

**Factors Influencing Adherence to Antiretroviral Therapy
among People Living with HIV in Myanmar**

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Myanmar

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Amsterdam, The Netherlands

Factors Influencing Adherence to Antiretroviral Therapy among People Living with HIV in Myanmar

A thesis submitted in partial fulfilment of the requirement for the degree of Master of Public Health

By

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Signature.....

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
ARV	Antiretroviral (drugs)
CBR	Crude Birth Rate
CBT	Cognitive-Behavioural Therapy
CD	Communicable Diseases
CDC	Centres for Disease Control and Prevention
FDC	Fixed Dose Combination
FGD	Focus Group Discussion
FSW	Female Sex Worker
GDI	Gender Development Index
GDP	Gross Domestic Product
GII	Gender Inequality Index
HAART	Highly Active Antiretroviral Therapy
HCT	HIV Counselling and Testing
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
IBM	Intervention Behaviour Motivation
IDU	Injection Drug Users
INGO	International Non-Governmental Organizations
IVR	Interactive Voice Response
KAP	Key Affected Population
M&E	Monitoring and Evaluation
mDOT	Modified Direct Observed Treatment
MMR	Maternal Mortality Ratio
MoH	Ministry of Health
MSF	Médecins Sans Frontières
MSM	Men Who Have Sex With Men
NAP	National AIDS Programme
NGO	Non-Governmental Organizations
PLHIV	People Living With HIV
RCT	Randomized Controlled Trial
SAT	Self-administered Therapy
SEA	South East Asia
SHG	Self-Help Group
SMS	Short Messaging Services
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
TasP	Treatment as Prevention
UN	United Nations
UNDP	United Nations Development Programme
VAD	Visual Analogue Scale
WHO	World Health Organization

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Abstract

Background: The magnitude and nature of antiretroviral therapy (ART) adherence problems among people living with HIV (PLHIV), identified in other contexts and like to be present in Myanmar National AIDS Programme (NAP) as well, are largely unknown. Monitoring tools to measure adherence and interventions to address adherence-related challenges are not in place.

Objective: This paper identifies factors influencing ART adherence among PLHIV and monitoring tools and promising interventions, in order to support the NAP in implementation of adherence monitoring and development of effective interventions to optimize adherence, to improve treatment outcomes and reduce transmission of HIV at individual and societal level in Myanmar.

Methodology: The study is based on exploratory literature review. The conceptual framework of Wekesa (2007) was adapted and applied to identify important determinants of ART adherence in Myanmar.

Findings: The study found that stigma and discrimination, legal and financial constraints and knowledge about treatment, its side effects and HIV-related diseases mainly affected ART adherence in Myanmar. A clear need for monitoring tools for adherence measurement was discovered. Evidence-based interventions to address adherence issues in the Myanmar setting were identified.

Conclusions: This review highlighted important factors for optimizing ART adherence among PLHIV in Myanmar and their interrelationships. The study identified adoptable monitoring tools and effective interventions for ART adherence which were practised in comparable settings.

Recommendations: Development of enabling environment for ART clients to promote adherence, provision of a package of interventions, enforcement of monitoring and evaluation system

Key words: adherence, antiretroviral therapy, barrier, facilitator, Myanmar

Word count: 12,884

Introduction

I have been interested in HIV infection since I was a medical student. After graduation from the medical university, I specialized in Sexually Transmitted Infections (STIs) including HIV and joined the National AIDS Programme (NAP) in Myanmar. I was appointed as a programme officer to the Prevention and Control Team of Acquired Immunodeficiency Syndrome (AIDS) and Sexually Transmitted Diseases (STDs) in Mandalay Region, one of the populous areas in Myanmar. There, I also had to take responsibility for provision of treatment and care of people living with HIV (PLHIV) at antiretroviral therapy (ART) clinic. During that time when I was working in the Myanmar HIV programme as a health care provider as well as a programme officer, I experienced difficulties regarding maintenance of adherence among PLHIV on ART. In the long run, many people failed to adhere to treatment optimally. Many studies have shown that multiple factors including individual choices, socio-economic reasons and cultural beliefs are influencing ART adherence.^{1,2,3} ART has a wide range of benefits, such as prevention of spread of infection to other people and survival of PLHIV. In addition, only optimal adherence can achieve full viral suppression and prevent emergence of drug resistant HIV.²

In Myanmar, the trend of HIV infection occurrence has gone downward after a peak in 1999. The HIV programme is implementing ART roll-out nationwide. Over 60% (75,000) of PLHIV who were eligible for treatment had access to ART in 2014⁴ though only 28% received treatment in 2010.⁵ In the early 2015, the ART guideline of Myanmar was revised on the basis of the World Health Organization (WHO) consolidated guideline. The CD4 count that makes PLHIV eligible for ART has changed from 350 cells/ μl to 500 cells/ μl .⁶ The number of PLHIV on treatment would rise into several folds in the future. If provision of free ART is not coupled with adherence interventions, it may become a major concern for treatment failure in ART clients and spread of drug resistant virus in the community. The NAP has not provided proper tools to monitor adherence yet and most healthcare providers do not pay sufficient attention to adherence issues. At both the national and provincial level, data on adherence among ART clients are unavailable though formally it is part of the programme monitoring and management system. In order to optimize ART health outcomes for PLHIV and associated benefits of the community as a whole, adherence issues should not be neglected, otherwise, long-term consequences of HIV infection would be encountered. The Government would have to spend more budgets

for expensive second and third line antiretroviral (ARV) drugs. Until now, available ART regimens are limited to first and second lines in Myanmar.⁷ Those concerns motivated me to study factors influencing ART adherence among Myanmar PLHIV and make recommendations to the NAP for developing effective adherence strategies and interventions.

Chapter 1: Background Information of Myanmar

This chapter describes the background information of Myanmar.

1.1 Geography

The official name of the country of study is the Republic of the Union of Myanmar. It is also known as Burma. It is the second largest country in South-East Asia (SEA), encompassing 677,000 square kilometres, ranging 936 kilometres from the East to the West and 2,051 kilometres from the North to the South. Neighbouring countries are China on the North and North-East, Laos and Thailand on the East and South-East and Bangladesh and India on the West. On the South, it is bordered by the Andaman Sea and the Bay of Bengal. Since 2005, the new capital has been Nay Pyi Taw where the seat of the government is placed.^{8,9}



Figure 1: Myanmar Country Map¹⁰

Source: Supporting practitioners to reinforce resilience across South & South-East Asia. [cited: 29 July, 2015]

1.2 Demography

According to the 2014 census, the total population is 51.48 million, with 93 males per 100 females. The population density is 76 persons/km² and the most densely populated area is Yangon accounting for over 5.2 million inhabitants. Nearly 30% of total population lives in urban areas. The average household size is 4.4 persons at the national level without significant variations between urban and rural areas. Annual population growth rate is 0.89% and total fertility rate is 2.29. Average life expectancy for both males and females is approximately 66.8 years and the longevity of females is greater than males. The 2014 census categorized the Myanmar population into three aged groups: those aged under 15 (child population), the group 15-64 years (productive age) and those aged 65 years and above (aged

population) accounting for 28.6%, 65.6% and 5.8% respectively. Infant mortality rate (IMR) is approximately 62 per 1,000 live births. The crude birth rate (CBR) is 18.9 births per 1000 population. From 2014 census, some data [e.g., maternal mortality ratio (MMR) and crude death rate (CDR)] are not available yet as the last phase of publications is still in process.¹¹ As reported by Ministry of Health (MoH), MMR is 200 per 100,000 live births in 2013.⁴

1.3 Socio-economic and Cultural Situation

Myanmar is an agricultural country. It is one of the world's least developed countries with the Human Development Index (HDI) 0.524 and rank of 150 out of 187 countries in the 2013 HDI report of United Nations Development Programme (UNDP). The Gender Inequality Index (GII) in Myanmar was 0.430 in 2013 with its rank of 83 out of 149 countries in 2013. However, Gender Development Index (GDI) was not known because of lack of relevant data.¹² The (2009-2010) Integrated Household Survey showed that 25% of the total population were living in poverty with significant difference between rural (29%) and urban (15%) areas.¹³ As reported in the 2014 census, the unemployment rate among people aged 15-64 years in Myanmar was 4.0% with a small variation between males (3.9%) and females (4.1%).¹¹

The 2014 census reported that the literacy level in Myanmar was 89.5%, accounting for (95.2%) in urban and rural areas (87.0%). The literacy rate was 92.6% for males and 86.9% for females. Over 3.55 million people were still illiterate with 10.5%.¹¹

Myanmar is a multi-cultural and multi-religious country. There are eight major ethnicities with 135 sub-groups. About 90% of population is Theravada Buddhist. There are also minority religions: Christianity (4% of the population), Islam (4%), Animism (1%), and tiny groups of Hindus, Taoists, and Mahayana Buddhists. The national language is Burmese.¹⁴

1.4 Political Situation

In 2011, a new civil government was handed over power from the former military government. Since then, the political system has been transformed into democracy. The parliament has become a key power centre and driver of reforms. The new government has paid more attention to corruption issues and reviewed the existing anti-corruption law in the reform process. However, the corruption perception index of Myanmar was at the rank of 156th among 175 countries in the world and Myanmar was the third most

corrupt nation in Asia Pacific, as per the transparency index in 2014.¹⁵ Since the start of the transformation into democracy, Myanmar has received positive international responses to political and economic reforms.¹⁶

The political situation is quite unstable with violent conflicts between ethnic armies and the Myanmar army in Kachin and Northern Shan States and frequent demonstrations all over the country.¹⁷ The Rohingya living in Rakhine State, the western part of Myanmar is currently encountering a humanitarian crisis. This minority group is not recognized as citizens according to a 1982 citizenship law. The international Non-governmental organizations (INGOs) and United Nations (UN) agencies mainly fulfil their basic humanitarian needs.^{18,19}

1.5 Healthcare System

The MoH takes the main responsibility to provide comprehensive health care services. One of the priorities is to fight HIV and tuberculosis in the country. To uplift the health care standard; health sector reforms in terms of access to health care services, development of a health insurance system, strengthening of human resources for health and reformulation of rules and regulations are being implemented. Both public and private providers are involved in health care service delivery. The Myanmar Medical Association takes authority for accreditation of private practitioners and provides trainings them with updated diagnostic and therapeutic measures and help solve emerging issues. Public health activities are conducted by cooperation and collaboration between public and private providers. The NGOs, INGOs, other civil society and community-based organizations participate in provision of ambulatory health care, prevention and control of communicable diseases (CDs), and social health protection.⁴ In the conflict areas, MoH provides emergency medical care, disease surveillance, prevention and control of CDs and health education in collaboration with INGOs and NGOs.

The Myanmar government spent 2-2.4% of the Gross Domestic Product (GDP) on the health sector between 2001 and 2011, which was the lowest among member countries of the WHO in SEA. Social security schemes cover only 1% of population. In 2011, the contribution of development partners on total health expenditure accounted for 7%. Government health expenditure increased from 1.03% in 2010 to 3.38% of general government expenditures in 2014. However, the contribution is still low to meet all health needs. Free of charge services for medical and surgical emergencies,

deliveries and obstetric emergencies have been provided since mid-2012. The out-of-pocket payments still exist although they decline. To have adequate human resource for health, new health staff are recruited yearly. Many health facilities have been expanded in rural and urban areas, but people residing in hard-to-reach areas still have limited access to health services.²⁰

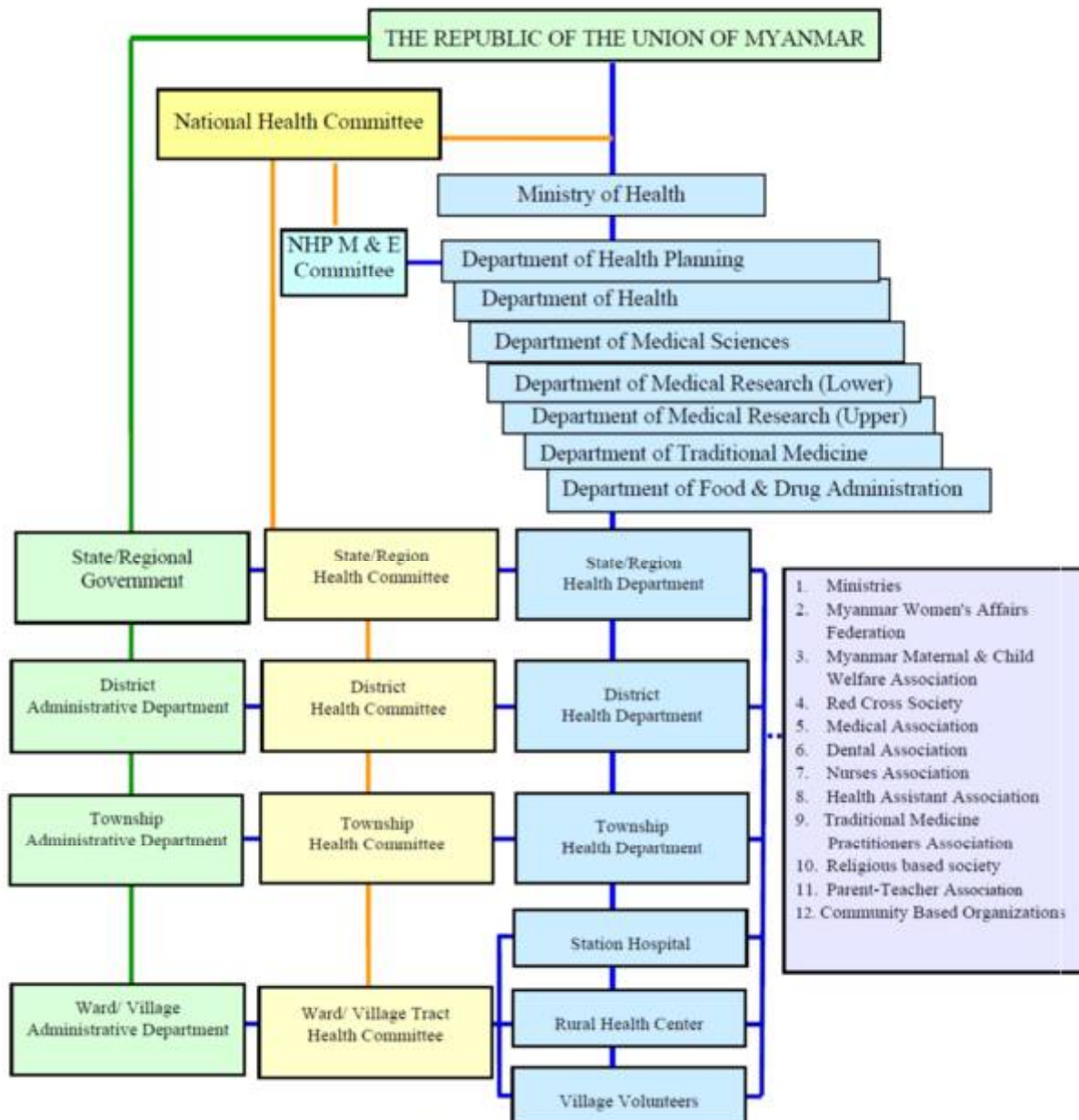


Figure 2: Organization of Health Service Delivery⁴
 Source: Health in Myanmar, MoH; 2014.

1.6 HIV and AIDS Situation

In Myanmar, the first case of HIV was detected in 1988. The peak of new infections occurred in 1999. The epidemic trend is going downwards but there remains high burden of disease. HIV prevalence is concentrated in key affected population (KAP) and is low in the general population. According to the 2013 HIV Sentinel Surveillance, the prevalence was 0.47% in the adult population (aged 15 and above). The prevalence among KAP was high: female sex workers (FSWs) (8.1%), men who have sex with men (MSM) (10.4%) and injection drug users (IDUs) (18.7%). It was 0.6% among pregnant women. There were 189,000 PLHIV, of which 37% were females. AIDS-related deaths were 15,000 and new infections exceeded 7,000 in 2013.²¹

The NAP is an institution in the MoH which mainly implements HIV care and prevention activities in Myanmar under the National Strategic Plan II (NSP II) (2011-2015) with three priorities:

- I. Reduction of HIV transmission and vulnerability particularly by people at highest risk
- II. Improvement of the quality and length of the life of people living with HIV through treatment, care and support.
- III. Mitigation of the social, cultural and economic impacts of the epidemic.²¹

The availability of services was low during the first decade of the epidemic. Even though Myanmar was one of the least developed countries in Asia, it was underfunded by international development partners because of political isolation. Sex work, homosexuality and drug abuse are criminalized. The breadth and depth of HIV preventive and treatment services were low in KAP. The 100% target condom promotions, prevention of mother to child transmission and harm reduction programmes have been implemented since 2000. Médecins Sans Frontières (MSF) Holland initiated ART services in Myanmar in 2003. The government launched the ART programme with free payments on drugs and laboratory investigations in 2005.²²

The programme has paid attention on the continuum of care for PLHIV since 2011. HIV counselling and testing (HCT) services have been decentralised since 2013. The task is shifted from laboratory technicians to other healthcare workers. Community-based HCT is implemented in non-government sectors targeting KAP in order to have more access to testing

services. Simultaneously, the number of ART centres has increased from year to year.⁷ About 140 ART centres have been established in government hospitals and STD clinics. Moreover, setting up ART decentralised sites started in 2013 to operate ARV drug dispensing. In June, 2014, 75,000 PLHIV were on ART in accordance with previous guidelines of the WHO. With ART initiation of PLHIV with CD4 count changing from 350 to 500 cells/ μ l, the number of people who are eligible for ART would have increased. The scale-up plan has targeted to cover over 100,000 patients in 2015 and 111,000 patients by the end of 2016.⁴

Chapter 2: Problem Statement, Justification, Objectives and Methodology

This chapter presents problem statement, justification, general and specific objectives and methodology.

2.1 Problem Statement

According to the current evidence, rapidly scaling-up of HIV treatment with quality assurance is essential to end the AIDS epidemic. It can improve the quality of life of PLHIV, reduce the number of AIDS-related deaths and prevent the spread of HIV infection in the community.²³ According to the 'United Nations' Declaration to Scale-up towards Universal Access to HIV treatment, care and prevention, countries in the Asia Pacific region developed a scale-up strategy for ART services.²⁴ The Myanmar NAP has a commitment to a robust ART scale-up plan. New ART centres are being established in regional and district hospitals and STD clinics. ARV drug dispensary sites are being decentralised with the target coverage of over 100 townships by the end of 2015. In 2014, nearly 60% of PLHIV who were in need of treatment were on ART. Based on the newly adapted National ART guideline, the target has already been set to provide ART for 11,000 clients with the coverage of 80% in 2015.⁴ Although the rapid scale-up of the ART programme gives many public health benefits, increased rate of loss to follow-up and issues of the ART adherence can be encountered.^{25,26} The '90-90-90' UNAIDS report describes that optimal adherence plays a role to achieve viral suppression in 90% of PLHIV receiving ART by 2020.²⁷

The WHO defines adherence as "the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider".²⁸ According to Schonnesson et al.²⁹, adherence is composed of three components: adherence to dosage, adherence to schedule and dietary adherence. Bangsberg³⁰ reported that a 95% level of adherence needs to be attained minimally to suppress viral load at 400 copies/ml. Therefore, many studies differentiate optimal and suboptimal adherence by the threshold 95% of taking medication with correct dose and at regular interval.^{31,32} In Myanmar, treatment adherence is measured by self-report only. Based on my own working experience in the Myanmar HIV programme, three sessions of adherence counselling are conducted before initiation of ART in order to ensure readiness and good understanding of clients about treatment. Ongoing adherence counselling is rarely done by health care providers,

because of client load and limited human resources. There are no other interventions to support good adherence to treatment. Although the NAP is currently implementing the ART scale-up programme, potential challenges on drug adherence have not been addressed well. No trainings on ART adherence counselling have been provided for healthcare providers from decentralised ART sites.

Although it is important for effectiveness of ART, there are very few surveys to access the level of ART adherence among PLHIV. Only two small-scale studies on the adherence issues in Myanmar are available. Tun et al.³³ did research on ART adherence in selected townships in Myanmar and mentioned that only 6.9% of 220 participants had the ever missed doses. In this study, all of the participants were self-help group (SHG) members and this selection could have affected the results. In a study of Nwe et al., it was found that 71.7% of PLHIV on treatment in public ART centre and 77.3% of those in INGO ART centre had high level of ART adherence. However, the authors did not define the levels of adherence in their study.³⁴ The findings of both studies could not represent the level of ART adherence in Myanmar, because of these limitations. The magnitude of the problem is difficult to define.

In other Asian countries, like Vietnam and Nepal, adherence issues occur among ART clients. A survey on ART adherence in Vietnam found that 24.9% of total participants via visual analogue scale and 29.1% using a modified Adult AIDS Clinical Trial Group Scale had less than 95% adherence.³⁵ A study in Nepal showed that 86.7% of respondents attained more than 95% of adherence without delays of more than one hour in the previous seven days.³ The studies measured the level of adherence in various ways. However, all the studies highlighted that ART adherence was influenced by several determinants. Without ensuring adherence, the spread of drug-resistant virus among the community can be a threat. Among all PLHIV receiving ART in Myanmar, percentages of first line and second line ART are 96 % and 3% respectively. Availability of second line ART is insufficient.⁷ Adherence to first line ART can predict the level of adherence to second line ART. Suboptimal adherence to first line ART is unlikely to suppress viral replication and most likely lead to a switch to second line ART. Maintenance of adherence to first line ART gives optimal outcomes for individuals, society and programme.³⁶ Therefore, it is high time NAP pays

attention to adherence issues to maximize individual and public health benefits.

2.2 Justification

Optimal adherence is a key to effectiveness of ART. PLHIV are given ART for dual goals: to save the life and to restrict the spread of HIV in the community. This can improve health outcomes and reduce healthcare cost at the individual level and increase cost-effectiveness at the population level. Suboptimal adherence can lead to increased HIV-related illness and death, and potential development of drug resistant viral strains individually, and increased risk of disease transmission and spread of drug resistant strains among the community. It also increases healthcare cost for clients and society, resulting in decreased income and economic productivity. Undetectable viral load prevents transmission of HIV to sexual partners and offspring.^{37,38}

In Myanmar, studies on factors influencing adherence to ART are scarce and the NAP has less attention to adherence compared to drug availability and accessibility. The information regarding ART adherence among PLHIV is very limited. Lack of adherence guidelines and proper monitoring tools form a challenge for the ART scale-up programme.^{39,40} This study aims to identify the determinants of ART adherence of PLHIV in Myanmar, and make recommendations on how the NAP could develop tailored interventions to improve adherence to ART among PLHIV.

2.3 Objectives

2.3.1 General Objective

To identify factors influencing ART adherence among PLHIV and promising interventions to improve ART adherence, in order to support the NAP in the development of design and implementation of adherence monitoring and effective interventions to optimize adherence, to improve treatment outcomes and reduce transmission of HIV at individual and societal level in Myanmar

2.3.2 Specific Objectives

1. To identify and discuss factors influencing ART adherence among PLHIV in Myanmar and other Asian countries
2. To identify monitoring tools for ART adherence assessment in Myanmar and review standardized methods of measuring adherence

3. To identify evidence-based interventions related to ART adherence applied in comparable international contexts and discuss how and which interventions can be adapted or adopted in Myanmar settings
4. To make recommendations to the MoH, NAP and other key stakeholders to optimize ART adherence among people living with HIV and AIDS in Myanmar

2.4 Methodology

2.4.1 Search Strategy

An exploratory literature review was conducted. Relevant literature was searched through PubMed, MEDLINE, Google Scholar, the Cochrane and VU library. Published and unpublished research articles and journals from Myanmar, SEA Countries and Asian countries were used. Government documents, guidelines, policy reports from WHO, UNAIDS and CDC were used to analyse the monitoring methods and interventions. Reports of local NGO, INGO and websites of community groups were assessed to obtain local information. The systematic literature reviews from the Cochrane library were assessed to identify relevant articles on a particular topic. Studies from the international context including African countries were reviewed when the conditions were comparable. English language studies conducted between 2005 and 2015 were included. Findings were discussed by triangulating different sources. Literature that was not related to the thesis topic was excluded.

Firstly, the titles and abstracts were screened. Then full-text articles were reviewed. Articles were included if they contained information on ART adherence in Myanmar and other countries. The following table (1) shows searching strategy of literature for this study.

Table 1: Search Strategy Table

Literature	Source	Objective 1	Objective 2	Objective 3
Peer-reviewed Published articles	Pubmed, Google scholar, MEDLINE, Cochrane, VU library	ART, antiretroviral therapy, adherence, barriers, facilitators, Myanmar, South- East Asian Countries, Asia, resource- limited settings	ART, adherence, Asia, developing countries, self- report, pill-count, pharmacy refill checks, direct observation	ART, adherence, intervention, treatment supporter, mobile health interventions, reminder, cognitive behavioural therapy, directly observed treatment, health education, motivational interviewing
	Key informants			Global literature (A rapid systematic review)
Grey literature	WHO, UNAIDS, CDC, MoH Myanmar, Google	annual report, Myanmar, Asia- Pacific region, Asia	monitoring tools, monitoring methods, ART adherence, measurement	interventions, ART, adherence
	Key informants	Three studies from Myanmar (Unpublished)		

2.4.2 Conceptual Framework

In order to guide the literature review, searching for applicable conceptual frameworks was conducted. Several frameworks were found: the socio-ecological framework of Roura et al., the theory of planned behaviour model of Munro et al, the information behaviour motivation (IBM) skills model of Fischer et al. and Wekesa's conceptual model of ART adherence. Socio-ecological framework of Roura et al.⁴¹ covers numerous determinants of ART adherence but fails to address psychological factors and health status of the individuals. Munro et al.⁴² paid more attention on behavioural factors but did not recognize structural factors for medication adherence. Although the IBM model enabled to address numerous factors, some factors were overlapping.⁴³ Therefore, testing that model would be complicated. Wekesa's framework dealt with a wide range of adherence-related factors. Although this framework was emphasized on Sub-saharan Africa, it was assumed to be comparable to other resource-limited settings, like the Myanmar setting. Therefore, this model was selected to assess influencing factors of ART adherence among PLHIV in Myanmar.

The original framework consists of individual factors, medical factors, community-related factors and structural and health system factors and describes health outcomes.⁴⁴ It was adapted in order to be relevant for the Myanmar setting. The adapted framework was grouped into individual factors, socio-cultural factors, medication-related factors, and structural and health system related factors, and also interrelationships between factors were shown. As adherence could give individual and community benefits, outcomes at both levels were mentioned. Policy and legal framework was included in structural factors, because it could largely affect the national response to HIV in Myanmar.²¹ By using this conceptual framework, important factors affecting ART adherence in Myanmar would be recognized. Based on these findings, effective interventions would be identified to enhance adherence.

In Wekesa's framework, demographic factors were not mentioned. However, it was included in the adapted framework. Individual factors include socio-demographic factors: age, marital status, education, alcohol and smoking, drug use, knowledge of HIV and ART, employment, psychological factors and health status.

Socio-cultural factors are comprised of gender, stigma and discrimination, disclosure of sero-status, social support, perception of treatment and well-being and use of other alternative medicines.

Medication-related factors are type of drugs: fixed dose combination or multi-tablets, long term and short term side effects, frequency of medication and duration of treatment.

Structural and health system related factors include patient-provider relationship, drug supplies, distance to health facilities, long waiting time, financial barrier and policy and legal framework.

The framework also presents the outcomes at individual and community level. Adherence can affect viral load, immunity, health cost, survival and risk of transmission of HIV in sexual partners and offspring. It also has an impact on the community such as spread of HIV infection and hinders economic productivity.

2.4.3 Limitation of the Study

The following limitations were acknowledged for this thesis.

There are no programme reports or national data available on the level of ART adherence among PLHIV in Myanmar. Therefore, the extent of the problem could not be described. This was partly remedied by including the author's working experience regarding some adherence issues of PLHIV on treatment.

Primary data collection was impossible because of time constraints. Within the timeframe process of thesis, there was not enough time to obtain ethical clearance from the Ethical Review Committee, Department of Health, Myanmar.

As there were very few studies on this issue in Myanmar, some unpublished research articles and reports of the NAP, NGOs and INGOs were used. Moreover, the study has an emphasis on adherence issues only although there could be other issues of PLHIV on treatment.

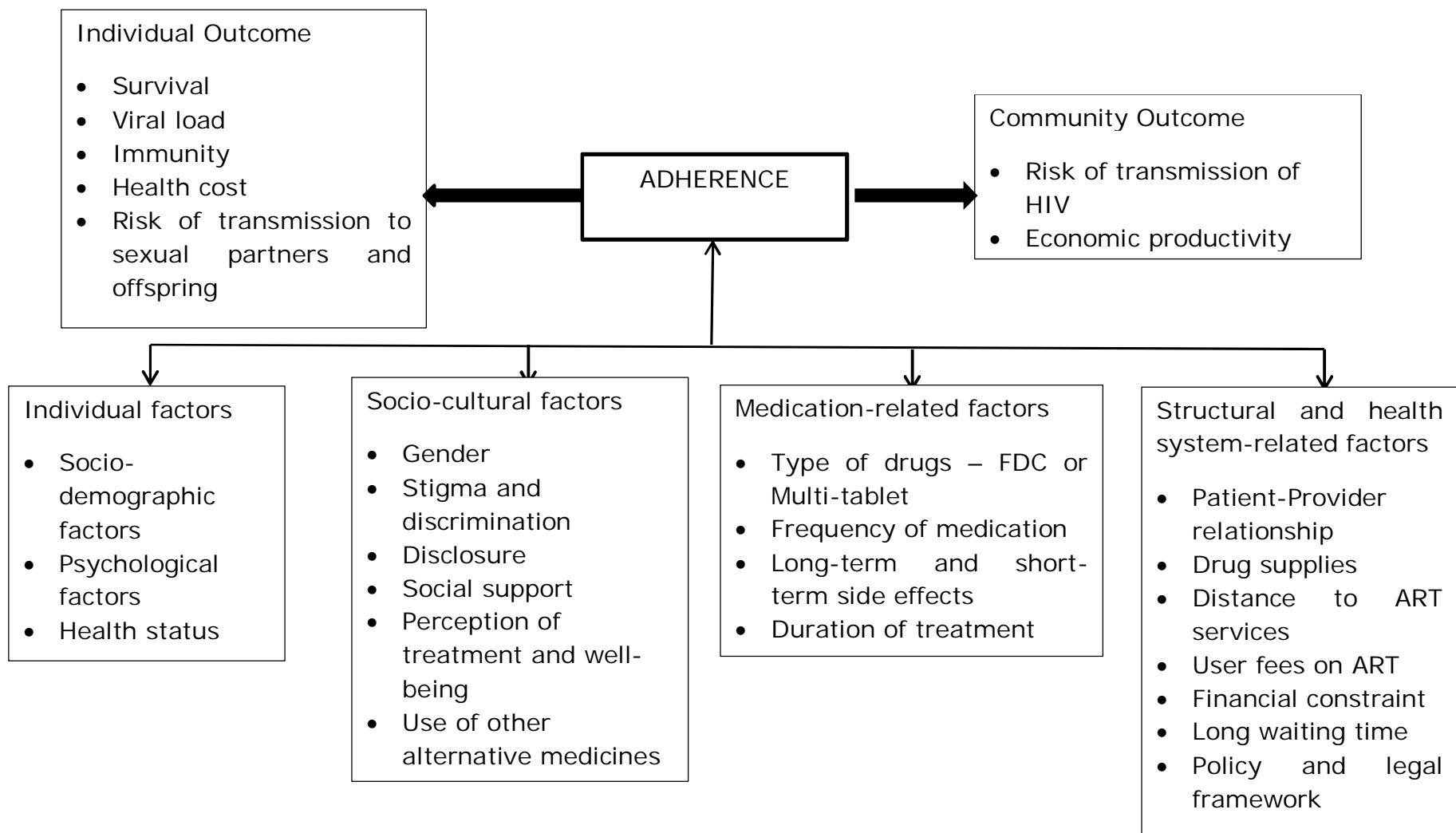


Figure 3: Conceptual Framework of ART Adherence in Myanmar⁴⁴
 Source: Adapted from Wekesa's Model, 2007.

Chapter 3: Factors Influencing ART Adherence

This chapter describes which factors are influencing ART adherence among PLHIV in Myanmar and other comparable settings.

3.1 Individual Factors

3.1.1 Socio-demographic Factors

Many studies showed that characteristics of PLHIV on treatment were unlikely to affect ART adherence. However, these factors would be explored in this review to understand the clients' characteristics in relation to medication adherence.

Age

In a study conducted in Yangon, Myanmar, there was no association between age and adherence to ART among respondents in a public and an INGO ART centre.³⁴ Their findings were supported by studies in Vietnam³⁵ and India⁴⁵ but Shidgel et al.³ found in Nepal that "a 1-year increase in age increased the odds of non-adherence by 4%". A meta-analysis conducted by Langebeek et al.⁴⁶ found older PLHIV had higher adherence level in countries with HDI, but there was no correlation between these two variables in countries with medium and low HDI. A systematic review analysing the adherence level among pregnant and postpartum women described that older aged women had better adherence to ART than younger women.⁴⁷ The association between age and ART adherence can be influenced by other individual characteristics.

Marital Status

This factor was found to be not associated with adherence in many studies.^{31,35,45} Only one systematic review of Rachlis et al.⁴⁸ described an association between marital status and ART adherence in low and middle income countries. Married PLHIV who had children were motivated to live longer and support their family. Willingness to survive favoured strict adherence.⁴⁹⁻⁵¹ An adherence study in Vietnam supported this finding that missed doses were more frequently found in single patients, compared to the married ones.⁵² In contrast, a study in Nepal showed no difference in the level of adherence between married and never married patients.⁵³ Both studies in Myanmar did not mention the relationship between marital status and ART adherence.^{33,34}

Education

Nwe et al.³⁴ found that level of education was not statistically associated with ART adherence among PLHIV in Myanmar. This finding was supported by studies in India and Vietnam.^{45,54} However, studies in Laos and Nepal showed that low level of education had impact on ART

adherence.^{2,55} Educated persons knew the effects of adherence on survival very well. Illiteracy was also related to risk-taking behaviours which led to non-adherence. Higher level of education of patients facilitated communication with healthcare providers and these patients/clients retained more health information, leading to increased adherence.² Several studies showed that illiterate people found it difficult to identify drugs and understand the advantages and disadvantages of medication.^{56,57} One cohort study in Myanmar showed increased educational attainment had strongly positive impact on clinical outcomes of PLHIV in terms of retention in the treatment program and reduced attrition rates among ART clients.⁵⁸

Employment

Employment has a major effect on ART adherence among PLHIV even in the free ART programme. Employment provides income and secures finance for basic needs of PLHIV. Unemployment impacted on livelihood, leading to food insecurity which affected non-adherence.⁵⁹ In key informant interviews conducted by the International Labour Office, unemployed people were more likely to interrupt ART medication or substitute ART with other therapies such as traditional, religious or indigenous medicines than employed people. The likelihood of psychological disorders is more common in unemployed than employed people.⁶⁰ In a qualitative study in Vietnam, fear of knowing sero-status by co-workers in workplace was a barrier to ART adherence.⁶¹ In another survey from Vietnam, unstable employment was strongly linked to sub-optimal adherence. People with formal work have issues related to stigma and discrimination, leading to missed doses and those with informal work have to deal with additional challenges such as lack of transport/money to go to health facilities.³⁵ Similarly, HIV stigma and discrimination have impact on both informal and formal workplace in Myanmar.⁶² Moreover, PLHIV in Myanmar had a limitation of job opportunities and they were often prohibited from working in food manufacturing.⁶³ No studies in Myanmar documented how employment affected the level of adherence. In a study of ART adherence among Myanmar migrants in Thailand, over 35% of respondents had missed doses and nearly 25% could not take ART on time. Most of them tried to avoid taking ART during working hours in order to keep their sero-status secret.⁶⁴

Alcohol and Smoking Habit

Alcohol and/or smoking are implicated as determinants of adherence to ART in numerous studies.^{65,66} The studies in Myanmar did not describe the impact of alcoholism and smoking on ART adherence.^{33,34} Braithwaite et

al.⁶⁵ mentioned that alcohol consumers had 1.7-4.7 times of the likelihood of non-adherence, compared to abstainers. Alcohol exacerbates immunosuppression and toxic effects of ART on the liver among PLHIV, which hinders clients to strictly adhere to medication.⁶⁵ In a meta-analysis study, 50-60% of alcohol users in the combined studies adhered to ART above 95% threshold.⁶⁶ Many studies showed that alcohol use affected outcomes of HIV treatment in Asian populations.⁶⁷⁻⁶⁹ In a study in Nepal, the respondents stated that alcohol drinking disrupted their regular medication and they often missed doses.⁵⁵

According to literature, tobacco smoking is common among HIV positive individuals.^{70,71} Current smoking was an independent predictor of poor adherence.⁷² In a secondary analysis of King et al.⁷³, it was found that high level of nicotine dependence was associated with sub-optimal ART adherence. HIV-positive smokers were more associated with other risky behaviours such as alcohol use and illicit drug use.⁷³ This finding was supported by Moreno et al.⁷² that smokers were more likely to use cocaine, heroin, marijuana and alcohol which predicted non-adherence to ART. Very few studies in Asia assessed the relationship between smoking and ART adherence. In a study of ART adherence done in Lao, 21.7% of 346 participants were current smokers but the association between two variables were not analysed.²

Illicit Drug Use

Many studies showed that illicit drug use contributed to less than 95% of adherence.^{2,74,75} Jiamsakul et al.⁷⁵ studied 12 clinical sites from Asia since 2007 and found that IDUs were less likely to adhere to ART, compared to heterosexual and homosexual exposure groups. A study in Laos also showed the significant association between illicit substance abuse and non-adherence to ART.² In contrary to those findings, Do et al.³⁵ described that substance abuse alone did not reduce adherence among Vietnamese PLHIV. In a survey on the treatment access for IDU living with HIV in Asia, it was found that two-third of study participants were in need of ART in Myanmar and only 30.6% out of them were on ART. The level of adherence among Myanmar IDU was not mentioned. In the same survey, Indian and Vietnamese IDUs had ever missed more than one dose in the last month, with a range of 65-78% of IDUs on treatment. However, about or less than one-fourth of participants had sub-optimal adherence in Nepal and China. Over 80% of those who missed doses reported the reason for poor adherence was forgetfulness.⁷⁶

Knowledge of HIV and AIDS and Information about ART

The systematic review of Hodgson et al.⁴⁷ revealed that the level of knowledge of disease and treatment influenced ART adherence. Wasti et al.⁷⁷ found that there was a negative association between lack of HIV and ART knowledge and good adherence. Several studies had similar findings.^{51,74,78} In a recent study of Hane⁷⁹, the knowledge of HIV and AIDS was high among 82.5% of 369 Myanmar PLHIV participants. However, one study showed that HIV-positive MSM had inadequate knowledge of opportunistic infections, ARV drugs and its side effects in many areas of Myanmar.⁸⁰ This finding was supported by Tun et al.³³ In Bio-Behavioural Surveillance of Myanmar (2007-2008), it was found that knowledge about HIV transmission and prevention was moderately high in both IDU and FSW. In this study, knowledge on ART was not assessed.⁸¹ Studies in Myanmar emphasized on knowledge of HIV and AIDS and only one study investigated the level of knowledge of ART. No studies explored how they affected ART adherence.

Others

When researchers explored main reasons for non-adherence in their studies, most respondents mentioned simply forgetfulness and being busy.^{78,82-84} Consistently, Nwe et al.³⁴ found that respondents missed their dose because of forgetfulness or being busy with social activities. The authors also explained that PLHIV skipped their medication when they attended such social events as marriages, funerals or festivals. This also reflected reluctance of taking drugs in front of others for fear of stigma and discrimination.⁸⁵

3.1.2 Psychological Factors

Psychological factors affect treatment adherence among PLHIV. Several mental health disorders such as anxiety and depression are associated with HIV. These undermine adherence to ART.⁸⁶ In the study of Do et al.³⁵, depression was a significant factor for ART non-adherence. One study in China underscored mental health issues of PLHIV which resulted from social isolation, stigma and discrimination. Lifelong ART itself made PLHIV feel different from others, leading to depression. It was found that some people took medicine only when they were in good mood.³¹ In Myanmar, there was no evidence found on psychological factors.

3.1.3 Health Status

The health status including comorbid infections and CD4 cell counts at the time of ART initiation also determines adherence. Many studies showed high mortality rate during six months of ART initiation and researchers

concluded that poor health status contributed to poor adherence, which could directly affect the survival of patients. Lower CD4 count (less than 200cells/ μ l) causes more opportunistic infections, leading to poorer adherence and higher mortality.⁸⁷⁻⁸⁹ A study of Rai et al.⁹⁰ showed similar findings. In Vietnam, optimal adherence was found among PLHIV with CD4 count (350-500 cells/ μ l) and poorer adherence was associated with CD4 count (<200 cells/ μ l). PLHIV with CD4 counts (above 500 cells/ μ l) also had sub-optimal adherence compared to those with 350-500 cells/ μ l.⁵² A study in Laos concluded that there was no correlation between CD4 count at the start of treatment and ART adherence.²

3.2 Socio-cultural Factors

3.2.1 Gender

Very few studies indicated that gender affected ART adherence. In an adherence study in Nepal, men had better understanding of treatment than women. Besides, socio-cultural and economic restrictions on gender affected ART adherence among females living with HIV. Therefore, Nepalese women had poorer adherence to ART compared to men.⁵⁵ However, a study conducted in India found that there was no association between gender and medication adherence.⁴⁵ The study of Nwe et al.³⁴ found that gender was not a significant determinant. Nevertheless, in a report of UNAIDS, HIV infected Myanmar women and girls had difficulty in coping with the impact of HIV and their decision-making power was restricted because of unequal power relations between men and women as well as other social factors.⁹¹ Lack of this capacity might deter the ability of HIV-infected women in adherence to ART, as proved in the study of Nepal.⁵⁵

3.2.2 Stigma and Discrimination

Internalized and externalized stigma has a great impact on ART adherence. In different cultural and social contexts, all PLHIV encounter stigma problems in their daily life.^{51,74,82,83} The stigma index survey in Asia-Pacific region showed that 7% of Myanmar PLHIV avoided going to a hospital and taking treatment because of internalized stigma. Loss of job opportunities and refusal from society and family because of positive sero-status were found. Myanmar had a rank of first in the stigma and discrimination issues: exclusion from societies and physical and verbal assaults in this survey. In most of Asian countries, KAP such as FSW, MSM and IDU had double stigma when they were HIV-infected.⁶² These sub-populations were regarded as marginalized groups in Myanmar because of their illegal status.²¹ Although stigma and discrimination existed in Myanmar, Tun et al.³³ and Nwe et al.³⁴ did not assess its

significance in ART adherence. In a qualitative study in Nepal, one participant mentioned that she failed to go to hospital for ART refills, because of fear of meeting her relatives.⁵⁵ A systematic review also showed that clients were reluctant to take ART in front of others leading to missed doses. Fear of being recognized, discrimination and isolation from family and society discouraged people from taking drugs regularly and promptly.⁷⁷

3.2.3 Disclosure

Disclosure of HIV status makes people enriched with self-skills in terms of maintenance of adherence, prevention of further spread of infection and physical, social and psychological well-being.⁹² One study proved that disclosure of sero-status helped PLHIV to get support from family and society for adherence.⁹³ Wasti et al.⁵⁵ found that PLHIV in rural areas travelled to ART facilities at far distance in order to avoid disclosure of their status to their societal environment even though they had a financial challenge in travel. In the stigma index survey of Myanmar, 61% of PLHIV had found themselves empowered by disclosure of their status.⁶¹ Nwe et al.³⁴ showed a statistically significant association between disclosure to family and good ART adherence.

3.2.4 Social Support

Support from family, peers and friends leads to increasing ART adherence. It is facilitated by disclosure of HIV status. Lack of family support can make clients miss or skip doses.^{55,94} In a study done in Mandalay region, Myanmar, most of the respondents indicated the significant role of family members (husband, wife or children) in reminding them to take medications.³⁴ In a study in Thailand, close family members including spouse/partners, parents and children had a main role in reminding clients to take medication. Besides, parents were willing to remind their adult children to take drugs regularly.⁹⁵ In the study of Tam et al.⁶¹, ART clients mentioned that peer support was the best for them to have optimal adherence. This finding was supported by the study of Bam et al.⁵³ which was conducted in Nepal. Moreover, social support could also reduce the degree of fear for discrimination and overcome financial barriers, resulting in good adherence.⁴⁹

3.2.5 Perception of Treatment and Well-being

Treatment perception significantly affects adherence. Trust in medication enhanced taking ART regularly and on time. In a mixed-method study of Nepal, one participant mentioned that people from rural area still believed

that HIV infection sentenced one to death regardless of taking ART and this devalued treatment.⁵⁵ Chomat et al.⁹⁶ discovered that perceived good health was based on absence of clinical manifestations of diseases and this impeded the regular access to treatment. A study in India could not show the statistical significance of the relationship between the perception of well-being and ART adherence, but half of the respondents with self-report of “sick” had skipped their medication when they were in good health.⁵⁵ According to the study of Bam et al.,⁵³ feeling sick was also one of the reasons for missing doses.

3.2.6 Use of Other Alternative Medicines

As ART is a lifelong treatment, PLHIV become exhausted with taking ART and hope that other complementary and alternative medicine can help them rather than ARV drugs and relieve symptoms and side effects of ART.^{93,96} A systematic review concluded that some ingredients could cause drug–drug interactions and alter ART levels in the blood, resulting in treatment failure, viral resistance and drug toxicity.⁹⁷ A survey in India found that more than 40% of 1,667 PLHIV were taking some traditional medicines. In the same study, 5% of respondents who had awareness of ART showed more beliefs in traditional medicine than ART.⁵⁹ The Myanmar traditional medicine system has been largely influenced by Indian traditional medicine during British Rule. Myanmar people have a strong belief that all diseases are treatable with traditional medicine as ancestors pass down the knowledge. The majority of people use it as a supplement.⁹⁸ Although there was no formal research on beliefs of PLHIVs about traditional medicine, PLHIV in Myanmar could also use traditional medicine, like those in comparable settings.

3.3 Medication-related Factors

There are a wide range of medication-related factors including type of drugs, number of pills, frequency of medications, side effects and duration of treatment. They play a critical role in medication adherence. In a systematic review conducted by Galen et al.,⁹⁹ ARV drugs are available in the form of fixed-dose combination (FDC) which combines two or more active drugs in a single tablet or capsule or in the form of drugs with the same active ingredients in separate pills. According to the evidence, FDC had better adherence than separate pills. However, ART programmes of many countries purchased separate pills containing the same active drugs in place of expensive FDCs, in order to reduce health expenditure. This contributed to a lower level of adherence.⁹⁹ The Myanmar ART programme provided separate pills for PLHIV most of the times. The logistic supply of ARV drugs could not be properly managed by the

programme. In some periods, FDCs were available. ART clients had frequent experience in switching from FDC to multiple pills and vice versa. Confusion of clients with dosing and frequency was often experienced while I was working in an ART clinic.

Frequency of medication can also influence ART adherence. After reviewing several studies, Galen et al.⁹⁹ assumed that once-daily regimen achieved better adherence, compared to twice daily regimen. In Myanmar, until the end of 2014, twice daily regimens were mainly used (zidovudine-based and Stavudine-based regimen).^{6,7} In early 2015, the Myanmar NAP revised the 2011 national ART guideline on the basis of 2013 WHO consolidated guidelines and the first-line regimen became a once-daily regimen (Tenofovir-based regimen) while the Stavudine-based one was phased out.⁶ Several studies also showed that duration of treatment could affect adherence. With the longer duration of treatment, clients found it more difficult to adhere to medication strictly.^{2,45}

Other contributory factors for ART adherence are long and short-term side effects of drugs. In a study of Cambodia, it was found that side effects occurring within four weeks of ART initiation (such as nausea, abdominal pain, vomiting, diarrhoea, and change in taste) could not significantly affect ART adherence. However, lipodystrophy-related side effects caused by Stavudine-based regimen (change in body shape, larger stomach, larger breasts, slimmer buttocks, legs and arms, visible veins on the legs, hollow cheeks, and accumulation of fat in the neck) largely affected the willingness of taking ART, because these symptoms represented physical markers of ART taking and increased the fear of PLHIV for stigmatization.⁹² In one study in Myanmar, one of the long-term side effects of ARV, such as numbness of extremities, was a big problem for MSM who were beauticians because of inability to work.⁸⁰ In the study done in China, 30% of 98 respondents skipped and stopped ART because of side effects of drugs.¹⁰⁰

Many studies have shown that complexity of drug regimens including high pill burden, daily dosage frequency and special administration instructions impede optimization of ART adherence.¹⁰¹⁻¹⁰⁴ Regarding administration information, it was found in my ART clinic that counsellors instructed every client to take ART at 8am in the morning and 8pm in the evening for twice daily regimen and 8pm in the evening for once daily regimen, without inquiring individual's opinion and lifestyle. When it did not fit the time schedule of some clients, they often had missed doses. The WHO has recommended to use "effective, affordable, one pill, once daily potent

ARV regimens with minimal toxicities or drug interactions'' to promote adherence.¹⁰⁵

3.4 Structural and Health System-Related Factors

3.4.1 Patient-Provider Relationship

Harmonized relationships between patients and healthcare providers can favour optimal adherence to ART.⁷⁷ Deterioration of patient's health status alters his or her trust in physician as well as treatment. Similarly, recurrence of clinical symptoms, decrease in CD4 count and increase in viral load make service providers strongly instruct patients to follow optimal adherence. This interrelation leads to a negative relationship between providers and patients, affecting the adherence.¹⁰⁶ In a study in China, PLHIV who actively participated in partnership with their healthcare provider could manage their experiences of side effects well and optimize ART adherence.¹⁰¹ The study of one civil society organization in Myanmar mentioned that MSM living with HIV had experienced discriminatory behaviour of health service providers in an ART clinic. The participants complained that providers did not give a chance for discussion their sexual practices during consultation. As a consequence, MSM clients felt uncomfortable and reluctant to receive treatment in health services.⁸⁰ In a study in Asia-Pacific countries including Myanmar, 51% of IDUs who disclosed their status in ART services received friendly attitudes of healthcare providers towards IDU. However, more than 10% experienced discriminatory behaviour of service providers and refusal of service provision.⁷⁶ In the study of Tint et al.¹⁰⁷ conducted in selected states and regional hospitals in the upper part of Myanmar, the majority of clients mentioned satisfaction with ART service providers.

3.4.2 Drug Supplies

Interrupted supply of ART is related to medication adherence.⁴⁴ Pharmacy stock-outs could lead to frequent interruption of ART among clients, resulting in increased risk of adverse health outcomes.¹⁰⁸ Several studies highlighted the importance of adequate supply of drugs in ART adherence.^{2,55,109} According to the report of OIG, no material stock-out was found in the sample of Myanmar ART centres from January 2012 to December 2013.¹¹⁰ In the study of six countries in the Asia-Pacific region, the underlying cause of frequent missed dose was inadequate supply of drugs. Limited availability of drugs led to repeated follow-up visits to refill the drugs.⁷⁶ In a study in Nepal, One participant described that one or two month prescriptions were barriers to regular access to treatment, because of short duration of follow-up and frequent travel to ART drug dispensing centres. So, short periods of prescription made the patients

adhere to ART sub-optimally.⁵⁵ A survey in Vietnam found that more than 30% of respondents had to switch to another regimen because of drug stock-out. Frequent switching from one to another regimen affected medication adherence.¹⁰⁹

3.4.3 Distance to ART Services

Long distance to ART services from home is a huge barrier to optimal adherence.^{79,82,83,103,112} In a study of Wasti et al.,⁵⁵ it was mentioned that limited number of ART sites created long distance of travel for PLHIV who resided outside the capital of Nepal, which was a major constraint to adherence. In Myanmar, 56% of PLHIV on treatment received ART in the two largest cities only until September, 2012.¹¹² ART centres and ARV drug dispensing sites started to be extended since 2013 and increased in number yearly. Until 2014, there were 140 ART centres across the country.⁴ However, the effectiveness of scale-up ART programme on adherence have not been addressed.

3.4.4 Financial Constraints

Financial constraints considerably hamper ART adherence. PLHIV with enough financial resources from developing countries had as high levels of adherence as those in developed countries.¹¹³ Several studies showed the benefit of free ART programmes on adherence, leading to positive results regarding viral load suppression.^{114,115} A study of ART adherence in one public and one private sector facility in a city of Myanmar found that reasons for lost to follow-up were not financial, as there was free access to ART services. However, this study did not address other financial issues including travel cost, opportunistic cost and other non HIV-related health cost.³⁴ In the survey of Myanmar MSM living with HIV, it was described that people who resided outside those cities had to travel long distance and faced financial constraints for travel cost and accommodation. These constraints gave rise to irregular refill visit.⁸⁰ In another study in Myanmar, an ART client mentioned that she had to buy expensive drugs for ulcers. In the same study, respondents stated the requirement of accommodation for clients from other areas to stay overnight.¹⁰⁷ In a study of Moon et al.,¹¹⁶ patients with higher WHO clinical stage of HIV infection were burdened with non-ARV cost of care including treatment of opportunistic infections and hospitalization. It was pointed that the cost of other components of care resulted in negative consequences for treatment continuation to PLHIV, regardless of the existence of free ART programme.¹¹⁶

3.4.5 Long Waiting Time

The WHO described that long waiting time at clinics was a challenge for PLHIV (especially pregnant and postpartum women) to get optimal adherence.¹¹⁷ In Myanmar, ART clinics were congested with a large number of PLHIV on ART. In one study, a participant mentioned that he had to queue for a patient booklet and for consultation or investigations as early as 6am in the morning. Therefore PLHIV from another area had to come to the city where there was an ART centre before the appointed date. As a result, they had to spend on accommodation for night stay and encountered financial constraints.⁸⁰ This precluded them from returning to a clinic for a drug refill, resulting in disruption of treatment. The study of Nwe et al.³⁴ found that long waiting time was a barrier to ART adherence for PLHIV in Yangon. In the study of Tint et al.,¹⁰⁷ 42% of 100 respondents reported less than one hour of waiting time and 33% of those who had to wait for one to two or more than two hours remarked acceptable waiting time.

3.4.6 Policy and Legal Framework

Enabling policy and legal environment favours universal access to prevention, treatment and care services for KAP.¹¹⁸ In many countries in the Asia-Pacific region, drug use, sex work and homosexuality are criminalized.¹⁰⁹ This illegal status makes KAP a marginalized group and increases stigma and discrimination.⁸⁰ In Myanmar, punitive laws for KAP are still enforced. Sex work, homosexuality, drug use and possession of needles and syringes by non-medical persons are fined or people risk imprisoning.^{21,63} The International AIDS Society highlighted the significance of supportive legal and policy environment for KAP to have access to HIV preventive and treatment services.¹¹⁹ Wolfe¹²⁰ described the practice of compulsory treatment and rehabilitation services for IDUs in Asia and the former Soviet Union. This hindered access to treatment services which was also linked to maintaining medication adherence. In Myanmar, more than 25% of PLHIV lost their job because of their HIV status. And for those still working, their income had dropped by 50%.⁶² The Union of Myanmar Federation of Chambers of Commerce and Industry has ratified workplace policies with UNAIDS to remove HIV-related discrimination in workplace, but the effectiveness has not been addressed.⁶³ Studies in Asian countries rarely addressed the legal and policy context which linked with other determinants of ART adherence.

Chapter 4: Monitoring Tools and Interventions for ART Adherence

This chapter describes monitoring tools and effective interventions for ART adherence from Myanmar and comparable international context.

4.1 Monitoring tools for ART Adherence Assessment in Myanmar and Other Settings

In the newly developed National ART guideline, self-report is the only method used for measurement of ART adherence in Myanmar. It was developed to check the number of doses missed in three days and since the last visit, taking medicines with correct dose at correct time as well as reasons for failure of adherence in every refilling visit. As a single tool could not give full information about adherence, standardized measures from other settings were reviewed to give insight on what would be appropriate additional measures in Myanmar. Viral load and CD4 tests are direct methods to measure the outcomes of ART adherence, but the cost of laboratory investigations is high. Myanmar ART clients were checked for CD4 biannually, in order to know immunological failure^{7,58} but it was not linked to ART adherence monitoring in the programme.

The WHO recommended using a combination of two methods at least to measure ART adherence and adapt monitoring tools suitable for specific countries.¹²¹ The Centres for Disease Control and Prevention (CDC) has mentioned the following methods of ART adherence which are indirect measures and most of them are simple and relatively inexpensive.¹²²

4.1.1 Self-reporting

Asking missed doses during a specified period is a good measure in resource-limited setting. This could be assessed by several methods, such as questionnaires and Visual Analogue Scale (VAS) in which PLHIV can indicate or circle their adherence level as shown in figure (5).¹²² Numerous studies showed that self-report on levels of ART adherence was reliable in assessing viral load responses.^{32,123} It was also suggested that providers should elicit the number of missed doses within a certain period.¹²⁴ The drawbacks of self-reporting are recall bias and socially desirable answers. Regardless of these drawbacks, this method is cost-effective and gives a chance to discuss immediately the non-adherence issues between client and provider, which enable the providers to help the clients choose the options for the solution to the problem, by providing information about better strategies to maintain adherence.¹²⁵

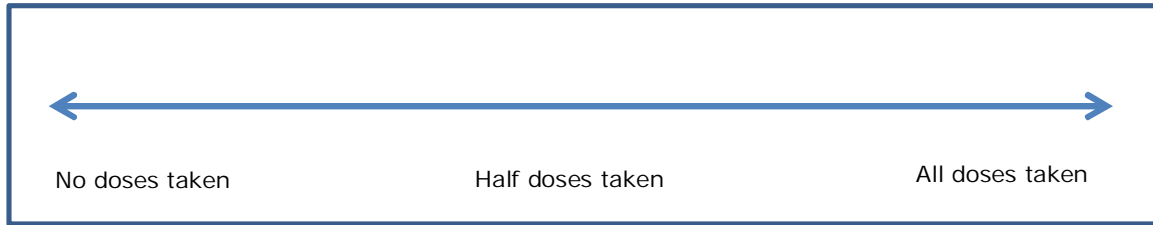


Figure 4: Visual Analogue Scale Measuring for ART Adherence¹²²
 CDC. Program monitoring companion to antiretroviral therapy adherence interventions. 2013.

4.1.2 Pharmacy Refill Checks

This method includes checking client's visit to ART dispensing clinic according to prescribed intervals. This reflects client's adherence to medication in an indirect way.¹²² However, there is a limitation that the source of medication should be only one.¹²⁵ In Myanmar, in principle PLHIV have to refill ART in the same site until they are transferred out because of their personal request.⁷

4.1.3 Pill Count

Pill count-based adherence measurement is a comparison between the actual and expected consumption by checking pills during clinic visits. It is necessary for PLHIV to bring the remaining drugs along with them when they visit the ART clinic. More human resources will be needed to practice this method. In addition, this method is time-consuming and thus costly.¹²² The clinical trial of Donell et al.¹²⁶ showed that there was a strong correlation between pill count data, biologic effect of adherence. Also over-adherence and missing pill counts reflected non-adherence.

4.1.4 Electronic Caps

Electronic caps are used in Medication Event Monitoring Systems (MEMS). These special caps can record the date and time when the patients open the bottle to take the pills. However, this method is difficult to be applied in resource-limited setting, because these caps are expensive and costly for free ART programmes.¹²² This method was only used in research.¹²⁵

4.1.5 Biological Assays

Measurement of drug level in the blood plasma or urine is also suggested by CDC. This method represents the most recent drugs taken, but does not indicate adherence for the whole prescribed period. It is also a costly and technically challenged method.¹²²

4.1.6 Direct Observation

This method may be useful in special settings, such as inpatient clinics or prisons. Human resources will be intensively needed because one person should observe a client taking ARV drugs. Reporting every dose to the clinic is infeasible for life-long treatment.¹²²

On the basis of monitoring tools mentioned above, core indicators could be developed as shown in table (2).

Table 2: Core Indicators relevant to Measurement Tools

Measurement tools	Core indicators
Self-report	Self-reported doses of ARV medicine missed over a defined period ¹²⁷
Pharmacy refill visit records	The number of days that ARV medicines were dispensed over a certain period (6 months or a year) ¹²⁷
Pharmacy refill visit records	Client attendance at appointments and the number of days until reappearance following missed appointments ¹²⁷
Pill count	Number of pills taken compared to the number of pills prescribed ¹²⁷

4.2 Effective Interventions to Strengthen Adherence in Comparable International Contexts

In order to strengthen adherence in Myanmar PLHIV, effective interventions practised in comparable international contexts were assessed. There is no best intervention or package of interventions that fit all populations and all settings. On the basis of identified factors influencing adherence in a specific context, tailored interventions are necessary. The updated WHO consolidated guidelines differentiate programme level and individual level adherence interventions.¹¹⁸

4.2.1 Programme Level Adherence Interventions

The newly developed WHO guideline identifies programme level adherence interventions to ensure optimal adherence to ART among PLHIV. They are 1) free care at the point of service delivery 2) use of FDC regimens and 3) proper drug supply management system to prevent drug stock-out.¹¹⁷ A systematic review of Souteyrand et al.¹¹³ showed achievement of high adherence in ART free programmes and reduction in the cost of more expensive second-line drugs. The meta-analytical studies of Galen et al.⁹⁸ and Bangalore et al.¹²⁸ proved that FDC regimens could

reduce the potential of non-adherence. No studies documented the effectiveness of drug supply system on ART adherence, though many studies showed it was significant for adherence.

4.2.2 Individual Level Adherence Interventions

Investigations of interventions practiced in settings where PLHIV are eligible for treatment regardless of clinical stage and/or CD4 count are not applicable to Myanmar, where the principle of Treatment as Prevention (TasP) is not applied. The strategies for adherence are different between those who are treated immediately after diagnosis of HIV and those with HIV-related symptoms or low CD4 count. Bain-Brickley et al.¹²⁹ concluded in their systematic review that adherence interventions gave promising effects on emotional well-being of patients, leading to improvement in health outcomes. The rapid systematic review of Chaiyachati et al.¹³⁰ showed strong evidence for improved adherence of five interventions: treatment supporters, active reminder devices, cognitive-behavioural therapy (CBT), modified direct observation treatment (mDOT) and education improving ART adherence in most settings.

Treatment Supporters

Treatment supporters play a key role in improving ART adherence. Chaiyachati et al.¹³⁰ described various types of treatment supporters: nurses, community support workers, peers, patients' family members and those close in proximity. They support PLHIV by discussing barriers to adherence and giving options of solutions to problems. In-home visit or peer support sessions, giving education about coping strategies and sharing feelings, fears and attitudes about HIV and ART were found helpful for improving adherence.¹³⁰ A study in India mentioned that social support from family members encouraged PLHIV to overcome stigma and social constraints and augment ART adherence.¹³¹ The findings of Knodel et al.⁹⁵ were similar; treatment supporters had a positive influence on ART adherence in Thailand, especially family members. PLHIV support groups seemed impractical to support reminding daily medication. The contrary to this finding was found in Vietnam: trained peer supporters could improve ART adherence and quality of life in clients with advanced stage of HIV, but no significant effect was found in those with WHO clinical stage 1 and 2.¹³²

Active Reminder Devices

The effectiveness of active reminder devices including both telephone reminders and other technologies, such as pagers and pillboxes with in-built timers and alarms.¹³⁰ Several randomized controlled trials (RCTs)

proved the benefits of personalized mobile phone reminder systems on ART adherence in resource-limited settings.^{133,134} In India, mobile phone services: “(i) an automated interactive voice response (IVR) call and (ii) a non-interactive neutral picture short messaging service (SMS)”,¹³⁵ were provided for ART clients to support adherence. Of two interventions, participants showed the preference to IVR and a complete case analysis proved promising effect of both interventions on adherence: increasing the proportion of clients with optimal adherence from 85% to 91%. Rodrigues et al.¹³⁵ proved that this intervention was effective for forgetfulness. A RCT of Shet et al.¹³⁶ conducted in India found no significant outcomes in virological failure or adherence by this intervention after two year follow-up period. The Indian NAP assessed the incurred cost for mHealth intervention for adherence support and found that it was relatively inexpensive and feasible to implement nationwide.¹³⁷

As per a global survey of the WHO, many countries have used m(Mobile)Health interventions with various adoption levels between developed and developing countries. North America, South America and Southeast Asia had the highest adoption levels of mHealth initiatives, in contrast with Africa.¹³⁸ A systematic review of Hovarth et al.¹³⁹ found that mobile phone text messaging was effective for promoting ART adherence. A study in Vietnam confirmed the feasibility of mobile phone text messaging to improve ART adherence in the Vietnamese setting.¹⁴⁰ In the Consolidated ART guidelines, the WHO recommends including mobile phone text messages in a package of adherence interventions.¹¹⁷

Cognitive Behavioral Therapy (CBT)

Cheyachati et al.¹³⁰ analysed RCTs on CBT either as a single intervention or in combination with other interventions. They mentioned that this intervention showed effectiveness on ART adherence. However, the design of interventions needed to be based on socio-cultural factors and health system organizational factors, as these were different from one setting to another.¹³⁰ In the trials studied, CBT was integrated with motivational interviewing (MI) and improvement in ART adherence was found.¹⁴¹ The study in Thailand proved the effect of this intervention (MI + counselling) on ART adherence among PLHIV.¹⁴² Motivation of PLHIV to change their behaviour was achieved by addressing personal issues. The review of Heijnders & VanDerMeij described the effects of CBT: reduction of self-stigma and improvement of self-esteem and stress management.¹⁴³

Modified Directly Observed Treatment (mDOT)

mDOT is one of the effective interventions in ART adherence. Goggin et al.¹⁴⁴ defined that “mDOT is a portion of medication doses under supervision”. This intervention was originated from directly observed therapy (DOT), in which patients have to take all doses of medication regimens under supervision (e.g. visiting nurses, family members, friends, etc.) from the start to the end of the course. DOT was first applied in tuberculosis patients. As HIV treatment is life-long, implementation of DOT is challenging for clients and service providers.¹⁴⁴ Many researchers modified DOT in different ways by adapting the drug regimen, duration and interval of observation, and type of administrators in their RCTs. Gross et al.¹⁴⁵ compared the effect between mDOT and self-administered therapy (SAT) in treatment-naïve HIV-1 infected people and found that the observed benefit was insignificant. Infeasibility of mDOT in the long-term and the importance of transition period from mDOT to SAT were mentioned.¹⁴⁶ Similarly, White et al.¹⁴⁶ found that the results of virologic suppression between mDOT and SAT were not significantly different in prison settings. However, Maclino et al.¹⁴⁷ found the promising outcomes of CD4 count and virologic suppression among substance users (heroin/cocaine/alcohol) on ART. Therefore, mDOT could be an effective strategy for specific populations who are in need of strict adherence.

Educational Interventions

Cheyachati et al.¹³⁰ identified that educational interventions also seem to be an effective way to improve adherence to ART. A number of education-based interventions were evaluated and the findings showed that this approach was likely to improve ART adherence among PLHIVs in resource-limited settings.¹³⁰ Similarly, the study of Tran and Houston¹⁴⁰ proved that educational interventions were effective for optimal ART adherence. Education including benefits of ART on individuals, family and community, adverse drug effects, self-efficacy and social support enhanced ART adherence and reduced the potential of HIV-related morbidity and mortality. In Thailand, educational video group sessions could give the same effect of adherence, compared with MI + counselling.¹⁴²

Chapter 5: Discussion

This chapter discusses factors influencing ART adherence among PLHIV, monitoring tools for ART adherence assessment and effective interventions which would be tailored in the Myanmar setting.

5.1 Factors Influencing ART Adherence

This section summarizes the findings regarding factors influencing ART adherence and discusses the most important factors in the Myanmar setting.

It is relevant to first share some reflections on the quality of studies that were identified and reviewed. There were only two small-scale studies on ART adherence which were conducted in selected townships in Myanmar. Both studies had several limitations, such as sample size, selection bias, and analytical methods, and the findings are not generalizable to the whole of Myanmar. Mostly, studies in Asia including Myanmar were cross-sectional. Change in the level of adherence over time was unknown. Causal relationship between variables and adherence were not identifiable. Self-report was the most commonly used measurement tool in many studies. There might be overestimation because of socially desirable answers. The literature focuses on pill adherence and failed to address schedule and dietary adherence. Furthermore, most studies were clinic-based, the respondents who participated in the study were more engaged in care and had good adherence.

Regarding individual factors, although studies were explored to address the role of age in ART adherence, findings were overall inconclusive. Marital status was not found to be a factor but a systematic review described that being married could be a motivating factor to maintain adherence.⁴⁸ Several studies have shown that high educational level facilitates the understanding of disease and treatment, which positively affects the long-term health outcomes and ART adherence.^{2,54,58} Poor health status which is related to low CD4 count is a barrier to strict adherence, because of comorbid infections and increased susceptibility to side effects, as shown by most studies.⁸⁷⁻⁹⁰ This then links to medication-related factors. Asymptomatic clients with high CD4 count can also be demotivated to take drugs regularly. Therefore, both good and poor health status can influence ART adherence. One study mentioned that smokers had the likelihood of other substance abuse like alcohol and drugs.⁷² Therefore, they seem interlinked and impact on adherence. Even in the free ART programmes, PLHIV have indirect costs such as transportation, accommodation and food. Employment fulfils the basic

needs and indirect costs for HIV treatment. Moreover, unemployment exacerbates depression, which affects adherence. So employment status of PLHIV overwhelms adherence level.

Stigma and discrimination are consistent predictors of non-adherence in many contexts while originally they are socio-cultural factors; they link to factors across several of the groups of influencing factors. KAP living with HIV experience double stigma, which delays access to health facilities and induces poor adherence. The resultant social isolation and discrimination from the family and society increase the fear of PLHIV for disclosing their sero-status. The social stigma also makes PLHIV more depressed. To avoid stigma, PLHIV in some settings were found to go to health facilities far from home for ART, despite the fact that they encountered higher costs and longer travel hours, thus interlinking with the financial barriers.⁵⁵ The effects of stigma and discrimination in a particular context can greatly influence disclosure. In many studies, missed doses were related to behaviour that avoids taking medicines in front of others and disclosing their status.^{61,64,77,85} Nischal et al.⁹³ concluded that HIV disclosure facilitated social support for adherence. Conversely, it was found that HIV disclosure and social support positively affected ART adherence. Men had better adherence to ART than women as a result of gender inequality regarding education and decision-making power between men and women. Moreover, lifelong treatment and a high pill burden develop ART fatigue and makes PLHIV test complementary and alternative medicines. This worsens illness as consequences of drug-drug interactions. Side effects of drugs cause disfigurement or disturb the ability to work.^{80,92} This induces clients to discontinue medication. Therefore, information on medication regarding side effects of drugs, HIV-related disorders and ART-taking schedules are of importance to adherence. So, socio-cultural factors are interrelated with medication factors.

Among the structural and health system-related factors, patient-provider relationship plays a key role in optimizing adherence. Good communication with service providers helps the clients get adequate information about disease and treatment and also encourages discussing their personal issues, leading to good adherence. Financial constraints also cut across various groups of factors. In spite of the ART programme being free of charge, unavailability of treatment for opportunistic infections and other co-morbid diseases as well as indirect health costs are burdens for clients. Therefore, in developing countries, financial barriers inversely correlate with adherence.¹¹⁴ Long distance to ART clinics

is also a (time and cost) barrier to adherence. Low drug stocks require frequent refill visits, thus burdening clients with travel costs. This discourages regular refill visit and leads to missed doses, as does the heavy load of clients at ART services which prolongs waiting time.

Reflecting back on the Myanmar setting, stigma and discrimination were found to be the main issues for ART adherence. These factors cause delayed disclosure to HIV and lack of social support. PLHIV and KAP were stigmatized and discriminated by healthcare providers in some ART clinics.^{76,80} One local study mentioned that one of the main reasons for missed doses among PLHIV was forgetfulness, and another reason is being busy with social activities, which reflects the avoidance of taking medication in front of other people, for fear of stigma and discrimination, in accordance with the findings of a study from India.⁴¹ The findings have shown that stigma and discrimination have impact on job opportunities and incomes of PLHIV in Myanmar, indirectly affecting adherence. Although the Myanmar NAP provides ART free of charge, clients have indirect costs, negatively influencing ART adherence. Obviously, PLHIV encounter financial barriers to optimal ART adherence. There are anti-discriminatory laws in workplace in Myanmar but they have not yet been enforced. A lack of enabling environment for PLHIV and KAP living with HIV is an important structural barrier in the Myanmar setting. This in turn enlarges the degree of stigma and discrimination. No drug stock-out was found in Myanmar ART centres, but frequent change from FDC to separate pills reflected an improper drug supply system. This has contributed to sub-optimal adherence.

Long distance to health facilities and heavy load of clients in ART centres were found as constraints of Myanmar PLHIV to have regular access to treatment, like other settings. Scaling up of ART programmes nationwide would reduce the geographical barrier for ART accessibility and decongest the number of clients in ART centres. However, it would not address the choice of some PLHIV to go to distant ART services in order to avoid stigma and discrimination. According to some studies in Myanmar, PLHIV including KAP living with HIV have inadequate knowledge about ART, its side effects and HIV-related disorders, which affects ART adherence. The counsellors also give a fixed ART-taking schedule to every client without exploring their daily personal lifestyle, and some PLHIV find it difficult to stick to the schedule, resulting in missed doses. This review highlighted the main issues of ART adherence in Myanmar and helped develop interventions tailored to the needs of PLHIV.

5.2 Effective Interventions to Enhance ART Adherence

When interventions were reviewed, it was found that the proven interventions of Cheiyachati et al.¹³⁰: treatment supporters, active reminder devices, CBT and education address several of the identified individual and socio-cultural factors influencing ART adherence.

Treatment supporters have a promising effect on ART adherence. This intervention would help address forgetfulness to take medication. According to findings in several studies, support from family members is helpful for optimizing adherence and reducing social barriers, especially stigma and discrimination. Involvement of peers, healthcare providers and counsellors as treatment supporters could benefit adherence by providing home visit and/or educating clients about coping strategies and sharing feelings concerning ART. Although HIV disclosure is not a primary outcome of this intervention, such kind of support would facilitate sero-status disclosure and vice versa.

It was also found that educational interventions were cost-effective in resource-limited settings. Treatment supporter groups could conduct education sessions for PLHIV, family and community during refill visit and/or home visit, to ensure adequate information about ART, HIV and AIDS among PLHIV on ART.

In Thailand, CBT such as MI + counselling on ART adherence was found effective.¹⁴² The components of intervention could tailor to clients' needs and empower PLHIV to reduce self-stigma and improve self-esteem. Information about ART, its side effects and HIV-related disorders could be provided during counselling session. Motivation of clients would help sustain optimal adherence and cope with personal issues. This intervention is feasible in Myanmar, as the design can be adapted to a particular context.

At present, mobile phones are widely used in many countries. Studies showed effectiveness of interactive text messaging. This improves ART adherence and overcomes forgetfulness.^{130,132,133} Based on the WHO's recommendation and evidence derived from the Indian context, mHealth interventions are adoptable in Myanmar. However, fees for using text messages would be considered. There is a need to investigate willingness to pay for it among ART clients and the implied cost for the NAP before implementation.

Of the individual level interventions, mDOT is effective for specific populations for a certain period. Facilitation of sero-status disclosure and

reduction of stigma and discrimination are important to implement this intervention. As both observer and client would be responsible for strict adherence, the maintenance of optimal adherence for long period might be infeasible.

Evidence has already shown that structural interventions are also crucial for improving ART adherence. The policy and legal system of Myanmar deters access to ART services and maintenance of adherence among PLHIV, including KAP living with HIV. Addressing these structural barriers would enhance adherence and also help to reduce stigma and discrimination against PLHIV. Although a free ART programme has been established in Myanmar, the findings of this study highlighted that making sure of free access to treatment for opportunistic infections and non-HIV related illness and strengthening of the drug supply management system and consistent supply of FDC regimens still need to be fulfilled.

5.3 Monitoring Tools Adoptable in Myanmar HIV Programme

Myanmar is in need of proper monitoring tools for adherence measurement. The self-report is the only method used in Myanmar until now. The number of missed doses three days before the visit and since the last visit is investigated in order to measure the adherence level. The validity of measuring missed doses since the last visit is unreliable as the intervals between visits vary in duration. Recall bias could be overcome by using a shorter time interval, to investigate missed doses. Despite overestimation of ART adherence, self-report is a cost-effective way of monitoring adherence for the Myanmar setting. However, in terms of evidence, using a single method cannot provide reliable information.¹²¹ Pharmacy refill checks could be useful as an additional method in resource-limited settings in spite of some drawbacks. Another good method is pill count-based monitoring. Being a time-consuming method, it might impact on waiting time. Also, this method requires cooperation of clients to bring the remaining drugs during every refill visit. More human resources would be needed to integrate one of these monitoring tools in Myanmar ART programme. Electronic caps and biological assays are costly and advanced, resulting in further financial and technical constraints. Direct observation is impractical for lifelong treatment. According to the studies reviewed, self-report, pharmacy refill checks and pill count are feasible and affordable for the Myanmar setting. Regular checking CD4 count has already existed in Myanmar ART programme. This could be integrated in monitoring adherence.

5.4 Conceptual Framework for ART Adherence

The conceptual framework was adapted to fit the Myanmar context. The model was effective in addressing a wide range of influencing factors of ART adherence relevant to Myanmar, by adding some factors such as policy and legal framework. Throughout the review process, evidence for the correlation between the legal environment and ART adherence was scarce even in the international context. However, they were found as significant factors influencing ART adherence in Myanmar. The framework also reflects the outcomes of adherence at individual and community level. Studies from Asian countries mainly focused on socio-cultural factors. Only few studies addressing other determinants of ART adherence were identified in the Asia-Pacific region. This could be explained by publication bias or researchers' interest. Although the conceptual framework mentioned user fees on ART, it was not found as a significant factor in Myanmar and other Asian countries, as the ART programmes are free of charge. It was noteworthy to observe the interrelationship between and within determinants and the interaction between different factors. The findings of the review would help the NAP develop the design of interventions to enhance ART adherence.

Chapter 6: Conclusions and Recommendations

This chapter presents the conclusions of the literature review and recommendations for the NAP and other stakeholders.

6.1 Conclusions

This literature review explored individual, socio-cultural, medication-related, and structural and health system-related factors influencing ART adherence in Myanmar and other comparable settings, in order to address adherence issues of PLHIV in Myanmar. According to findings, stigma and discrimination, financial and legal constraints and knowledge about HIV, AIDS and ART are underscored as important barriers to ART adherence in Myanmar.

In this review, the effect of stigma and discrimination was found dominant in Myanmar. It delayed HIV disclosure, leading to lack of social support and poor adherence. In the healthcare settings, PLHIV especially KAP were stigmatized by service providers, leading to disharmonized relationship between clients and providers. As a result, clients do not get adequate information about treatment, its side effects and HIV-related diseases which is crucial for trust in ART and perception of well-being. Knowledgeable clients enable to maximize adherence and sustain it for a long period. PLHIV also encounter stigma and discrimination in formal and informal workplaces, which affects their employment status. Unemployment or low income makes PLHIV insecure of finance for basic needs and indirect costs. Even in the free-of-charge ART programme, they encounter financial constraints because of long travel to ART centres and lack of accommodation for night stay during refill visit. Furthermore, the programme covers costs for ARV drugs and laboratory investigations but not for opportunistic infections and non-HIV related care. This in turn leads to sub-optimal ART adherence. In Myanmar, punitive laws for KAP impede access to ART services and maintenance of ART adherence. In workplace, anti-discriminatory laws for PLHIV do not seem to be enforced although they are in place. These make PLHIV including KAP more stigmatized and discriminated. This review addressed other factors influencing ART adherence in Myanmar, but their effects were not clearly seen.

Evidence-based interventions which would be useful to address main adherence issues in Myanmar were identified. Treatment supporters, active reminder devices, CBT and educational interventions would address several factors influencing ART adherence in this context. Treatment supporters and CBT are interventions that address stigma issues and

affect other determinants of ART adherence such as HIV disclosure and social support. Financial and legal constraints can be addressed at the programme level. The NAP is the main body to cooperate and collaborate with other sectors at national and sub-national level. So the programme enables to negotiate other governmental sectors to create enabling environment for PLHIV and KAP. Addressing legal barriers would reduce stigma and discrimination also. Enforcement of anti-discriminatory laws in workplace needs to be encouraged. This would secure the employment status of PLHIV and help overcome the financial barriers. Knowledge about HIV and ART can be improved by providing peer education sessions as well as ART adherence counselling which is one component of CBT. A package of complementary interventions can promote adherence to ART. The evidence shows that they all are feasible and adoptable in resource limited settings like Myanmar. Some interventions would be more appropriate to specific groups of ART clients. Therefore, the characteristics of targeted clients and socio-cultural environment need to be considered for the development of interventions.

Based on the findings of this study, it is obvious that there is the need to strengthen the monitoring and evaluation (M&E) system of ART adherence measurement in Myanmar. More than one monitoring tools are required. Self-report, pharmacy refill checks and pill count were found as simple and inexpensive measurement methods. Although each method has some drawbacks, the combination of tools would give more reliable information about adherence level of Myanmar PLHIV. Proper indicators relevant to these measurements could be developed, as described in chapter 4. This would help the programme monitor adherence and identify the need of interventions to improve it.

As mentioned above, the findings of this review would guide the development of monitoring tools and interventions to enhance adherence in Myanmar. Nevertheless, further research needs to be conducted to have more information about adherence to ART in this context.

6.2 Recommendations

The findings of the review suggest the development of adherence-enhancing strategies, monitoring tools and effective interventions which address the most important influencing factors of ART adherence. The NAP takes the role of leadership to develop HIV policy, under the guidance of MoH. In the field of care and treatment, the staff of MoH, NAP, INGO and NGO are main implementers. In Myanmar, the information about private sector (for profit) involvement in HIV care in

terms of the number of clients receiving ART, the number of providers delivering services and quality of care is unavailable. Therefore, the targeted audience for recommendations are MoH, NAP, INGOs and NGOs.

MoH and NAP

1. Key gaps in policy and legal framework affecting PLHIV and KAP to reduce stigma and discrimination should be addressed. The MoH and NAP should engage with other ministries such as Ministry of Justice and Ministry of Social Welfare for amendment of punitive laws for KAP: FSWs, MSM and IDU and enforcement of protective laws such as anti-discriminatory laws for PLHIV in the workplace.
2. A package of adherence interventions tailored to the Myanmar setting needs to be developed. Peer support teams for ART adherence should be established in all ART services. Training on MI and ART adherence counselling should be provided for service providers, counsellors and peers. Ongoing adherence counselling should be encouraged. Family member involvement in treatment supporter programme should be encouraged. Peer education sessions during refill visit should be provided. Trials for mHealth interventions for adherence support in some ART services should be piloted in some ART services and then full-scale projects should be implemented.
3. The M&E system regarding ART adherence measurement should be strengthened. Pharmacy refill checks and/or pill count-based methods could be integrated with self-reporting for ART adherence measurement. Direct and indirect measurement methods (e.g. CD4 count and self-report) could be combined. Funding resources need to be mobilized for M&E of adherence. Proper indicators for ART adherence and standardized data-reporting format should be developed to strengthen recording and reporting system of ART adherence in ART centres and ARV drug dispensing sites. Monthly reporting system should be enforced to be functional.
4. Further research should be conducted on
 - a. How determinants affect ART adherence over time,
 - b. Knowledge, attitudes and practice of ART among PLHIV and specifically KAP living with HIV,
 - c. Adherence issues among KAP living with HIV and
 - d. Cost-effectiveness for mHealth interventions and perception of ART clients on SMS and IVR to advance adherence in Myanmar.

INGOs and NGOs

1. Adherence support activities such as stigma reduction activities, peer education sessions and home visit should be incorporated into existing HIV support programmes.
2. Collaboration and cooperation with PLHIV SHGs in adherence promoting activities should be strengthened.

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