related Characteristics

As shown in Figure 4.2, the proportion of ARV regimen of the PLWHA in this study and in the sub-optimal adherence group concentrated on 1a regimen

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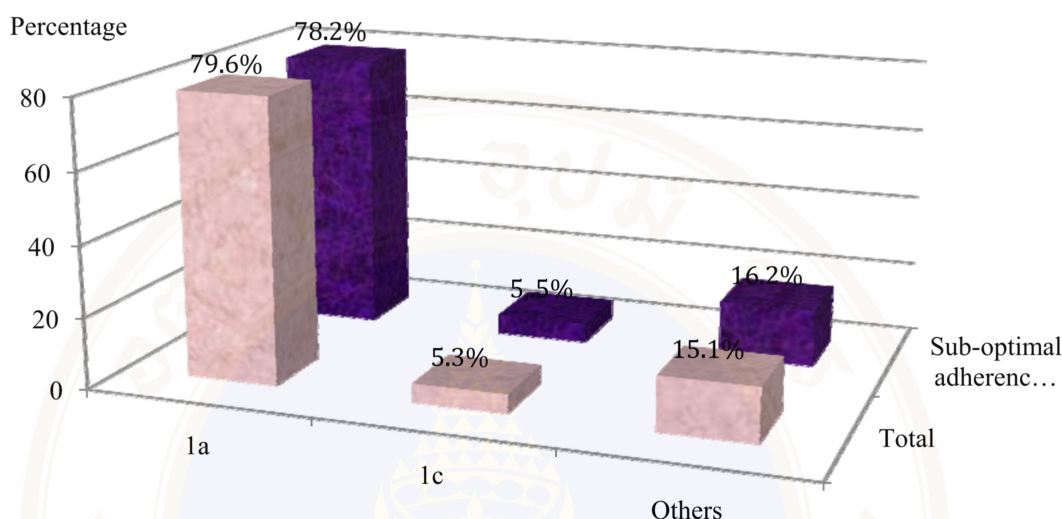
(D4T/3TC/NVP) at 79.6 and 78.2%, respectively and the lowest was 1c regimen (AZT/3TC/NVP) at 5.3 and 5.5%, respectively (Figure 4.2).



(*Note: 1a= D4T/3TC/NVP; 1c= AZT/3TC/NVP; Others = D4T/3TC/EFV; AZT/3TC/EFV; TDF/3TC/NVP; TDF/3TC/EFV*)

Figure 4.2 Proportion of ARV Regimen among PLWHA in Vietnam in 2009

4.2 Adherence to ART and the Reasons for Missing to Take ARV on Time

This section provides the proportion of adherence to ART and the reasons for missing to take ART on time of the PLWHA in this study as follows:

4.2.1 Adherence to ART

Adherence to ART in this study was defined by time adherence for the last three day period in terms of the PLWHA self-reports. Eight hundred and forty three (69.9%) out of 1206 of the PLWHA reported that they took all ARV on time for the last three days. On the other hand, 363 (31.1%) of the PLWHA reported that they didn't take all of ARVs on time for three previous days. The percentage of the optimal adherence was 69.9% while 31.3% was the percentage of the sub-optimal adherence to ART.

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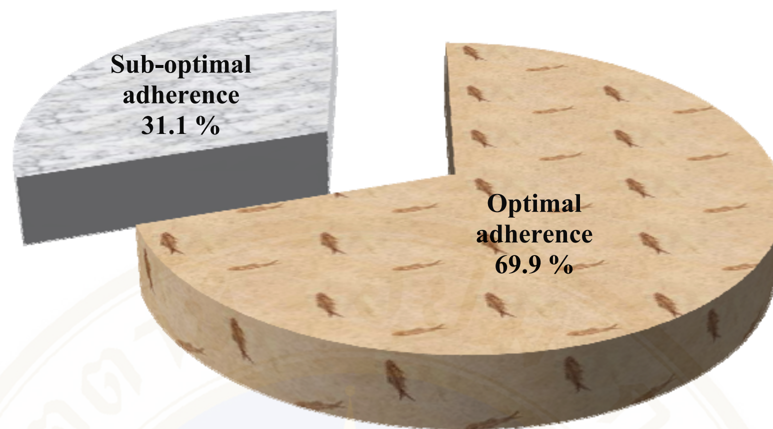

Figure 4.3 Adherence to ART among PLWHA in Vietnam in 2009

4.2.2 Reasons for Missing to Take ART on Time

A multi responses question was used to examine the reasons for missing to take ART on time for the last treatment time. There were 1333 responses for total sixteen reasons which were given by 459 out of 1206 of the PLWHA in this study (Figure 4.4).

The first and most common reason was 'being busy with other things' at 17.9%. The second reason was 'being away from home' at 14.9%. The third reason that was given for missing to take ARV on time was 'simply forget' at 13.7%. Specially, there were 42 of the PLWHA who reported that they forgot to take ART on time attributed to 'felt healthy'. The other reasons are shown in Figure 4.4.

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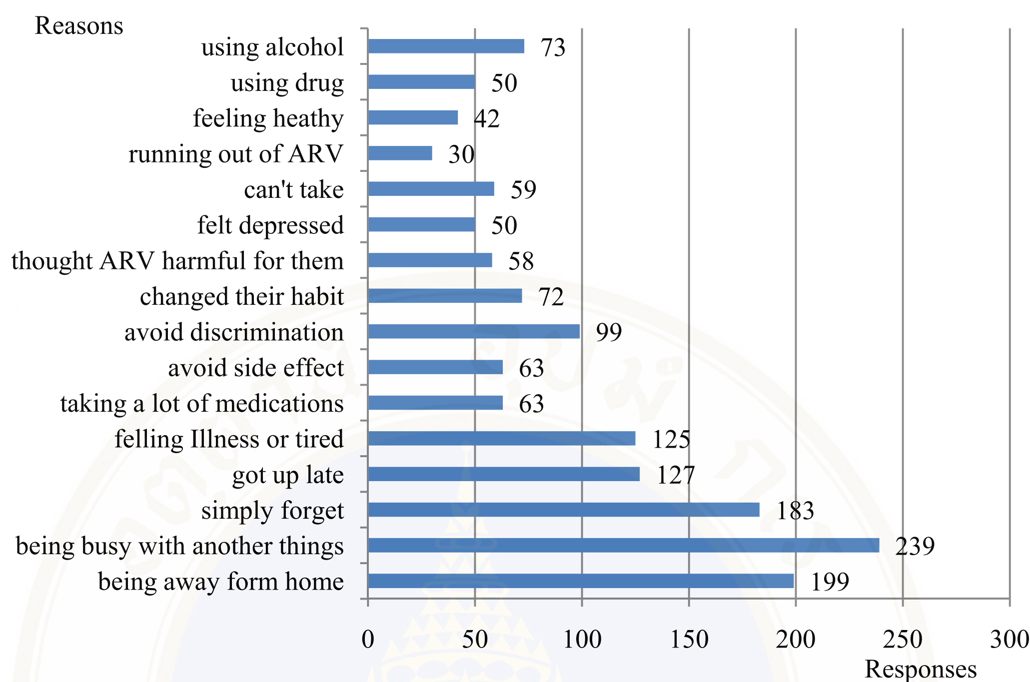

(*Note: Results from a multiple responses question, with total 1333 responses from 459 PLWHA*)

Figure 4.4 Reasons for Missing to Take ART on Time among PLWHA in Vietnam in 2009

4.3 The Difference in Adherence to ART between Each Factor Affecting this Adherence among PLWHA

This section presents the difference in adherence to ART between each factor affecting this adherence by using chi squared test as follows: the socioeconomic-related factors and the factors affecting this adherence.

4.3.1 The Difference in Adherence to ART between Each Socioeconomic-related Factor

Table 4.3 shows the difference in adherence between each socioeconomic-related factor by using chi squared test. There was a significant difference in adherence between the PLWHA's age, gender and occupation to be recognized.

The percentage of the optimal adherence among PLWHA who were older age were higher than younger age, showed a statistically significant (Table 4.3). Specially, female was recognized a significant higher in the percentage of the optimal

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adherence compared to those who was male. The percentage of the optimal adherence was highest among the worker group at 76.5%, while this was only 63.1% among PLWHA who was unstable occupation (Table 4.3).

On the other hand, the difference in adherence between other factors such as level education, residence, region, and marital status were not recognized any statistically significant (Table 4.3).

Table 4.3 Comparison in Adherence between Each Socioeconomic Factor among PLWHA in Vietnam in 2009 by Using Chi Squared Test

Variables	Sub-optimal	Optimal	Total (N=1206)		χ^2	P-value
	%	%	N	%		
					6.6	0.036
Age group						
20-29	35.1	64.9	382	100		
30-39	27.9	72.1	680	100		
≥40	27.1	72.9	144	100		
Gender					9.3	0.002
Male	33.2	66.8	766	100		
Female	24.8	75.2	440	100		
Education					3.2	0.199
Primary	34.4	65.6	160	100		
Sec & high	30.0	70.0	953	100		
College& Un	26.3	76.3	93	100		
Occupation					12.8	0.005
Worker	23.5	76.5	132	100		
Famer	25.3	74.7	261	100		
Unstable	36.9	63.1	328	100		
Other	29.9	70.1	485	100		
Marital status					3.2	0.075
Spouse	29.7	70.3	703	100		
Other	30.6	69.4	503	100		
Residence					0.2	0.685
Rural	29.6	30.1	623	100		
Urban	30.7	69.3	574	100		
Region					0.0	0.983
North	30.1	69.9	681	100		
South	30.1	69.9	345	100		

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4.3.2 The Difference in Adherence to ART between Each Factor Affecting this Adherence

From Table 4.4, the difference in adherence to ART between each factor affecting this adherence (ignoring the co-affect of others) is shown by using chi squared test as follows: the PLWHA-related factors, condition-related factors and therapy-related factors.

There was a significant which was recognized in the difference of the percentage of the optimal adherence to ART between the PLWHA who used drugs compared to those who did not use drugs in the last month. The percentage of the optimal adherence of the PLWHA who did not use drugs was 75.5% higher than those counterpart 63.9% (Table 4.4).

Table 4.4 Comparison in Adherence between Each Factor Affecting among PLWHA in Vietnam in 2009 by Using Chi Squared Test

Factors	Sub-optimal	Optimal	Total (N=1206)		χ^2	P-value
	%	%	N	%		
PLWHA-related factors						
Drugs use					19.1	0.000
No	24.5	75.5	624	100		
Yes	36.1	63.9	582	100		
Alcohol use					6.9	0.009
No	33.7	66.3	572	100		
Yes	26.8	72.3	634	100		
Condition-related factors						
Recent CD4 count (cells/ml)					3.2	0.075
>500	35.3	64.7	207	100		
≤500	29.3	70.9	999	100		
PLWHA weight (kg)					0.0	0.770
≤51	29.7	70.3	629	100		
≥52	30.5	69.5	577	100		
Duration of HIV infection (years)					1.9	0.170
≤3	28.7	71..3	743	100		
≥4	32.4	67.7	463	100		
Distance (km)					0.4	0.550
≤12	30.6	69.5	910	100		
>2	28.7	71.3	296	100		
Therapy-related factors					0.63	0.731
1a	29.6	70.4	960	100		
1c	31.3	68.8	64	100		
Other	32.4	67.7	182	100		

(*Note: 1a= D4T/3TC/NVP; 1c= AZT/3TC/NVP; Others = D4T/3TC/EFV; AZT/3TC/EFV; TDF/3TC/NVP; TDF/3TC/EFV*)

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In contrast, the percentage of the optimal adherence to ART of the PLWHA who used alcohol was 72.3%, higher than those who did not use alcohol in the previous month (Table 4.4).

The difference in adherence to ART between the PLWHA's recent CD4 count, weight, duration of HIV infection, distance from home to the hospital and ARV regimen did not show any significant (Table 4.4).

4.4 Factors Affecting Adherence to ART among PLWHA

Table 4.5 shows the association of adherence in terms of time adherence for the last three days with different independent variables was examined by using binary logistic regression model. There was a statistically significant association ($p<0.05$) identified between adherence with drugs abuse, age group, level attainment, occupation and recent CD4 count of the PLWHA in this study.

Firstly, the PLWHA who used drugs was 63% (95%CI, 44-90%) less likely to adhere to ART than those who didn't use drugs in the last month (Table 4.5).

Secondly, the relationship of the sub-optimal adherence to ART with the PLWHA who was unstable occupation was indicated clearly. The PLWHA who was unstable occupation was 58% (95%CI, 0.36-0.93%) less likely to adhere to ART than those who was worker (Table 4.5).

Thirdly, the increase in adherence to ART among PLWHA who had recent CD4 count ≤500 cells/ml was identified. The PLWHA who had recent CD4 count ≤ 500 cells/ml was 1.4 (95%CI, 1.03-2.01) times more likely to adhere to ART than those who had recent CD4 count which was over 500 cells/ml (Table 4.5).

Fourthly, adherence to ART increased 1.43 (95%CI, 1.08-1.90) times among PLWHA aged between (30-39) years old compared to those who aged between (20-29) years old. The increased of this adherence of the PLWHA among the oldest ≥40 years old compared to the youngest age group (20-29) years old was not recognized any statistically significant. However, the PLWHA who was greater than 40 years old was 1.45 (95%CI, 0.94-2.25) times more likely to adhere to ART than those who was aged between 20-29 years old (Table 4.5).

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Lastly, the association of high attainment with the optimal adherence was recognized in this study also. The PLWHA who had attended at secondary or high school was 1.40 (95%CI, 0.95-2.03) times more likely to adhere to ART than those who had attended at primary school and less only, but it didn't show any statistically significant (Table 4.5).The increased in adherence to ART among PLWHA who had highest education was stronger. The PLWHA who had attended at college or university was 1.95 (95%CI, 1.04-3.63) times more likely to adhere to ART than those who attended primary school and less only.

In addition, other factors such as: use of alcohol, duration of HIV infection and ART regimens were not associated with adherence to ART.

Looking back on the hypotheses in Chapter II and the results, one can see that:

(Hypothesis 1) The PLWHA who used drug were less likely to adhere to ART than those who didn't used drug. This study finds that the PLWHA who used drug was 63% (95%CI, 44-90%) less likely to adhere to ART than those who didn't use drug for the last one month period. This finding supports this hypothesis.

(Hypothesis 2) The PLWHA who was unstable occupation was less likely to adhere to ART than those who were workers. The finding of this study showed that the PLWHA who was unstable occupation was 58% (95%CI, 0.36-0.93%) less likely to adhere to ART than those who was worker. This hypothesis is supported by this finding also.

(Hypothesis 3) The PLWHA who had low recent CD4 count was more likely to adhere to ART than those who had high recent CD4 count. This study also shows that the PLWHA who had recent CD4 count ≤500 cells/ml was 1.4 (95%CI, 1.03-2.01) time more likely to adhere to ART than those who had recent CD4 count over 500 cells/ml therefore, this hypothesis is supported also.

In conclusion, high age, high attainment, and having low CD4 count were factors which had statistically significant to be associated with the increase on the adherence to ART found in this study. On the other hand, drugs users and the PLWHA was unstable occupation showed a statistically significant clearly to be associated with the decrease of adherence to ART were recognized also.

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Table 4.5 Final Logistic Regression Model that Predict Adherence to ART among PLWHA in Vietnam in 2009

Variables	Crude OR (95%CI)	P-value
Age group *(ref : 20-29)*		
30-39	1.43 (1.08-1.90)	0.011
≥40	1.45 (0.94-2.25)	0.096
Gender *(ref: female)*		
Male	0.85 (0.56-1.27)	0.280
Education *(ref: primary school)*		
Secondary +High school	1.40 (0.95-2.03)	0.085
College and University	1.95 (1.04-3.63)	0.037
Occupation *(ref: worker)*		
Farmer	0.96 (0.57-1.60)	0.873
Unstable occupation	0.58 (0.36-0.93)	0.023
Other	0.69 (0.43-1.09)	0.145
Marital status *(ref: not spouse)*		
Spouse	0.94 (0.72-1.21)	0.614
Residence *(ref : rural)*		
Urban	1.05 (0.79-1.40)	0.734
Region (*(ref :south)*		
North	0.94 (0.68-1.30)	0.715
Drugs use *(ref: not use)*		
Use	0.63 (0.44-0.90)	0.011
Alcohol users *(ref: not use)*		
Yes	1.05 (0.76-1.44)	0.759
Distance (km) *(ref: ≤2)*		
≥13	0.98 (0.72-1.33)	0.991
CD4 count (cells/ml)*(ref: ≥500)*		
≤500	1.44 (1.03-2.01)	0.029
Duration (years) *(ref: ≤3)*		
≥4	0.84 (0.65-1.10)	0.442
Weight (kg) *(ref: ≤50)*		
>51	1.14 (0.86-1.52)	0.333
ARV regimen *(ref: 1a)*		
1c	0.87 (0.50-1.52)	0.623
1b+1d	0.95 (0.67-1.36)	0.809
N	**1206**	
LR chi squared	**47.9**	
P-value	**0.000**	

(*Note: 1a= D4T/3TC/NVP; 1c= AZT/3TC/NVP; Others = D4T/3TC/EFV; AZT/3TC/EFV; TDF/3TC/NVP; TDF/3TC/EFV*)

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4.5 Discussion

4.5.1 Adherence to ART

This was the first time adherence to ART in Vietnam was evaluated by a large sample throughout the country. As mentioned in section 4.1, the studied subjects had the same socioeconomic characteristics of the PLWHA in Vietnam in 2009 with the prevalence of HIV infection concentrated on IDUs at approximately 50% ,and male was higher than female (VAAC, 2009).

As shown in Figure 4.3, most of the PLWHA in this study on the ARV first-line regimen with the following six kinds of ARVs: D4T, 3TC, AZT, TDF, NVP and EFV. These ARVs have to be taken every 12 hours per times and can take with or without food (WHO, 2010), hence, adherence to ART in this study was carrying the following characteristics:

Firstly, for the last three days period, total ARV which the PLHWA had to take were total six dosages. If even single dose out of six dosages was forgotten, the proportion of adherence for last three days will be equal (5/6) x100% = 83%, that is less than the optimal adherence. Therefore, reasoning to treat the optimal adherence for the three days in terms of time adherence in this study by the PLWHA who took all ARVs on time.

Secondly, in this situation even with only one question the adherence contained three parts were as follows: time (took ART on time), dose (took all of ART) and foods (could take with or without foods) adherence. That means time adherence for the last three day in terms of the PLWHA self-reports in this study was similar to other studies using the combination of time, dose and foods adherence.

Thirdly, the percentage of the optimal adherence found in this study was 69.9% (Figure 4.3) that was similar to other studies. As the finding of the VAAC at the first round of the ‘Data Collections for ART Cohorts and HIV Drug Resistance Early Warning Indicator in 2007’, 67% of the adherence indicator in several provinces was reported. Similarly, other studies in the world also used the PLWHA self- reports to measure adherence to ART, that documented the percentage of the optimal adherence was 72.4, 75.0 and 71.0 %, respectively (Tiyou et al.,2010; Amberbir et al., 2008; Golin et al., 2002).

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Fourthly, this result was lower compared to other studies, which measured adherence by dose adherence only. A study in America showed the optimal adherence which was measured by dose adherence for the one previous day and one previous week was 79 and 78%, respectively (Arnsten et al., 2001). Likewise, 18 (81.8%) of the PLWHA in a cross-sectional study in china also reported that (>or 95%) adherence on the previous three days in terms of dose adherence of the PLWHA self-reports (Wang et al., 2007).

In conclusion, similar in the percentage of the optimal adherence to other studies which used the combination of time, dose and foods adherence while that was lower than other studies which used single dose adherence measurement only. As shown in Figure 4.3, 69.9% was the percentage of the optimal adherence to ART among PLWHA in Vietnam in 2009. By this finding, an estimated 30% of the PLWHA on ART in Vietnam has been facing with HIV drug resistance strain development (WHO, 2010; FHI, 2004; HAIVN, 2007; Chesney et al., 2000).

As the consequences of ARV drug resistance strain, an estimated for a very big finance has to be purchased by the Vietnam Government in the near future to prepare ARV second-line regimens for treating the PLWHA who had developed or infected with HIV drug resistance (Bautista et al., 2006; Over et al., 2007). Moreover, not only the burden of the finance but also the burden of this disease will be bigger and bigger was attributed to the transmission of HIV drug resistance to the uninfected and drug-naive person. It believed that try to find out the reasons for the sub-optimal adherence to ART and solving these reasons to increase the percentage of the optimal adherence that is very necessary.

4.5.2 Reasons for Missing to Take ARV on Time

The reasons were given for missing to take ARV on time in this study are shown in Figure 4.4. Based on the findings of and other studies in the world one can see that:

Three common reasons were given for missing to take ARV on time by the PLWHA that were as follows: being busy with others things, being away from home and just simply forget. Similarly, three common reasons for skipping ARV’s dose which were reported as follows: simply forget, had a changed in daily routine and

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being away from home (Barfod et al., 2006). The other study documented that the following four common reasons were given for missing to take ARV: being away from home, being busy with other things, running out of ARV and simply forget (Tiyou et al., 2010) and in a Chinese's study indicated that three common reasons for missing to take ARV which were: forgetfulness, being busy and feared of ARV side effects (Wang et al., 2007).

The reasons were given for the sub-optimal adherence to ART in this study that were similar to other studies and that were well known. Moreover, before starting ART the PLWHA in Vietnam are provided knowledge about adherence to ART as well as how to adhere to ART and the important of this adherence through counseling by the health care providers. The common reasons for missing to take ART also are mentioned during counseling time to warn PLWHA against this missing. Health care providers also suggest to the PLWHA using memory aids, asking their family or friend to help to remind them to take ART on time (MOH, 2009).

The good results of the counseling before ART initial were recognized in this study through the following two signs: the first sign was all of the PLWHA in this study (100%) reported that they used the memory aids to remind themselves to take ART on time (Nguyen et al., 2010), the second sign was more than 96% of the PLWHA in this study who was receiving a very good care from their family and the health care providers. In this study these were shown by 96% of the PLWHA who were satisfied with those supports (Table 4.2).

In addition, the reasons were given for missing to take ART on time such as: 'simply forget, being busy with other things, and being away from home' were quiet easy to solve. As the suggestions of several studies, the PLWHA who was 'forgetfulness or being busy with other things' could use the memory aids to remind themselves to remember taking ARV (Dong, 2007; Tuan, 2008; FHI 2004; Golin et al., 2002). For the PLWHA who was being away from home could use the pills boxes to bring ARV along with themselves (FHI 2004; Golin et al., 2002).

However, the sub-optimal adherence to ART still occurred among 30% of the PLWHA in this study. That was questionable for both the PLWHA and clinicians so, may be the cause of the sub-optimal adherence to ART not only concentrated on those reasons which were reported, but also paid attention on the sensitive

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characteristics, which were difficult to be mentioned or difficult to be recognized or may need special intervention from special program to solving such as: drugs and alcohol abuse, unstable occupation (Altice et al., 2001; Chesney et al., 2000) or special of the PLWHA need a special helping such as: low education group, younger age (Paterson et al., 2000), for this reason, the second objective of this study that was predict adherence to ART was done.

4.5.3 Factors Affecting Adherence to ART

As shown in section 4.4 above, there were 5 factors affecting to adherence that found in this study. Two out of 5 factors were identified to be associated with the sub-optimal adherence to ART as follows: drugs users and unstable occupation. Three factors were recognized the relationship with the optimal adherence to ART that were: high attainment at college or university attended, aged between 30-39 years old and recent CD4≤500 cells/ml. Look back to the Vietnam context at that time and others findings in the world, one can see that:

Firstly, drugs users were the most consistence factor that was recognized to be associated with the sub-optimal adherence to ART in this study (Table 4.5). Likewise, the results from other studies were reported that drugs users were less likely to adhere to ART than those who were not drugs users (Haubrich et al., 1999; Tuan, 2008; Chesney et al., 2000; Golin et al., 2002).

According to VAAC, IDUs were the most at risk persons of HIV transmission in Vietnam (VAAC, 2009). They also were the most at risk of the sub-optimal adherence to ART as this finding. Both of these IDUs characteristics will make a very big challenge for Vietnamese to fight HIV/AIDS. Furthermore, HIV drug resistance may development attributed to the sub-optimal adherence (Chesney et al., 2000) among the most at risk person of HIV transmission hence, the ability of HIV drug resistance transmission in Vietnam may be very high too.

Secondly, the PLWHA who was unstable occupation was identified a relationship with the sub-optimal adherence to ART. Evidence was found that the sub-optimal adherence was associated with this group (Altice et al., 2001) and some similar findings such as: low income, unemployment and unstable household were documented to be associated with the sub-optimal adherence in several studies (Tiyou

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et al., 2010; Duran et al., 2001; Golin et al., 2002). This finding is reasonable for understanding as unstable occupation causes low income, unstable household, unemployed and be stressful. Those factors were associated with the decrease adherence to ART that were claimed in several studies (Chesney et al., 2000; Golin et al., 2002).

Thirdly, factor was identified to be associated with the optimal adherence to ART was having CD4 count ≤500 cells/ml. According to WHO, the chance to meet opportunistic infections (OIs) of the PLWHA who had CD4 count >500 cells/ml will be much fewer than those who had CD4 count ≤500 cell/ml. Healthy and no OIs will be the causes of skipping their ARV as 42 of the PLWHA's responses in this study. They said that the reason for missing to take ARV on time was felling healthy (Figure 4.4). Similarly, results of other studies documented that 'felt good' and 'asymptomatic physical' were associated with skipping ARV (Barfod et al., 2006; Sherr et al., 2008; Tiyou et al. 2010).

Moreover, according to MOH guideline for HIV/AIDS treatment and care in 2006 and 2009, the criteria of a CD4 count for starting ART at that time that was less than 200 cells/ml (MOH, 2006; MOH, 2009). As shown in Table 4.4, there were 207 of the PLWHA who had a CD4 count which had increased from less than 200 cells/ml to over 500 cells/ml. They were recognized to be less likely to adhere to ART than those who had a CD4 count ≤500 cells/ml. This finding will be a new warning for the necessity for maintaining the adherence to ART in Vietnam at that time as well as in the near future.

Fourthly, the PLWHA who was aged between 30-39 years old was more likely to adhere to ART than those who were aged between 20-29 years old (Table 4.4). There were many evidences from other studies were investigated that younger age had relationship with the sub-optimal adherence to ART (Paterson et al., 2000; Fogarty et al., 2002; Cauldbeck et al., 2009). The PLWHA who was aged between 20-29 years old was reported a relationship with drugs users and alcohol users (MOH, 2007) so, it was affecting adherence to ART indirectly. Furthermore, the PLWHA who was aged between 30-39 years old was more consistent in their family life, in their occupation and experience in daily life. Naturally, they were more responsible for

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taking care themselves and their family as well as adherence to ART than those who were aged between (20-29) years old.

Lastly, the PLWHA who had attended at the college or university was recognized significant related with the optimal adherence to ART. This finding was the same as two other studies (Paterson et al. 2000; Golin et al. 2002). The fact that, high education will be more likely to have high income, the biggest chance to get the stable occupation and great understanding about ART as well as the necessity of adherence to ART so they will be more likely to adhere to ART.

In conclusion, the results found in this study were similar to other studies. However, those findings reflected the factors affecting adherence to ART in Vietnam in 2009. That is reasonable to treat all of these findings as the evidences for both of clinicians and policy makers to develop some things new in the strategy to solving adherence to ART among PLWHA in Vietnam to have the best outcomes of ART in the future.

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CHAPTER V
CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

As mentioned in Chapter I, the objectives of this study were as follows: to examine adherence to ART among PLWHA in Vietnam in 2009 and to explore factors affecting this adherence. The data of this study was obtained for a pilot program for 'Evaluation Adherence to ART and Relationship between Adherence and Outcomes of ART in Vietnam in 2009'. The findings of this study can be divided into two parts as follows:

Firstly, the percentage of the optimal adherence to ART in Vietnam in 2009 found 69.9 % (Figure 4.3) that was similar to other studies. It indicated that adherence to ART among PLWHA in Vietnam at that time was a challenge, even though both of the Ministry of Health and health personal in Vietnam paid much attention on improving this adherence. The results also suggest that second objective of this study should be done to explore the factors affecting adherence to ART among PLWHA in Vietnam in 2009.

Secondly, the reasons for missing to take ART on time in this study were similar to other studies (Figure 4.4). These reasons were used to warn the PLWHA against the missing to take ART on time, but they still forgot to take ART because of those reasons. By this reason, the factors affecting to adherence to ART were explored.

As shown in Table 4.5, worse adherence to ART concentrated on the PLWHA who was drugs user or unstable occupation. In contrast, the PLWHA who had recent CD4 count which was ≤500 cells/ml, was high education at college or university and was aged between 30-39 years old showed a statistically significant association with the optimal adherence to ART.

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The findings were very good evidences for both the health care providers and policy makers to plan to help the PLWHA in Vietnam to improve adherence to ART in the future.

5.2 Recommendations

Based on the findings of this study, Vietnam context in recent years and a framework for the intervention to increase adherence to ART of WHO (WHO, 2003), the recommendations should be given for the health care providers, policy makers and, researchers as follows:

5.2.1 Recommendations for the Health Personnel and Policy Maker

According to WHO, the interventions to improve adherence for each dimension of factors affecting this adherence in this study could be:

For socioeconomic-related factors, in this study the PLWHA who was low levels of attainment, low aged between 20-29 years old was reported a significant association with the sub-optimal adherence. The interventions to improve adherence to ART is intensive education on use of ARV for the PLWHA who was low levels of attainment at primary school and less than primary school and aged between 20-29 years old (WHO, 2003).

For the condition-related factors, in this study the factor was recognized a significant to be associated with the sub-optimal adherence was the PLWHA who had recent CD4 count over 500 cells/ml. According to WHO, the interventions to improve adherence to ART among them including strengthen education on use of ARV and the supportive medical consultation (WHO, 2003).

For the PLWHA-related factors, the drugs users was identified a significant relationship with the sub-optimal adherence. The interventions to improve adherence among PLWHA who are drugs users as follows: monitoring drugs use, psychiatric consultation, behavioural and motivational intervention, counseling / psychotherapy and telephone counseling (WHO, 2003).

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In conclusion, three recommendations should be given for the health care providers to improve adherence to ART among PLWHA in Vietnam as follows: (1) strengthen education on use of ARV for all of them; (2) the supportive medical consultation is also very necessary; and (3) monitoring drugs use, psychiatric consultation, behavioural and motivational intervention and counseling / psychotherapy for the PLWHA who are drugs users are very necessary also.

Likewise, to support to the PLWHA through use of ART and support to the health care providers to improve adherence to ART among PLWHA. Based on the feasibility of the interventions, two recommendations should be given for the policy makers in Vietnam as follows: (1) setting up the counseling network through hold country with the professional counselors systems and the training counselors program are very necessary; (2) the telephone counseling systems should be set up or at least for PLWHA who are drugs users should be provided this service to remind themselves to remember to take ARV on time.

5.2.2 Recommendations for Further Studies

With the advantages of the PLWHA self-reports measurement compare to other methods such as: MEMS, pill counts, biological markers and pharmacy refill data. This method will be appropriate method using in low and middle income countries. Based on several studies report, the instrument of this method should be comprised of two questionnaires in terms of the PLWHA self-reports (Chesney et al., 2000; Tiyou et al., 2010) instead of using only one question in this study.

Moreover, to have the accuracy results of adherence measurement, for further research should combine the PLWHA self-reports with one or more other method such as: MEMS, pill counts, biological markers and pharmacy refill data to measure adherence to ART.

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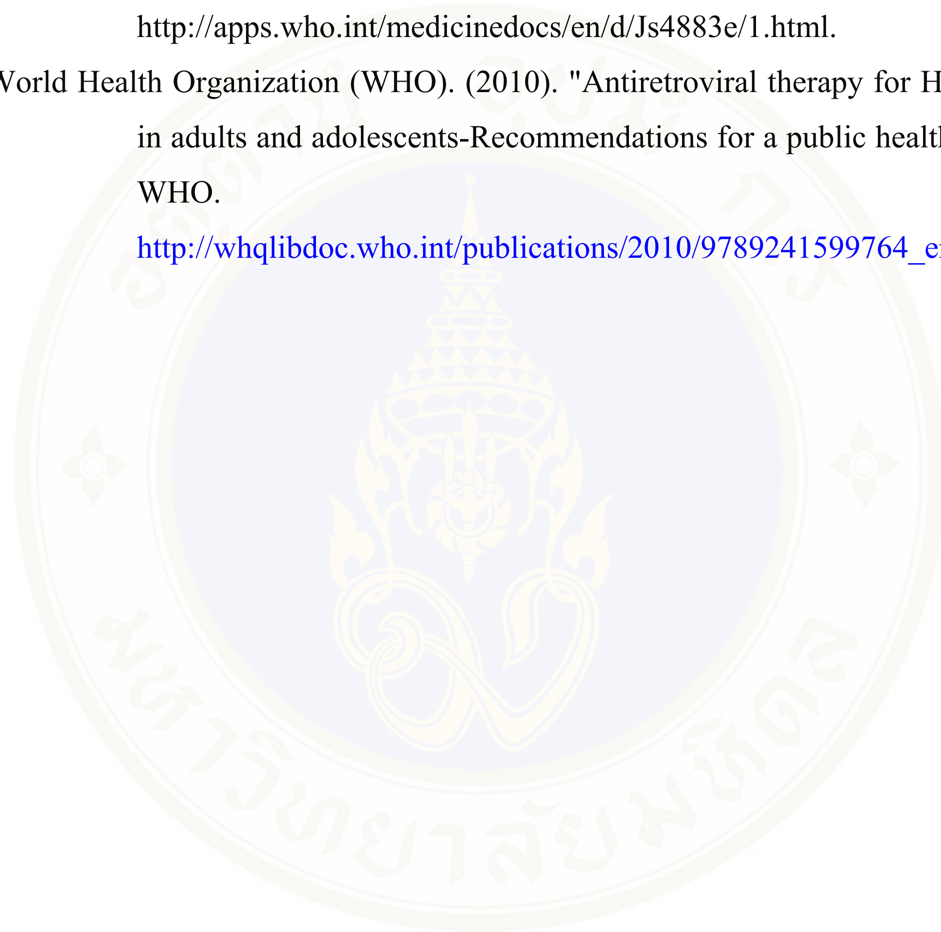

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BIOGRAPHY

NAME:	Nguyen Thi Dung
DATE OF BIRTH:	June 12, 1980
PLACE OF BIRTH:	Hanoi, Vietnam
INSTITUTIONS ATTENDED:	Hanoi Medical University, 1998 - 2004 Medical Doctor (General Practitioner) Mahidol University, 2010 - 2011 Master of Arts for Population and Reproductive Health Program at Institute for Population and Social Research.
SCHOLARSHIP:	Vietnam HIV/AIDS Prevention Project Funded by World Bank (Ministry of Health, Vietnam)
HOME ADDRESS:	Hamlet 3 - Thuong Mo Commune - Dan Phuong Suburban District - Ha Noi City Tel: 84-433886051, mobile : 84-904358622 Email: Dung.NIITD@gmail.com
OFFICE OF POSITION:	Out-patients Clinic at National Hospital of Tropical Diseases of Vietnam, 78 - Giai Phong Road - Dong Da District - Hanoi City - Vietnam

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