A SOCIO-ECOLOGICAL VIEW OF FACTORS INFLUENCING ART ADHERENCE AMONG WOMEN LIVING WITH HIV IN BALI, INDONESIA

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A thesis submitted in partial fulfilment of the requirement for the degree of

Master of Science in International Health

by

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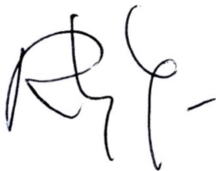

Master of Science in International Health (MIH)

KIT Institute/Vrije Universiteit Amsterdam
Amsterdam, The Netherlands

August 2024

Organised by:

KIT Institute
Amsterdam, The Netherlands

In cooperation with:

Vrije Universiteit Amsterdam (VU)
Amsterdam, The Netherlands

Abstract

Title: A Socio-Ecological View of Factors Influencing ART Adherence Among Women Living With HIV in Bali, Indonesia

Background: Indonesia faces major challenges in HIV diagnosis, treatment, and viral load control, with significant gaps from the UNAIDS 95-95-95 targets. By 2022, only 79% of people living with HIV were aware of their status, 41% were receiving Antiretroviral Therapy (ART), and 19% had achieved viral load suppression. The number of new HIV infections among women increased from 12,573 in 2015 to 17,839 in 2021. Women represent 35% of the 540,000 people living with HIV in Indonesia, and ART coverage for women was just 29% in 2022. In Bali, approximately 27,000 people are living with HIV, with women making up 31% of this population. Women living with HIV (WLHIV) in Bali faces unique challenges impacting ART adherence. This study investigates the factors influencing ART adherence among WLHIV in Bali using a socio-ecological framework.

Methodology: Employing a socio-ecological model, this study analysed individual, interpersonal, community, health system, and policy-level factors affecting ART adherence. Data were gathered through key informant interviews with healthcare providers and a review of relevant literature.

Results: The study identified a range of factors impacting ART adherence among WLHIV in Bali. At the individual level, education level, income and mental health were significant. Positive interpersonal relationships, including support from family, partners and healthcare providers, were associated with higher adherence. Community-level, stigma and societal norms were major barriers, while health system factors such as access to services and quality of care were critical determinants. Policy factors, including supportive ART policies and health insurance schemes, played a role in improving adherence.

Conclusion: Addressing ART adherence in Bali requires a multi-faceted approach. Recommendations include integrating mental health support, enhancing interpersonal support, combating stigma, improving healthcare access, and reinforcing supportive policies to improve ART adherence and treatment outcomes for WLHIV.

Keywords: ART adherence, HIV, Women Living with HIV, Bali, Indonesia

Word count: 11,498

Table of Contents

Abstract .... *iii*

Table of Contents .... *iv*

Table of Figures .... *vi*

Abbreviations .... *vii*

Acknowledgements .... *viii*

1. Introduction .... *ix*

2. Background *1*

2.1. Indonesia 1

2.2. Bali 2

2.3 Economic Context in Indonesia and Bali 3

2.4. Health System in Indonesia and Bali 4

2.5. HIV Situation in Indonesia 6

3. Problem Statement, Justification, and Objectives *8*

3.1. Problem Statement 8

3.2. Justification 9

3.3. Objectives 9

3.3.1 General Objective 9

3.3.2 Specific Objectives: 9

4. Methodology *10*

4.1. Methods 10

4.2. Analytical framework 12

5. Results *14*

5.1. Individual Factors 14

5.1.1. Sex 14

5.1.2. Age 14

5.1.3. Education Level 15

5.1.4. Income 15

5.1.5. Mental Health 16

5.1.6. Spirituality 18

5.1.7. Comorbidities 18

5.1.8. Past Experiences 19

5.2. Interpersonal Factors 20

5.2.1. Family 20

5.2.2 Partners 20

5.2.3 Friends 21
5.2.4 Healthcare providers 22

5.3 Community Factors 22
5.3.1 Community support 22
5.3.2 Stigma or discrimination 23
5.3.3 Cultural Norms, Traditions, and Beliefs 24

5.4 Healthcare System Factors 25
5.4.1 Distance 25
5.4.2 Waiting times 26
5.4.3 Availability of ART medication 26
5.4.4 Availability of healthcare workers 27
5.4.5 Bureaucracy 27

5.5 Policy Factors 28
5.5.1 National Health Insurance 28
5.5.2 Government policies 29

6. Discussion 30

7. Conclusion and recommendations 32

7.1. Conclusion 32

7.2. Recommendations 32

References 34

Annex 1. Search Strategy (table) 39

Annex 2. Interview Guide For Key Informants 41

Annex 3. Informed Consent Form For Interview Participants 44

Table of Figures

List of Figures
Figure 1. Map of Indonesia
Figure 2. Map of Bali
Figure 3. Socio-ecological framework

List of Table
Table 1. Search Strategy Table

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
ASEAN	Association of Southeast Asian Nations
BPJS	Badan Penyelenggara Jaminan Sosial (Social Security Administration)
CDC	Centres for Disease Control and Prevention
CD4	Cluster of Differentiation 4
GDP	Gross Domestic Product
AHF	AIDS Healthcare Foundation
HIV	Human Immunodeficiency Virus
IEC	Information Education Communication
INA-CBG	Indonesia Case-Based Groups
JKN	Jaminan Kesehatan Nasional (National Health Insurance)
KDS	Kelompok Dukungan Sebaya (Peer Support Group)
KII	Key Informant Interviews
MMD	Multi-Month Dispensing
NGO	Non-Governmental Organization
OOP	Out-of-Pocket
PI	Principal Investigator
PLHIV	People Living with HIV
PMO	Pengawas Minum Obat (Medication adherence supporter)
PMTCT	Prevention of Mother-to-Child Transmission
Puskesmas	Pusat Kesehatan Masyarakat (Community Health Center)
SUFA	Strategic Use of ART
TB	Tuberculosis
UHC	Universal Health Coverage
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization
WLHIV	Women Living with HIV
WPS	Wanita Pekerja Seks (Female sex worker)

Acknowledgements

I would like to express my deepest gratitude to the KIT Fund for supporting my master's studies and making this academic journey possible.

A special thanks to my academic advisor and thesis advisor for their invaluable support, enthusiasm, and insightful feedback throughout the thesis process. Your guidance has been instrumental in shaping this study.

I am also deeply grateful to the course management team at the Royal Tropical Institute for their technical and emotional support during my studies. My appreciation extends to my classmates and my only Indonesian best friend in Amsterdam, your friendship and support have meant the world to me.

Lastly, I am profoundly thankful to my parents for their unwavering love and support, which has been a constant source of strength and motivation.

1. Introduction

My journey into international health, particularly focusing on HIV/AIDS, began during my medical studies at Udayana University in Bali, Indonesia. Joining the AIDS Care Student Group opened my eyes to the complexities of HIV/AIDS and sparked my interest in addressing these challenges on a broader scale.

For the past seven years, I’ve worked at the Kerti Praja Foundation (KPF) in Bali, a non-governmental organisation focused on HIV/AIDS prevention, diagnosis, and treatment. As a clinician, I’ve provided care to people living with HIV/AIDS and participated in various HIV prevention programs. One of the most impactful roles I’ve held is project manager for the Prevention of Mother-to-Child Transmission (PMTCT) project. Leading a team that educates, counsels, and tests pregnant women for HIV has shown me the challenges in fighting this disease.

My work at Kerti Praja Foundation (KPF) has strengthened my commitment to addressing HIV/AIDS at both individual and community levels in my home country and demonstrated that addressing HIV/AIDS requires more than just medical treatment; it involves understanding and tackling broader socio-ecological factors, including socio-economic and cultural influences that affect health outcomes. This approach aligns with the principles of international health, which focuses on addressing health disparities and improving health outcomes on a global scale.

HIV remains a significant challenge in Indonesia. In 2022, around 540,000 people in Indonesia were living with HIV, but many don’t know their status or aren’t receiving treatment. Women, who make up 35% of the HIV population here, present unique challenges due to the interaction of socio-ecological factors. Optimal adherence is critical to achieving complete viral suppression and preventing the emergence of drug-resistant strains of HIV. Without appropriate adherence interventions, the benefits of ART can be compromised, leading to treatment failure and increased transmission rates.

My thesis, titled “A Socio-Ecological View of Factors Influencing Antiretroviral Therapy Adherence Among Women Living with HIV in Bali, Indonesia,” aims to identify and analyse the diverse factors affecting ART adherence among women in Bali. By understanding these factors through a socio-ecological framework, I hope to contribute to the development of more effective, targeted interventions. These interventions are crucial for enhancing adherence rates, improving health outcomes, and ultimately, supporting broader public health efforts to control HIV in Indonesia.

2. Background

2.1. Indonesia

Figure 1. Map of Indonesia (1)

Indonesia, officially called the Republic of Indonesia, is a country in Southeast Asia, located between the Indian and Pacific Oceans. Indonesia is the world's largest archipelago with more than 17,000 islands, including major ones like Sumatra, Java, Sulawesi, and parts of Borneo and New Guinea. Indonesia covers an area of 1,904,569 square kilometres (735,358 square miles), making it the 14th-largest country in the world. The islands stretch from 95°E to 141°E longitude, crossing the equator and featuring a wide range of ecosystems and wildlife (1,2).

Indonesia has a population of over 280 million people, making it the fourth-most populous country in the world and the country with the largest Muslim population. Java, the most populated island globally, has more than half of Indonesia's people, showing significant urbanisation in certain areas. The capital city, Jakarta, is the second-most populous urban area in the world and is the country's main centre for economy, politics, and culture (3,2).

Indonesia is a presidential republic, meaning it has a president who acts as both the head of state and government, and an elected legislature. The country is divided into 38 provinces, nine of which have special autonomous status to address their unique regional needs. This structure allows for local governance and policies that cater to regional characteristics (1).

Indonesia is known for its rich cultural and ethnic diversity, with over 1,300 ethnic groups and more than 700 languages spoken. The official language is Indonesian, which helps unify the country. The majority religion is Islam (87.1%), followed by Christianity

(10.5%), Hinduism (1.7%), Buddhism (0.7%), and various traditional beliefs. This diverse religious landscape reflects Indonesia's long history of cultural influences and integration (1,2).

Indonesia was under Dutch colonial rule for over three centuries before gaining independence after World War II. Post-independence in 1945, Indonesia experienced periods of political and economic instability, but since the late 20th century, the nation has seen considerable progress in economic development and democratisation. Since then, Indonesia has seen rapid economic growth and has become an important player regionally and globally (3,1).

2.2. Bali

Figure 2. Map of Bali (1)

Bali is an island located in Indonesia, positioned between Java to the west and Lombok to the east. Part of the Indonesian archipelago, Bali spans approximately 5,780 square kilometres (2,232 square miles) and is one of the most famous tourist destinations in the country. The island is renowned for its vibrant arts scene, unique Hindu culture, and picturesque landscapes, including its famous rice terraces, volcanic mountains, and beautiful beaches, contributing to its reputation as a tropical paradise (1).

Among Indonesia's many islands, Bali stands out for its cultural and economic significance. The island's tourism sector is a major driver of its economy, attracting millions of visitors annually. Bali's cultural heritage, with its traditional dance, music, and

religious ceremonies, is a vital aspect of Indonesia's national identity and international image (3,2). The preservation of Balinese culture is supported through community efforts and cultural tourism, which help maintain traditional practices while also embracing modernization. The island's rich cultural tapestry is a significant part of its appeal and contributes to its global recognition.

2.3 Economic Context in Indonesia and Bali

Indonesia is a sprawling archipelago comprising over 300 ethnic groups. Following the Asian financial crisis of the late 1990s, Indonesia has experienced substantial economic growth, positioning itself as the tenth largest economy in terms of purchasing power parity (1).

Indonesia's global leadership was highlighted by its successful G20 Presidency in 2022, hosted in Bali, and the Association of Southeast Asian Nations (ASEAN) chairmanship in 2023. These roles underscore the country's influential position in steering sustainable post-pandemic recovery and tackling global challenges. In July 2023, Indonesia re-established its status as an upper-middle-income country after a setback in 2020 caused by the pandemic. By March 2023, the poverty rate had improved to 9.36%, down from 10.2% in September 2020. According to the World Bank's October 2023 economic report, Indonesia's gross domestic product (GDP) growth is projected to be 5.0% in 2023, with a medium-term average of 4.9% from 2024 to 2026. Despite these positive forecasts, global economic uncertainties remain a significant risk to Indonesia's economic stability and growth (3,2).

Indonesia, a country with a diverse economy, faces varying economic conditions across its regions. The national economy is driven by sectors such as agriculture, manufacturing industries, and services, with tourism playing a significant role, especially in Bali. Bali's economy heavily relies on tourism, which impacts its local infrastructure and healthcare resources. The influx of tourists contributes to the island's prosperity but also creates challenges in managing resources and delivering healthcare services. In general, the broader Indonesian economy is characterised by rapid growth and de'elopment, but disparities remain between different regions. While urban centres like Jakarta and Surabaya experience economic advancement, rural and remote areas, including some parts of Bali, face economic challenges that can influence healthcare access and quality (1,2).

2.4. Health System in Indonesia and Bali

The health system in Indonesia comprises a range of public and private healthcare providers and financing. This system operates within a decentralised government framework, involving central, provincial, and district levels of administration. The central Ministry of Health oversees tertiary and specialist hospitals, sets strategic directions, establishes standards, regulates the system, and ensures the availability of financial and human resources. Provincial governments manage provincial hospitals, provide technical oversight, monitor district health services, and coordinate cross-district health issues. District and municipal governments are responsible for managing district and city hospitals, as well as the network of community health centres (puskesmas) and associated sub-district facilities (4,5).

The Jaminan Kesehatan Nasional (JKN), Indonesia's national health insurance scheme, was launched in January 2014 and is managed by the Social Security Administration Agency for Health (BPJS Kesehatan). Its primary objective is to ensure that all Indonesian citizens have access to essential health services, including preventive, promotive, curative, and rehabilitative care, without suffering financial hardship. The program successfully achieved Universal Health Coverage (UHC) in 2019 (5,6).

JKN pools contributions from three main sources; government subsidies, which cover the poor and near-poor; contributions from formal sector employees, shared between employees and employers; and payments from informal sector workers and non-salaried individuals, who contribute independently. This funding structure supports a comprehensive benefit package that includes outpatient and inpatient care, preventive and promotive services, maternity and child health services, and treatment for both non-communicable and communicable diseases, including HIV/AIDS (4,6).

Primary care under JKN is delivered through puskesmas (community health centres) and other primary care providers. These facilities act as gatekeepers, managing the first point of contact for patients and providing essential health services. For more specialised care, JKN covers services provided by hospitals, using the Indonesian Case-Based Groups (INA-CBGs) payment system. This system categorises patients based on their diagnoses and treatments, ensuring standardised payments for similar cases (6).

JKN aims to reduce out-of-pocket (OOP) expenses, historically a significant barrier to healthcare access for many Indonesians (7). By pooling risk and resources, JKN provides financial protection to its members, particularly vulnerable and economically disadvantaged populations. However, challenges remain in ensuring equitable access to healthcare services across different regions, addressing the needs of informal sector workers, and managing the high demand for services. Additional challenges include persistent high OOP expenditures, disparities in service quality and availability between urban and rural areas, and the need to expand coverage for informal sector workers who often have irregular incomes. Ensuring the long-term financial sustainability of JKN while expanding benefits and coverage is also an ongoing concern (5,6).

The pathway for HIV testing and treatment in Indonesia involves Initial testing at puskesmas, private clinics, hospitals, and through outreach programs targeting high-risk populations. Confirmed diagnoses lead to the staging of HIV infection and referrals to higher-level facilities for antiretroviral therapy (ART) initiation and ongoing management, all supported by JKN coverage. Despite the structural and administrative complexities, these integrated efforts aim to provide comprehensive healthcare services and improve health outcomes for the population (4,6).

In Bali, the health system includes puskesmas, which serve as primary healthcare centres offering essential services such as preventive, promotive, and basic curative care. These centres play a crucial role in the early detection and management of health issues, including HIV testing and treatment. More complex cases are referred to general hospitals in Bali, which provide specialised and comprehensive care, including HIV/AIDS treatment (8).

In Bali, HIV test and treatment coverage is distributed unevenly across different types of healthcare facilities. Out of a total of 208 healthcare providers, 174 offer HIV testing, and 112 provide treatment for people living with HIV (PLHIV). Puskesmas clinics, with 120 locations, lead in testing with 119 services and offer treatment at 62 sites. Hospitals, which number 74, conduct 48 tests and provide treatment at 44 locations. Clinics, though less common with only 10 facilities, perform 6 tests and offer treatment at 5 sites. Correctional facilities (lapas/rutan) have 4 locations, providing 1 test and treatment at 1 site. This distribution shows that while puskesmas clinics are the primary providers of both testing and treatment, other facilities, especially clinics and correctional centres, offer significantly fewer services (8).

2.5. HIV Situation in Indonesia

HIV (human immunodeficiency virus) attacks the immune system, progressively weakening it and potentially leading to AIDS (acquired immunodeficiency syndrome) if not properly managed. Although there is no cure, effective drug therapy combined with social and psychological support can significantly improve the quality of life for those affected (9). HIV/AIDS was first identified in Indonesia in the late 1980s. The epidemic has evolved over the decades, with varying prevalence rates across different regions and populations. Initial responses focused on awareness and prevention, with increasing efforts to provide treatment and support as the epidemic expanded (4).

In Indonesia, there are approximately 540,000 individuals living with HIV in 2022. According to recent data, Indonesia continues to face challenges with HIV/AIDS, particularly in high-risk populations such as sex workers, men who have sex with men, transgender women and people who inject drugs (9,10).

Moreover, HIV in Indonesia is increasingly affecting individuals outside of the traditional key populations, including the spouses and partners of these groups and former key population members. According to a 2019 Ministry of Health report, 66% of people living with HIV were not classified as key populations, and this group accounted for nearly half of all new infections (11). The National HIV/AIDS Action Plan for 2020-2024 highlights the importance of expanding outreach and targeted programming to include these non-key populations (4,11).

Indonesia is still far behind in achieving the global HIV target of 95-95-95. In 2020, 64% of people living with HIV are aware of their status, only 34% are reported to be on antiretroviral therapy (ART). Among those receiving treatment, only about 17% are estimated to achieve viral suppression (12). Persistent barriers, such as limited access to viral load testing and equipment, hinder progress in treatment outcomes (11). Since 2010, AIDS-related deaths have surged by 88%, with 26,000 reported deaths in 2021 (4).

HIV Testing and Treatment Pathway in Indonesia (5,13)

The pathway for HIV testing and treatment in Indonesia follows a structured process:

1. **Testing**: Individuals may access HIV testing through puskesmas, private clinics, or hospitals. Testing can also be part of outreach programs targeting high-risk populations.
2. **Diagnosis**: Positive test results lead to a confirmatory diagnosis and staging of HIV infection.
3. **Treatment**: Those diagnosed with HIV are referred to higher-level facilities for ART initiation and ongoing management. ART is provided through public health facilities and supported by the national health insurance scheme (JKN).

Indonesia's approach to improving HIV treatment includes the SUFA (Strategic Use of Antiretrovirals) strategy, introduced by the Ministry of Health in 2014, and the Test

and Treat Policy implemented in 2018 (14,15). SUFA focuses on community involvement and the distribution of free ART, recognizing that adherence is essential for effective treatment. Adherence is crucial for maintaining viral suppression and improving health outcomes (14,16). The Test and Treat Policy expands this approach by mandating routine testing for various high-risk groups and initiating ART treatment for all individuals living with HIV, regardless of clinical symptoms or cluster of differentiation 4 (CD4) count. This policy also includes counselling for those who refuse testing or ART (15)

3. Problem Statement, Justification, and Objectives

3.1. Problem Statement

Human Immunodeficiency Virus (HIV) continues to be a significant public health challenge worldwide, with an estimated 39 million people living with the virus globally (9). In Indonesia, approximately 540,000 people were affected by HIV in 2022, concentrated in high-prevalence provinces such as DKI Jakarta, Papua, West Java, and Bali (10,4). HIV attacks the immune system by targeting CD4+ T cells, which are essential for regulating immune responses. As HIV progressively damages these cells, the immune system becomes increasingly compromised, leading to AIDS (acquired immunodeficiency syndrome), a severe stage marked by a critical decline in immune function (17,26).

Indonesia faces significant challenges in achieving its main HIV targets with low rates of HIV diagnosis, treatment, and viral load control (4,12). In 2022, only around 79% of people living with HIV knew their status, and of that number, only 41% were undergoing antiretroviral (ART) treatment, and 19% had their viral load controlled (4). These figures highlight Indonesia's considerable distance from the global 95-95-95 target set by UNAIDS (The Joint United Nations Programme on HIV/AIDS) (10). The majority of HIV diagnoses in Indonesia occur at the AIDS stage, particularly among populations not reached by existing HIV prevention programs (17).

HIV diagnoses among women in Indonesia have gradually increased every year due to factors, such as increased testing through PMTCT (prevention of mother-to-child transmission) programs, changes in risk behaviours like unprotected sexual activity and lack of targeted interventions (18,28). The recent Indonesian Ministry of Health report for HIV/AIDS shows the annual number of new HIV infections in women has increased from 12,573 in 2015 to 17,839 in 2021 (4,18). In 2022, women represent 35% of the total population of 540,000 people living with HIV in Indonesia (10,4). The coverage of women living with HIV (WLHIV) who have received ART in 2022, both key populations and women in the general population, was very low at around 29% (10). Women other than key populations who are at risk of contracting HIV include homemakers and women in the general community. Even though this population is at low risk, in reality, HIV transmission in Indonesia among low-risk women continues to increase (18,19).

Bali, as the top tourist destination in Indonesia, is also facing significant public health challenges related to HIV. There were approximately 27.000 people living with HIV in Bali in 2022, with women constituting about 31% of this population (8). Many determinants contribute to the challenges women face in accessing ART in Bali (19). Key barriers include social factors such as stigma and discrimination, which can lead to social isolation and reluctance to seek care (20,21).

3.2. Justification

Improving adherence to Antiretroviral Therapy (ART) among WLHIV in Bali, Indonesia is essential for enhancing their overall quality of life and reducing HIV-related morbidity and mortality (3,12). Optimal ART adherence significantly lowers the risk of HIV transmission, supporting broader public health efforts to control the HIV epidemic. Additionally, improved ART adherence reduces the burden on the healthcare system by decreasing the incidence of drug-resistant HIV strains and the need for more intensive medical interventions (5,3).

In the Bali context, where HIV prevalence among women is high and achieving treatment targets remains a challenge, understanding the determinants of ART adherence is critical. A socio-ecological approach provides a comprehensive framework for understanding how various levels such as individual, interpersonal, community, and policy factors affect the ART adherence. Addressing the specific barriers faced by women in Bali, such as social stigma, cultures, and traditional beliefs, can lead to the development of effective and culturally sensitive interventions.

This study aims to identify and address these determinants, providing valuable insights for healthcare providers, policymakers, and community organisations to enhance ART adherence and health outcomes for women living with HIV in Bali, Indonesia.

3.3. Objectives

3.3.1 General Objective

To investigate factors influencing Antiretroviral Therapy (ART) adherence among women living with HIV in Bali, Indonesia and propose recommendations to enhance ART adherence and improve treatment outcomes.

3.3.2 Specific Objectives:

1. Identify key factors affecting ART adherence among women living with HIV in Bali, Indonesia.
2. Propose policy recommendations to increase ART adherence and improve treatment outcomes for women living with HIV in Bali, Indonesia.

4. Methodology

4.1. Methods

This study is a literature review supplemented with key informant interviews (KIIs). The literature review focuses on determinants of ART adherence among WLHIV in Indonesia, using PubMed and Google Scholar to source studies from the past decade (2013-2023). Articles and journals published from Indonesia, Southeast Asian countries, and other Asian nations were utilised for this study. Additionally, research from an international perspective, including studies from African countries, was reviewed to compare conditions. Government documents, guidelines, and policy reports from the World Health Organization (WHO), UNAIDS, and the Centers for Disease Control and Prevention (CDC) were also incorporated into the analysis. The keywords used for the search are given in the search strategy table (Annex1). The inclusion criteria were English-language publications, excluding news, editorials, and non-English literature.

Qualitative methods involve KIIs with healthcare providers (doctors, nurses, and counsellors) from HIV clinics in the 3 districts of Bali (Denpasar, Badung and Buleleng) with the highest HIV prevalence. Interview topics cover challenges in ART adherence, patient barriers and facilitators, strategies for improvement, and policy recommendations.

Sampling Procedures

Purposive sampling was utilised to select participants for the KIIs in this study. The sampling aimed to gather insights from healthcare providers involved in HIV care in districts of Bali with the highest HIV prevalence: Denpasar, Badung, and Buleleng. Eight healthcare providers were selected, including:

- 2 nurses from Prof. Ngoerah General Hospital in Denpasar (DPS01 and DPS02)
- 1 nurse from Wangaya Regional Hospital in Denpasar (DPS03)
- 1 doctor from Kerti Praja Foundation in Denpasar (DPS04)
- 1 doctor and 1 nurse from Mangusada Hospital in Badung (BDG02 and BDG02)
- 2 nurses from Puskesmas Buleleng (BLL01 and BLL02)

This selection ensured diverse perspectives from different types of healthcare facilities, including hospitals, foundation clinics, and primary health centres across three different geographic locations. The selection criteria were based on providers' expertise in HIV care management and their role in supporting ART adherence among WLHIV in HIV services in Denpasar, Badung, and Buleleng. Providers were chosen for their demonstrated proficiency in delivering ART and their experience in addressing the specific needs of WLHIV. This criterion aimed to ensure that participants had substantial experience and knowledge relevant to managing HIV care and understanding ART adherence.

Data Collection

Data were collected through online KIIs conducted by the principal investigator (PI). The interviews were scheduled and conducted via secure video conferencing platforms to accommodate participants' availability and ensure confidentiality. The process involved:

- Development of Interview Guides: Semi-structured interview guides were created to focus on factors influencing ART adherence, strategies for improvement, and policy recommendations. These guides were designed to facilitate in-depth discussions and capture comprehensive data.
- Conducting Interviews: A total of eight online interviews were carried out with the selected healthcare providers. Each interview lasted approximately 30-40 minutes and was conducted in Bahasa Indonesia. The interviews were audio-recorded with the participants' consent, or detailed notes were taken.
- Consent and Confidentiality: Prior to each interview, informed consent was obtained electronically. Participants were assured of confidentiality and the voluntary nature of their participation, with clear information provided about the study's purpose and procedures.

A waiver for ethical clearance was obtained from KIT Research Ethics Committee due to the minimal risk nature of KIIs, which involved only professional interactions without personal questions. Ethical waiver was secured from KIT for this research, ensuring compliance with ethical standards and guidelines.

Data Analysis

The collected data were analysed using thematic analysis to identify key themes and patterns related to ART adherence. The analysis involved the following steps:

- Transcription and Translation: Audio recordings of the interviews were transcribed verbatim. Transcripts were then translated into English to facilitate analysis.
- Thematic Analysis: Thematic analysis was conducted to identify and categorise themes related to factors influencing ART adherence among women in Bali. This process involved coding the data findings to address the study objectives.
- Data Validation: The transcripts reviewed and checked for consistency in the coding process.

The analysis provided a detailed understanding of the factors influencing ART adherence and informed recommendations for improving adherence and treatment outcomes.

Study Limitation

This study has several limitations that should be considered. The focus of the KIIs on a limited number of healthcare providers from specific facilities in Bali may not fully capture the diverse experiences of all healthcare workers involved in HIV care across the region.

The small sample size of 8 participants further limits the generalizability of the findings. Moreover, the online format of the interviews might have affected data quality due to potential technological issues and the absence of non-verbal cues. Translation of interview transcripts from Bahasa Indonesia to English could also have introduced inaccuracies, potentially impacting the depth of the analysis. Future research should consider including a broader range of participants, expanding the study to multiple regions, and incorporating both qualitative and quantitative approaches.

4.2. Analytical framework

A socio-ecological model framework for antiretroviral adherence adapted from Gumede et al, 2021, was used to analyse the determinants of ART adherence among WLHIV in Bali, Indonesia. This socio-ecological framework categorises the different determinants based on their scopes. Starting from the smallest, these scopes are individual, interpersonal, community, and policy (22). This framework was used to investigate the influence of these determinants on ART adherence among WLHIV in Bali, Indonesia.

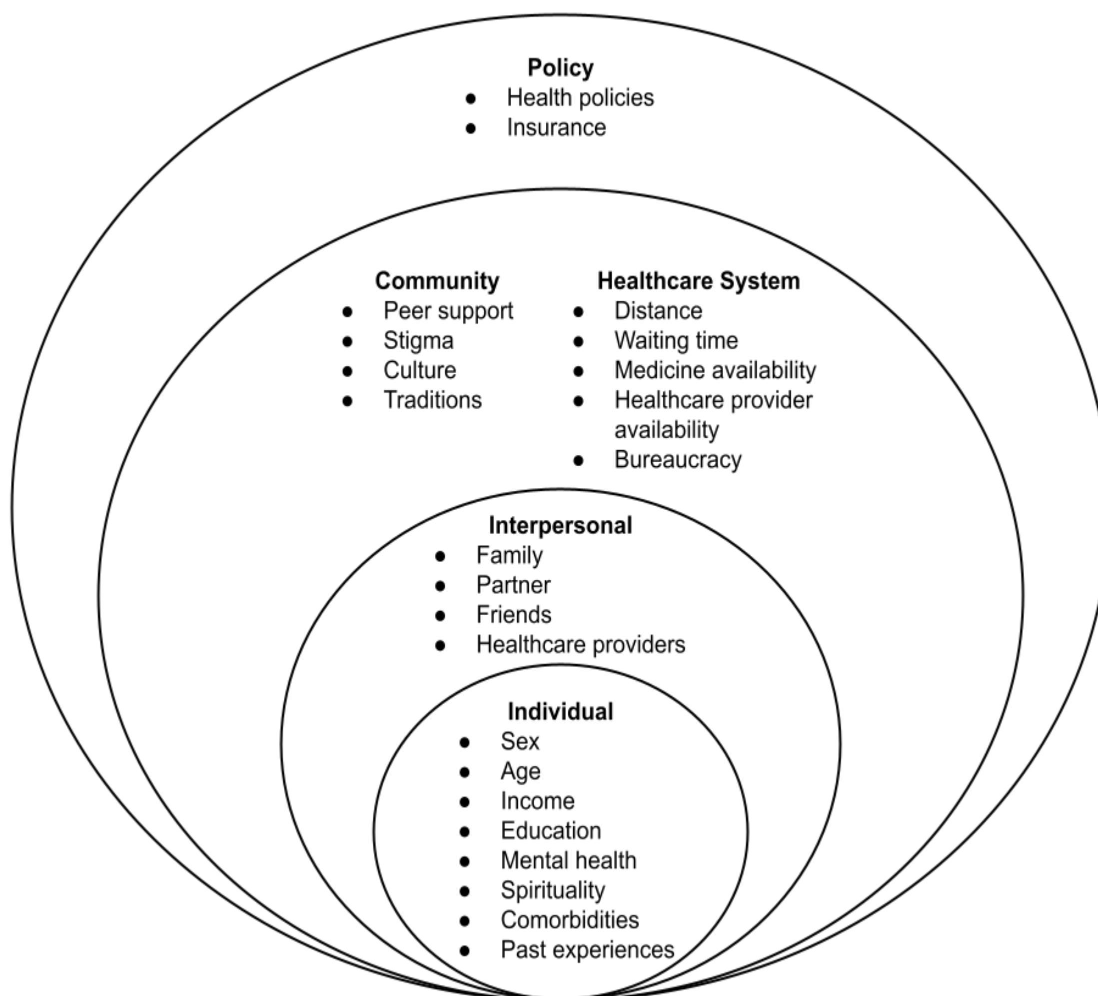

Figure 3. Socio-ecological framework. Adapted from Gumede (22) and Mugavero (23)

Individual factors include socio-demographic characteristics, experiences with antiretroviral medication, and psychosocial and socio-cognitive aspects. Socio-demographic factors such as age, sex, and educational status significantly influence medication adherence. Interpersonal factors include the relationships between WLHIV and their families, partners, friends, and healthcare providers. Community factors cover public stigma, societal and cultural norms, and health system influences that impact ART adherence. Policy factors involve the structural and institutional support systems that facilitate ART adherence (22,23).

5. Results

The findings for each factor are presented below.

5.1. Individual Factors

5.1.1. Sex

The literature generally indicates that women show better adherence to ART than men. This was explained to be the result of women being more diligent and conscientious in managing their health (24). However, some studies suggest there are no significant differences between the sexes, arguing that adherence is influenced by a variety of factors that can affect both men and women equally, such as patient education and understanding of their treatment (25).

The interviews conducted for this research show differing views with regards to the influence on sex on ART adherence. Three informants indicated that women tend to be more compliant with their medication. One interviewee pointed out that women were less compliant compared to men, particularly those who are busy with household responsibilities, family duties and personal schedules, and stigma and privacy concerns. Another 3 respondents either suggested that there is no difference between sexes or highlighted various factors that can affect both men and women.

"In terms of differences, I think women tend to be more compliant." (Doctor, DPS04)
"So far, in my experience, women tend to be a bit less adherent to their medication compared to men. There are various reasons for this, mainly revolving around their busy schedules. Often, they are mothers with several kids… (Nurse, DPS03)
"For adherence, family support is very important, but sex is not." (Nurse, BLL01)

5.1.2. Age

Systematic reviews on ART adherence among HIV-positive adults in sub-Saharan Africa reveal that age plays a role in adherence, with older individuals (over 40) generally demonstrating higher adherence levels compared to younger adults. Other studies have found no correlation between age and ART adherence (24,25).

The key informant interviews reported that age influences adherence, with a general trend indicating older individuals show better adherence compared to younger. Several interviews highlight that older women typically show more consistency in their medication routines due to their often-stable life circumstances and support systems. Another mentioned that a key factor influencing adherence is the patient's understanding of their treatment, rather than their age. This implies that while age might play a role, it is not the primary determinant of adherence.

“Adherence really depends on the patient’s understanding. Even if they are younger, if they truly understand, they’ll be better at following the treatment. But if they don’t, it’s the same” (Nurse, DPS01)
“Women between the ages of 24 to 45 tend to be less consistent with taking their medication.” (Nurse, DPS03)
“If I look at the trend, the younger ones tend to be a bit more careless, whereas the older ones are more consistent in taking their medication.” (Doctor, BDG01)

5.1.3. Education Level

Education influences ART adherence by enhancing patients’ understanding and awareness of HIV treatment. Higher education levels generally improve comprehension of treatment regimens, which can lead to better adherence (18). However, this is intersected by socioeconomic factors; individuals with higher education may also be in a better position to make empowered health decisions and access resources. Conversely, lower education levels can correlate with poverty and reduced autonomy, particularly affecting women who might need permission from partners or family members to seek and adhere to treatment (26,27). Inadequate knowledge among PLHIV and caregivers often exacerbates this issue, leading to lower adherence due to insufficient awareness of treatment benefits and requirements (26).

“When someone is more educated, it’s easier to explain things to them, they get it and can accept the information more quickly. So yeah, education level definitely affects how well they understand and stick to their treatment.” (Nurse, DPS02)
“...those with at least a high school education tend to be more adherent compared to those with lower educational backgrounds.” (Nurse, BDG02)

Most of the interview results indicated that education level influences ART adherence. Women with higher levels of education generally have a better understanding of HIV and ART, which would theoretically facilitate adherence. However, despite their higher educational background, some educated patients showed poor adherence. This suggests that while higher education may improve understanding, it does not necessarily guarantee adherence. In contrast, women with lower levels of education often struggle to understand the intricacies of ART and the importance of consistent treatment. This lack of understanding can lead to challenges in ART adherence.

5.1.4. Income

Many studies highlighted that low socio-economic status is a significant factor contributing to non-adherence to ART. PLHIV faced unemployment issues and could not afford transportation to collect their medication. Additionally, the lack of insurance coverage for medication was also a major issue (26,27).

In Indonesia including Bali, ART medication is free, but PLHIV without national health insurance (JKN) must pay an administrative fee in primary health care and hospitals to collect their medication. This creates a significant barrier, especially for those in remote areas with financial difficulties. Additionally, they must pay for CD4 and viral load tests, which are often unaffordable. Externally funded programs offer free ART monitoring tests, but limited availability (6).

Based on interviews, income and economic factors crucially impact ART adherence. Patients from rural areas struggle with high travel and treatment costs, especially if they lack of JKN insurance. For those without coverage, out-of-pocket expenses for hospital tickets and other fees can lead to treatment delays or abandonment. Even with JKN, long-distance travel and associated costs can be burdensome. Financial strain is evident as increased hospital fees prompt some patients to postpone appointments, affecting their adherence. Support programs and free ART medications help, but transportation costs remain a significant barrier.

"Sure, income definitely has a significant impact. Patients often worry about the cost of treatment" (Nurse, DPS02)
"If they can't afford the travel expenses, it makes it hard for them to come for their treatment." (Doctor, DPS04)
"During the COVID crisis, the loss rate was very high. When we asked about the reasons, it was because of the lack of funds, and people had lost their jobs and returned to their hometowns, resulting in poor adherence. (Doctor, BDG01)

5.1.5. Mental Health

Research has highlighted that people living with HIV (PLHIV), face significant psychosocial stressors such as advanced stage infection, fear of breach of confidentiality, and concerns about the future of their families adding to this psychological burden. Lack of social support, social rejection, and economic hardship also play a significant role in affecting their mental health and adherence to ART (20).

Multiple psychosocial factors, including stigma, depression, and anxiety, significantly impact treatment adherence among PLHIV. Self-stigma leads to depression, anxiety, and low self-esteem, which causes PLHIV to avoid seeking support due to fear of disclosure and feelings of worthlessness (24). Anxiety is associated with concerns about disease progression, infecting others, and inadvertent disclosure, while depression is associated egateve beliefs about HIV and hopelessness, which reduce motivation to adhere to ART (24,28). Coping strategies vary from problem-focused and emotion-focused to dysfunctional methods such as substance abuse. In addition, socio-cognitive factors such as attitudes, subjective norms, perceived behavioural control, and self-regulation play an important role in ART adherence (24,25).

Recent research suggests that depression is associated with challenges to ART adherence. Studies have shown that individuals with depression may hold negative beliefs about the importance of adhering to their ART regimen. In addition, adverse ART side effects can cause discomfort and disclosure of their HIV status, which can hinder regular adherence (24,28). People with depression often reduce their ART intake. A 2014 study in India found that 25% of 85 participants had depression and were non-adherent to ART. This finding is consistent with other studies showing that depression significantly impairs adherence to antiretroviral therapy (28).

The interview results showed that mental health significantly impacts ART adherence. Initially, many patients, especially women, struggle with denial and psychological distress upon diagnosis. This denial can persist even among those with risk factors, leading to poor adherence. Psychological factors such as feeling useless or hopeless about the future can discourage patients from continuing their medication, particularly if they have lower educational backgrounds and view HIV as a terminal condition.

"For mental health, there are some impacts. For example, some people feel useless and think, I already have HIV, so why should I keep taking my meds? " What's the point of long-term medication if I'm going to die anyway?" (Nurse, DPS03)

"I have a patient who was left by their partner upon discovering the patient was positive while the partner was negative. Even now, the patient is still struggling with depression. According to the family, the patient sometimes throws away the medicine. Mental health issues significantly affect medication adherence." (Nurse, BDG02)

"For mental health, if it's women, here it's mostly WPS (women sex workers), so they already know they're at risk. For them, it's just normal. But if it's women who are at high risk because of their husbands, they might experience mental disturbances, wondering why it happened to them." (Doctor, DPS04)

"Yes, there are some psychological issues with some clients, especially those who are widows. They often still stigmatise themselves, which affects their adherence. They are afraid of being discovered and sometimes do not pick up their medication themselves" (Nurse, BLL01)

Summarizing the key points of the interview regarding mental health and ART adherence, women infected by their husbands often face some mental health challenges, feeling unfairly targeted and experiencing emotional turmoil. Those who are sex workers may accept their risk more readily, high-risk women might more accepting their HIV diagnosis. Psychological support from healthcare providers and families is crucial for patients, as many experience significant stress and depression, which can impact their adherence to ART. Stigma and lack of support also play a significant role in mental health, with some patients' reluctance to take medication due to self-stigmatisation

demonstrating how mental health issues related to stigma can undermine treatment adherence.

5.1.6. Spirituality

For people living with HIV in Indonesia, religion often serves as a crucial coping mechanism. Many find solace, support, and motivation through prayer and faith in God, which helps them deal with their condition and adhere to antiretroviral treatment. Believing that God provides medical knowledge for their relief can encourage PLHIV to stick to their treatment regimens (24). Many believe in God's power and use prayer to find peace of mind, accept their HIV status, and be more open to seeking healthcare services. Positive thinking is another frequently used strategy that enhances problem-solving skills, improves treatment adherence, and reduces internalised stigma, leading to better health outcomes (29).

However, religion can also negatively impact ART adherence. Some PLHIV might rely solely on their faith for healing, leading them to neglect their medication. For example, some patients stopped their ART because they believed in spiritual healing, which resulted in treatment failure. Misconceptions about HIV being a spiritual condition or a divine gift can further complicate treatment adherence (24,30).

From the interview results, it is evident that spirituality and religious practices have a role in ART adherence. Encouraging patients to pray or engage in their spiritual practices can positively influence their attitude towards medication. A positive mindset fostered by spiritual beliefs may increase medication adherence by making patients more open to accepting and adhering to their treatment. For instance, patients who approach their medication with a sense of spiritual acceptance often have better adherence than those who view it as a burden.

"Yes, it has a huge impact because we need to make sure our body accepts the medication. If our mind rejects it, our body will respond accordingly. That's why I always encourage patients to pray." (Nurse, DPS01)

"Yes, spirituality can also play a part. If someone is at peace with themselves spiritually, they tend to focus more on their own well-being and self-care. This often means they're more likely to stick to their ART medication routine." (Doctor, DPS04)

5.1.7. Comorbidities

According to the literature, individuals without comorbidities are more consistent with their ART regimens compared to those with comorbidities. This may be due to the increased pill burden associated with comorbidities, which can lead to more side effects and lower adherence. (31) Supporting this, a study in Ethiopia found that participants with multiple chronic conditions were less likely to have ART adherence, mainly due to additional side effects and the complexity of managing multiple medications. (32)

The health care providers in Bali reported that patients with additional health problems often find it challenging to manage their medication schedules. For those with multiple conditions, the burden of taking various medications at once can be overwhelming. They may worry about potential interactions between ARTs and other drugs, which can lead to anxiety and hesitation about adhering to their ART regimen. This is especially true when the number of medications increases, such as when tuberculosis (TB) treatment is added to their regimen.

"When someone has comorbidities, they worry about taking their medication. It can be overwhelming, wondering if the ART will affect their other conditions, how the additional medications will interact, and how they handle taking so many medications at once." (Nurse, DPS02)

"Yes, it has an impact, because the number of medications increases. Sometimes seeing so many pills can make patients think, "Why do I need to take so many medications?" (Nurse, DPS03)

5.1.8. Past Experiences

The experiences of people living with HIV significantly impact their adherence to ART. Adherence challenges often stem from the complexity of dosing regimens, the need to take multiple daily pills, side effects, and dietary restrictions. Research indicates that patients on triple combination treatments tend to show lower adherence compared to those on simpler two-drug regimens (24). Additionally, past experiences of HIV-related stigma and discrimination can further complicate adherence. Many PLHIV report facing stigma both within their families and in the wider community, including being separated from family members, having personal belongings isolated, and being ostracised or negatively labelled. These experiences of discrimination can undermine their commitment to maintaining consistent ART (33).

From interview results, past experiences have impacted women's adherence to ART in Bali. One common issue is the lack of support from partners, which can undermine their commitment to treatment. In some cases, discomfort with healthcare facilities also plays a role. For example, some patients have changed hospitals due to dissatisfaction with crowded and rushed services at previous health care, which made them uncomfortable and reluctant to continue their treatment. Furthermore, past experiences of HIV-related stigma and discrimination exacerbate these problems, making adherence even more difficult.

"In the past, perhaps she needed support, and she might have been on medication before, but her husband didn't care" (Nurse, DPS01)

"There are some cases where patients have moved here because, at their previous place, the medication process was too crowded. The waiting lines were long, and they felt it

wasn't very friendly since everything was rushed. So, they chose to move here" (Doctor, DPS04)

5.2. Interpersonal Factors
5.2.1. Family

Family factors significantly impact ART adherence among WLHIV, particularly in Indonesian contexts where motherhood is highly valued. Women often view maintaining their health as crucial for fulfilling their roles as primary caregivers and financial providers. This motivation leads to better adherence to ART, as they understand the importance of staying healthy for their family's well-being and preventing HIV transmission to their children (34).

A study in India found that when'individuals lack family support, especially reminders to take their medication, they are less likely to adhere to their ART regimen. This highlights the important role of the family in reminding patients to take their medication and assisting with medication collection (25). Without family support, patients may feel hopeless, which can lead to treatment refusal and decreased adherence. This indicates a significant association between family support and ART adherence (35).

In settings like Bali, where community activities and ceremonies can interfere with hospital visits, family involvement becomes even more essential. Healthcare providers often encourage patients to confide in at least one family member to ensure they receive necessary medication support. Moreover, healthcare workers advocate for the presence of a dedicated medication adherence supporter (PMO) to help monitor and encourage adherence.

"For the role of the family, some patients are open about their HIV status, when patients are open with their families, it makes a big impact. Families can remind them regularly to stick to their medication regimen." (Doctor, DPS04)
"In Bali, women are often very busy with religious work or ceremonies, and they frequently don't have the time to visit the hospital. We often urge them to be open with at least one family member so that someone can pick up their medication for them." (Doctor, BDG01)

5.2.2 Partners

Significant others including partners play a crucial role in adherence to ART for people living with HIV. Positive support from these individuals can significantly enhance adherence by offering emotional and practical help, such as assisting with clinic visits and providing encouragement (19). In some cases, male partners have been reported to exert control and show violence instead of offering support. This can involve preventing their partners from accessing medication, stealing ARTs, or using threats and coercion to undermine adherence. Such negative behaviours have been shown to significantly impact the mental and physical health of PLHIV, as evidenced by studies from Malawi and South

Africa, where partner-related threats and violence affected women's adherence and overall well-being (36).

While supportive partners can greatly improve adherence, some studies have found that women may continue their ART regimen even without active encouragement from their partners, due to their personal belief in the medication's efficacy. However, for those who are financially dependent on their partners, support remains essential for maintaining treatment and ensuring continued access to medication (37).

Based on the interviews, health workers reported that a partner or husband's role is crucial in a woman's adherence to ART in Bali. A supportive partner can greatly enhance adherence to the ART regimen, while a lack of support or negative attitudes from a partner can hinder it. Emotional stress from a breakup or ongoing relationship problems can also make it harder for women to stick to their treatment. In some cases, women may manage their treatment privately if they do not disclose their HIV status to their partner, which can lead to inconsistent medication adherence.

"Yeah, everything is influenced by the partner. It all depends on the support from their partner. If the partner is supportive and encouraging, it definitely has a positive impact." (Nurse, DPS02)
"If a female patient is HIV-positive and her partner is not supportive, it can lead to problems." (Nurse, BLL01)

5.2.3 Friends

Friends play a crucial role in supporting women living with HIV and their adherence to ART. They offer essential emotional and practical support, helping to counteract the effects of stigma and providing a sense of understanding and stability (36,38). Support from friends can make a significant difference in managing the emotional challenges of living with HIV, often serving as a buffer against stigma. Women who have a strong network of friends are better able to stay committed to their treatment, as these relationships offer crucial encouragement and assistance in dealing with the daily realities of their condition (29).

From the interview, the health care provider mentioned that friends can play a part in supporting ART adherence, particularly for women in vulnerable situations, such as those who are sex workers. Friends often provide crucial assistance, including accompanying patients to appointments and offering emotional support, especially when family members are unavailable. For some patients, friends become a primary source of encouragement and practical help, such as reminding them of appointments and managing their medical care. However, many patients prefer not to involve their friends due to concerns about privacy and potential exposure of their HIV status. While friends can positively influence adherence, their impact is generally less significant compared to family and partner support.

"Yes, support from friends is important, especially for our patients who are often sex workers. They usually get more support from their friends, because they come from outside Bali and are not close to their families." (Nurse, DPS01)
"I think friends it's not as influential as a partner's support. There are a few cases where friends are involved, but not too many." (Nurse, BDG02)

5.2.4 Healthcare providers

The relationship between a healthcare provider and a patient plays a critical role in the patient's adherence to ART. Patients who have a good relationship with their healthcare providers are more likely to consistently follow their medication, while those with a poor relationship may struggle with adherence (28). Effective communication between patients and providers helps patients understand their condition and the critical importance of sticking to their ART, which supports better adherence. (24,39)

Based on the interview results, the influence of healthcare providers on ART adherence is significant. Building a trusting relationship from the start is essential, creating a safe and non-judgmental environment helps patients feel secure in discussing their challenges. This is achieved by treating patients with empathy, providing continuous education on the importance of adherence, and addressing any concerns they may have.

"If we treat them well from the beginning, it will help build a good relationship that supports their adherence to medication." (Nurse, DPS01)
"We provide Information, Education, and Communication (IEC) to them about the importance of medication adherence and assess their progress. It's all for their own benefit, so we never get tired of offering this guidance." (Nurse, DPS02)

5.3 Community Factors

5.3.1 Community support

Community support, including peer support from organisations and social networks, significantly enhances ART adherence among women. Engagement with non-governmental and faith-based organisations provides women with critical resources and empowerment, leading to improved self-reliance and poverty alleviation (28). Various interventions, from peer support groups to community health worker home visits, demonstrate that community-based strategies can effectively improve ART adherence (36,40). These interventions leverage social networks to offer practical, emotional, and informational support, creating an environment conducive to consistent medication adherence. The success of these community support mechanisms often hinges on their ability to integrate into the patient's daily life and address specific needs, such as facilitating medication reminders and providing emotional encouragement (36,41).

From the interviews, community support improved ART adherence by creating a supportive environment where patients could share experiences and receive emotional and practical support. Support groups, including those facilitated by non-governmental organisations (NGO) and local organisations, provided patients with the opportunity to share experiences, receive encouragement and access practical support. These groups, such as peer support groups (KDS) and other HIV-specific communities, fostered a sense of belonging and reassurance, making patients feel less isolated in their journey. Regular meetings and support sessions, which included discussions about managing their health and overcoming barriers, helped patients stay engaged with their treatment. This community engagement was invaluable as it provided a platform for patients to see others managing their health well, which could inspire them to adhere to their own treatment.

“Being part of a support group helps them see that they’re not alone. Seeing friends who are healthy and committed to their treatment encourages them to stay on track with their own medication.” (Doctor, DPS04)
“KDS (peer support groups) have a significant impact especially for women, because they can share experiences with others in this community.” (Nurse, DPS01)

5.3.2 Stigma or discrimination

Stigma and discrimination are significant barriers to ART adherence among women living with HIV in Indonesia. Research shows that many people with HIV feel internalised stigma due to feeling guilty and unfaithful due to cultural and religious perceptions that view HIV because of sinful behaviour (33,30). This makes it harder for them to follow their treatment. Public stigma also causes fear of being judged, leading people to hide their HIV status and avoid local clinics. Instead, they may travel further to seek care discretely, which complicates adherence. Even though some clinics try to offer a supportive environment, many still have stigmatising attitudes, particularly towards marginalised groups like women sex workers (20,39). The combination of societal stigma, personal shame, and the pressure to conform to cultural expectations contributes to challenges in maintaining consistent ART adherence (19,21).

From the interviews, it is clear that stigma and discrimination significantly impact women’s adherence to ART. Despite progress in reducing stigma through outreach and education, women still face challenges. Stigma causes significant stress for women, leading to reluctance to seek treatment and attend appointments. Although the situation has improved in some areas in Bali, where WLHIV feel more accepted, fears of stigma remain. These fears often stem from concerns about privacy and potential exposure during community activities. As a result, stigma remains a significant barrier to consistent ART adherence for women in Bali, highlighting the need for continued efforts to combat discrimination and improve support.

“Stigma still has an impact because there is fear in the community. In Bali, there are often communal activities (gotong royong tradition) where people meet with many others. They worry that someone might know about their condition.” (Nurse, DPS02)
‘Yes, stigma in the community is a big issue. Many people still don’t understand HIV well and see it as something very alarming. They often believe that HIV can be transmitted easily through casual contact like touching, which is not the case. This misunderstanding leads to people ostracising those who are known to be HIV-positive.” (Doctor, DPS04)
“Stigma and discrimination in Bali have significantly decreased compared to when I first started working with HIV. However, I am still more concerned about stigma and discrimination from healthcare professionals.” (Doctor, BDG01)

5.3.3 Cultural Norms, Traditions, and Beliefs

Cultural norms, traditions, and beliefs can significantly influence ART adherence among WLHIV. In various settings, cultural expectations and religious beliefs shape how HIV care is approached (36). For example, in some cultures and religious beliefs, lower adherence is associated with a preference for herbal medicine, and traditional and religious practices can further affect adherence (42). Another example, fasting during cultural or religious observances, such as Muslim festivals, can lead to missed doses and affect ART adherence (43).

Based on the interviews in this study, traditional beliefs and practices in Bali, such as reliance on herbal medicine and traditional healers, may influence adherence, with some patients prioritising these methods over prescribed ART. Some patients still struggle with cultural and traditional beliefs that influence their adherence, such as those who believe in alternative medicine or fear the stigma associated with HIV in the community.

“Up to now, there aren’t too many, maybe only 1-2 patients, who believe that this disease can still be cured with herbal or traditional medicine. They have strong faith in such traditional treatments, even stopping their medication, which affects their adherence.” (Nurse, BDG02)
“There’s a belief that if someone dies of HIV, they might be buried right away. People might avoid touching someone who dies with HIV. So, the way people handle deaths from HIV can still be different from usual traditions.” (Nurse, BLL01)

Based on interviews with health workers, the busy schedules associated with these ceremonies often lead to missed doses or delays in taking medication, as women may be busy with communal and religious duties. To address this, healthcare providers advise patients to carry their medications carefully and plan ahead, ensuring they take ART before or after their traditional activities, with appropriate counselling and support from

family or friends, many women are able to manage their ART adherence effectively amidst their cultural commitments.

"Ah, usually, Balinese women are quite busy with making offerings and other traditional activities. It can affect them if they're too busy. For example, some patients might miss their medication because they're caught up with cremation ceremonies." (Doctor, DPS04)

"Yes, because often women say things like, 'Why is there a delay in taking the medication?' The response is often, 'Sorry, I have a traditional ceremony to attend, so I'm busy.' This indirectly affects their adherence to medication. Traditional ceremonies, especially in Bali, such as Hindu religious events, can be quite long, for example during Galungan-Kuningan." (Nurse, BDG02)

5.4 Healthcare System Factors

5.4.1 Distance

Distance to health facilities has a significant impact on ART adherence among women in Bali. Many women face difficulties initiating treatment due to long travel distances, which can be particularly challenging for those with childcare commitments, as they cannot leave their children at home alone (34). In addition, to maintain privacy, women often choose health facilities that are far from their home environment, resulting in longer travel times and higher transportation costs (37). Based on existing research, women living in rural areas or small towns are more likely to delay seeking care than women in urban areas. The most common barriers include long distances to health facilities and limited access to transportation (31). These factors collectively contribute to difficulties in accessing and adhering to ART.

The interviews demonstrated that distance could have a significant impact on women's adherence to ART. Patients who live far from health facilities may struggle with regular visits, often citing travel challenges and costs as barriers. For those with limited financial resources or transportation issues, distance can lead to inconsistent medication adherence. Some patients are able to manage their schedules effectively, but others may delay or miss doses due to travel distance. The introduction of satellite HIV clinics at primary health care centres has helped address this issue by providing closer access to ART services. In addition, reducing distance to care is critical in supporting consistent ART adherence.

"Yes, we have a patient from Bajra who's been on and off with their medication, and they keep saying it's because of the distance." (Nurse, DPS03)

"Travel costs can be a big issue. We usually suggest finding the nearest place to get ART medications to make it easier for them" (Doctor, DPS04)

5.4.2 Waiting times

Long waiting times at health facilities impact ART adherence. Studies in various settings in Africa have shown that long waiting times are distressing for women who often have to balance work and clinic visits, which impacts their ability to adhere effectively to ART (36). For women, waiting times of two to five hours are common, and while most accept these delays, they can lead to dissatisfaction and reluctance to return (36,37). Reducing waiting times through appointment reminders and patient centred care can improve adherence by making the process more manageable and less stressful (39).

Interview results suggest that waiting times can impact women's adherence to ART. Longer waiting times at health facilities can lead to tiredness and frustration, causing some patients with busy schedules to leave before receiving their treatment, which adversely impacts adherence. While improvements such as online registration and separate clinics have reduced waiting times, making the process more efficient, problems still arise when patients experience delays or overcrowding. Efficient management of appointment scheduling and pharmacy services have helped reduce these issues, but maintaining minimal waiting times remains critical to ensuring consistent treatment adherence.

"Yes, the wait time for services also has an impact. Since people have jobs and other schedules. Our clinic visits can be pretty crowded and sometimes, they're in a rush." (Nurse, BLL01)

"If it takes too long, patients often complain, saying things like, 'I'm in a hurry,' or 'I'm worried someone might see me,' and that kind of thing." (Doctor, DPS04)

5.4.3 Availability of ART medication

Reliable access to ART is strongly linked to increased adherence, with studies showing that consistent availability of medications improves adherence rates. Conversely, stock shortages and interruptions in the supply of ART and related medications can lead to non-adherence (19,44). For instance, when ART stock-outs occur, patients may be forced to switch to different regimens or endure gaps in their treatment, which can disrupt adherence and increase the risk of treatment failure (19,45). Frequent shortages not only impact service delivery and patient satisfaction but also create logistical and financial burdens, making it challenging for individuals to maintain their treatment schedules (46,42).

Interview results suggest that the availability of ART drugs in Bali generally supports women's adherence to treatment. Currently, ART drug stocks are consistently well managed and shortages are rare. Although there were some delays in distribution during the COVID-19 pandemic and significantly reduced adherence, this has been resolved, and availability is now considered very good. A Multi-Month Dispensing (MMD) program has been implemented to provide drugs for patients travelling long distances or overseas, but effective stock management is essential to prevent drug shortages.

“Yes, for instance, if the availability of ART medication is inadequate, it definitely has an impact. There were times during COVID when the lockdown was a problem” (Nurse, DPS03)
“Yes, we sometimes give patients who travel long distances or go abroad up to 3 months, but if the stock is very low, we can only give them 1 month.” (Doctor, DPS04)

5.4.4 Availability of healthcare workers

The number of available health workers in health services impacts women’s adherence to ART. Limited access to care, especially for opportunistic infections outside of regular hours, presents a challenge for those unable to afford private services (45). Although not always seen as a direct barrier, increasing the number of health workers could enhance the overall quality of care and support adherence, providing more consistent and effective treatment for women (37,45).

Based on the interview results, the availability of health workers in Bali also plays a role in women’s adherence to ART. Although there are some challenges, such as handling multiple tasks and occasional understaffing, for example there are times when health services do not have enough time for tasks such as data entry, their limited time can affect the quality of counselling and support, which are critical to maintaining consistent ART adherence.

“I was recently responsible for both the outpatient clinic and PMTCT, which means handling double the reports and tasks, it’s quite challenging.” (Nurse, DPS01)
“Now we have the SIHA system here, which requires a lot of data input, so sometimes we don’t have enough time especially when the hospital is crowded.” (Nurse, DPS02)

5.4.5 Bureaucracy

The complex bureaucracy within Indonesia’s healthcare system poses significant challenges to women’s adherence to ART. The system’s fragmentation, managed at the district level, often leads to inconsistencies in HIV and sexual health care provision (29). This fragmentation results in high rates of lost-to-follow-up and barriers to accessing comprehensive HIV care (46). Administrative procedures, including registration fees and fragmented access to medication, further hinder adherence. For instance, high registration fees can create financial barriers, while inefficient medication distribution processes can disrupt treatment regimens (19,46).

Bureaucracy, including registration fees, can impact women’s adherence to ART in Bali. While some health workers reported smooth processes and no major bureaucratic issues, challenges remain. For example, high registration fees, with three hospitals in Bali recently reporting a rapid increase in registration fees, can be a significant burden for

WLHIV. Financial assistance and programs from organisations such as AIDS Healthcare Foundation (AHF) have reduced this issue, but patients often struggled with the costs. In addition, the complexity of the JKN system and BPJS procedure, which sometimes prevents referrals to hospitals, adds to the bureaucratic hurdles. While some facilities offer free registration and efficient handling of JKN benefits, the overall impact of these bureaucratic and financial barriers remains a concern for many patients.

"It does have an impact, now at my workplace, everything is handled in one place, registration and BPJS (JKN) are all managed there." (Nurse, DPS02)
"Yes, it has a significant impact, because hospital registration fees are quite expensive now from 25,000 to 150,000." (Nurse, DPS03)
"Now, many are insisting on being referred to a general hospital, but due to the strict JKN system, BPJS does not allow patients to be referred for medication to hospitals because the primary health centres already offer PDP (HIV treatment) services. This has become a bureaucratic issue with BPJS." (Nurse, BLL01)

5.5 Policy Factors

5.5.1 National Health Insurance

National health insurance plays a critical role in ART adherence among women living with HIV. Patients with health insurance face lower costs for treatment. Women without health insurance are significantly less likely to adhere to ART, with a five-fold higher risk of nonadherence compared to those with insurance (52). However, even insured patients may not use their benefits due to the complex insurance system, which requires monthly premiums and imposes penalties for late payments. Economic hardship also affects adherence, as some patients struggle to afford treatment and health insurance (27,52). While insurance can reduce treatment costs, barriers such as complex systems and additional costs still affect ART adherence.

Based on information from health workers, national health insurance (JKN) has had a significant impact on women's adherence to ART in Bali. JKN ensures that HIV-related services, including treatment and testing, are covered, which reduces financial barriers and supports adherence. However, some challenges remain, such as patients' reluctance to undergo necessary procedures at primary health facilities before being referred to specialist hospitals, which can lead to delays or reluctance to seek care. Despite these issues, the overall impact of JKN is positive, as it facilitates access to comprehensive care and reduces out-of-pocket costs, making ART adherence more manageable for women in Bali.

"BPJS (JKN) helps a lot because it covers all the costs, so patients don't have to pay anything at all." (Nurse, DPS02)
"Yes, fortunately, the BPJS (JKN) covers both opportunistic infections related to HIV

patients, which really helps them stick to their medication." (Nurse, BDG02)
"About BPJS (JKN), patients often complain when they must go to the first-level health facility (puskesmas) before getting a referral to hospital. They did not get a referral because ART services at puskesmas were already available. At puskesmas, they felt uncomfortable and preferred to be referred directly to Hospital. As a result, some patients were reluctant to choose the general route without BPJS." (Nurse, DPS03)

5.5.2 Government policies

Indonesia's approach to HIV/AIDS is guided by a comprehensive policy designed to address prevention, treatment, and care. A key component of this policy is the Strategic Use of ART (SUFA) policy, launched by the Indonesian Ministry of Health in 2013. SUFA aims to improve access to antiretroviral therapy (ART) and improve retention in ART programs (14). The initiative was initially launched in 13 cities and is set to expand to a total of 75 cities by 2014. SUFA focuses on optimising ART use to improve overall program effectiveness (16). The policy has led to quicker enrolment in care, more rapid identification of those eligible for treatment, and improved retention in ART.

Government policies significantly impact women's adherence to ART in Bali. On the positive side, these policies effectively ensure a steady supply of medications and support essential HIV services. However, challenges persist, particularly due to bureaucracy and increased administration fees in public hospitals, which impose additional financial burdens on patients. These issues highlight areas where government policies need to improve to better support women's adherence to ART.

"National policies seem to be good overall, especially in terms of ensuring the availability of medications." (Doctor, DPS04)
"The issue that concerns us is the policy on hospital registration fees. The tariff policy, where prices have risen dramatically by hundreds of percent from 25.000 to 150.000 IDR, is very demanding." (Nurse, DPS03)

6. Discussion

This study showed a myriad of factors influencing ART adherence among WLHIV in Bali, Indonesia, across all levels of the ecological model. Although the factors at each level have been studied independently, the results indicate that they are all interconnected. This discussion contextualises the findings within the existing literature and offers insights into potential interventions for improving ART adherence. The framework guiding this analysis has helped to explore why certain factors influence adherence and how targeted interventions at each level may improve ART adherence. This discussion contextualizes the findings within the existing literature and offers actionable insights to improve adherence strategies.

The study findings reveal that individual factors, including socio-demographic characteristics, experiences with antiretroviral medications, and psychosocial aspects, play a significant role in ART adherence. Socio-demographic characteristics such as age, education, and employment status were associated with adherence levels. While sex did not significantly impact adherence, older age was linked to better adherence, likely due to a greater sense of responsibility and commitment to managing their health. WLHIV with higher education and stable employment were more likely to adhere to ART, reflecting findings from other studies that link a higher socioeconomic status with better health outcomes (34,31). Psychosocial factors, including mental health and self-efficacy, were critical for ART adherence. WLHIV with higher self-efficacy and better mental health were more likely to adhere to their treatment regimens, consistent with research highlighting the role of psychological support in managing chronic conditions (20,28,46). However, mental health is deeply affected by external factors such as economic status, family support, stigma and discrimination. To improve ART adherence, it is important to address these wider issues affecting mental health, rather than placing the burden of mental health on the individuals.

This study showed that interpersonal relationships significantly influenced ART adherence. Positive interactions with family members, partners, friends, and healthcare providers were associated with higher adherence rates. Supportive partners and family members were particularly important, corroborating findings from other studies that highlight the role of social support in improving health outcomes (20,46,39). Conversely, negative interactions or lack of support from significant others were barriers to adherence, a finding consistent with literature on the impact of relationship dynamics on health behaviours (33,29). Healthcare provider relationships also played a role, WLHIV who felt supported and respected by their healthcare providers were more likely to adhere to their ART regimen. The healthcare providers interviewed in this study recognized that positive relationships with patients contribute to better treatment outcomes. However, the specific elements that constitute a supportive relationship were not examined in detail. Future research should explore the characteristics of effective provider-patient relationships and

their direct influence on adherence. In addition, the implementation of training programs to improve communication skills and empathy of health workers is essential in improving ART support strategies (48,49,40).

Community-level factors such as public stigma and societal norms were identified as significant barriers to ART adherence. Many WLHIV experienced stigma related to their HIV status, which discouraged them from seeking or continuing treatment. This finding is consistent with extensive literature on the detrimental effects of stigma on healthcare adherence (33,32). Societal and cultural norms also influenced adherence, with some cultural beliefs negatively impacting women's willingness to adhere to ART. These findings highlight the importance of addressing stigma and cultural barriers through community-based interventions and awareness campaigns (30,32).

Health system factors, including accessibility and quality of healthcare services, were critical determinants of ART adherence. Women who faced challenges accessing healthcare services, such as long wait times or inconvenient clinic hours, reported lower adherence rates. This is in line with studies highlighting the impact of healthcare access on treatment adherence (39,41,50). The quality of care, including the availability of resources and the support provided by healthcare staff, also influenced adherence. Improving these aspects of the healthcare system could significantly enhance ART adherence among WLHIV (51,42,45).

Policy factors, such as structural and institutional support systems, are also important in influencing adherence to ART. The SUFA strategy providing free ART and the national health insurance scheme JKN, have significantly increased access to treatment. These supportive policies, which include financial assistance and reduced costs for ART, have been associated with increased adherence rates (52,14). Ensuring that policies are effectively implemented and that support systems are in place is crucial for enhancing ART adherence.

This study has some limitations. Data were collected from specific locations in Bali, which may not fully represent experiences in all regions of Bali. The study relied primarily on healthcare worker perspectives, which may not fully reflect patient experiences or the broader community context. The small sample size for KIIs may also limit the depth and generalizability of the findings. Future research should include a more diverse range of participants, incorporating mixed methods to gain a comprehensive understanding of ART adherence from multiple viewpoints. A reflection on the framework used in this study meaningfully helped meet the study objectives, although there may be aspects that could be refined for future studies. A critical evaluation of the quality of the studies referenced is also recommended to enhance research design and address any identified gaps.

7. Conclusion and recommendations

7.1. Conclusion

This study highlights the multifaceted factors influencing ART adherence among women living with HIV in Bali, viewed through a socio-ecological framework. This study findings emphasise the importance of enablers across the individual, interpersonal, community, health system, and policy levels. Effective ART adherence is strongly influenced by positive individual experiences with treatment, supportive relationships with family and healthcare providers, reduced community stigma, accessible and responsive health services, and strong policy frameworks. To improve ART adherence, it is critical to comprehensively address these influencing factors. Strategies should include enhancing psychosocial support, fostering strong interpersonal networks, combating community stigma through targeted interventions, ensuring adequate healthcare resources, and strengthening supportive policies.

7.2. Recommendations

- To address barriers at the individual level, healthcare providers should collaborate with mental health professionals to integrate psychological support services into HIV care. Addressing mental health barriers, such as depression and anxiety, is crucial for improving ART adherence. These services should be accessible through puskesmas and hospitals. Healthcare institutions need to update and expand their training for healthcare workers and counsellors, focusing on contemporary psychosocial support and adherence strategies to address challenges in ART management.
- To improve interpersonal support, community health workers and HIV program coordinators should implement educational programs that involve family members and partners in the ART adherence process. These programs should aim to improve understanding of HIV and adherence within the patient's support network. Implementing training programs to improve communication skills, empathy, and cultural competency among healthcare workers is also crucial. These measures will improve patient-provider relationships and reduce the stigma associated with HIV.
- To address issues at the community level, public health officials and community leaders should lead comprehensive education campaigns to reduce HIV-related stigma and challenge harmful societal norms. Advocacy groups and media outlets should focus on stigma reduction initiatives to change societal attitudes towards PLHIV and reduce discrimination. Local NGOs and community-based organizations should establish and support peer support groups for women on

ART. These groups provide a safe space for sharing experiences and receiving emotional support, which is essential for improving ART adherence.

- To address health system factors, health facility administrators and policymakers should work to improve healthcare efficiency by reducing wait times, optimizing appointment scheduling, and integrating laboratory services into primary care clinics. It is also essential to maintain critical equipment, such as CD4 and viral load machines, to support effective ART monitoring. Ensuring coverage for essential laboratory tests will facilitate comprehensive patient care.
- To address gaps at the policy and structural level, health insurance providers and government health departments should focus on reducing financial barriers by lowering medical costs including registration fees and providing financial assistance for transportation and related expenses. Simplifying JKN procedures will make specialized care more accessible. Policymakers should also ensure support for ART adherence by promoting MMD programs, which allow patients to access ART for extended periods. This approach will improve adherence among WLHIV.

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Annex 1. Search Strategy (table)

Table 1. Search Strategy Table

Factors (OR)				Geographic (OR)
Individual Factors				Bali
Sex				Indonesia
Age				Asia
Education level				Global
Income				
Mental Health				
Spirituality				
Comorbidities				
Past Experiences				
Interpersonal factors				
Family	**AND**	**ART adherence among women living with HIV (OR)**	**AND**	
Partners				
Friends				
Healthcare providers				
Community factors				
Community support				
Stigma or discrimination				
Cultural norms, traditions, and beliefs				
Traditional and religious ceremonies				
Healthcare system factors				
Distance				
Waiting times				

Availability of ART medication				
Availability of healthcare workers				
Bureaucracy				
Policy factors				
National Health Insurance				
Government policies				

Annex 2. Interview Guide For Key Informants

Researcher: Ni Ketut Lestari
Research Topic: “A Socio-Ecological View of Factors Influencing ART Adherence Among Women Living With HIV in Bali, Indonesia"

Name (Optional) :
Sex :
Profession :

Introduction

1. Greet the participant and introduce the interviewer.
   "Good [morning/afternoon], my name is dr. Lestari. I will conduct an interview as part of my research on ART adherence among women living with HIV in Bali. This research is part of my master's thesis at the KIT Institute Amsterdam."
2. Explain the purpose of the interview.
   "The purpose of this interview is to understand the factors that influence women living with HIV in Bali to adhere to their antiretroviral therapy (ART) and to find ways to improve their treatment outcomes."
3. Emphasise the voluntary nature and confidentiality of participation.
   "Your participation is entirely voluntary, and you can choose to stop at any time. All the information you provide will be kept confidential and used only for research purposes."
4. Obtain informed consent from the participant to proceed.
   "Before I started this interview, I have given you an informed consent form that you have agreed to. I also ask for permission to record this interview. After this research is completed, the recording will be deleted. Do I have your consent to proceed with this interview?"

Background Information

1. Can you mention your institution and your role in the HIV program?
2. How long have you worked in this capacity?

I will ask about factors that can influence ART adherence among women living with HIV in Bali. Please explain, based on your experience, how these factors affect adherence.

Individual Factors

1. How does **sex** affect ART adherence? Are there differences between the sexes?
2. How does **age** affect ART adherence among women living with HIV?
3. How does **mental health** in women living with HIV influence their ART adherence?
4. How do **income** and **economic conditions** affect women's ART adherence?
5. How does ownership of means of **transportation** impact women's ART adherence?
6. How does the **education level** of women living with HIV affect their ART adherence?
7. How does **spirituality** play a role in ART adherence among women living with HIV in Bali?
8. How do **comorbidities** (other existing health conditions) affect women's adherence?
9. Have any women living with HIV had **past experiences** with healthcare services or previous treatments that influenced their ART adherence?

Interpersonal Factors

10. Based on your experience in dealing with women living with HIV, how does **family** influence their ART adherence?
11. What role do **partners** play in influencing ART adherence among women living with HIV?
12. What role do **friends** play in influencing ART adherence among women living with HIV?
13. What role do **healthcare providers** play in influencing ART adherence among women living with HIV?
14. Based on your experience, what **effective approaches** have healthcare providers used to improve ART adherence among women living with HIV in Bali?

Community Factors

15. How does **community support** (such as peer support groups) influence ART adherence among women living with HIV? How does a **lack of community support** affect women's ART adherence?
16. How does **stigma** or **discrimination** related to HIV in the community impact ART adherence among women living with HIV in Bali?
17. How do **cultural norms**, **traditions**, and **beliefs** in Bali influence ART adherence among women living with HIV in Bali?
18. Balinese women have crucial roles in **traditional** and **religious ceremonies** in Bali. How does this impact ART adherence among women living with HIV in Bali?

Healthcare System Factors

19. Does **distance** to a health facility affect ART adherence among women living with HIV in Bali? How does it affect them?
20. How do long **waiting times** at a health facility affect women's ART adherence?
21. How does the **availability of ART medication** affect women's adherence?
22. How does the **availability of healthcare workers** affect women's ART adherence?

23. Are there **financial barriers** (such as registration fees) that women face in accessing ART at your clinic? How do these barriers affect their adherence?
24. Can you provide examples of how **bureaucracy** in a health facility affects women's ART adherence?

Policy Factors

25. How does the **National Health Insurance** (Jaminan Kesehatan Nasional) affect ART adherence among women living with HIV in Bali?
26. What other **government policies** (at both national and provincial levels) influence ART adherence among women living with HIV in Bali?
27. What **policy changes** or **recommendations** do you think are necessary to improve ART adherence among women living with HIV in Bali?

Conclusion

Is there anything else you would like to add regarding the factors that influence ART adherence among women living with HIV in Bali?

Thank you for your time and contribution to this research. If further discussion is needed, I will follow up with you.

Annex 3. Informed Consent Form For Interview Participants

STUDY TITLE: "A Socio-Ecological View of Factors Influencing ART Adherence Among Women Living With HIV in Bali, Indonesia "

Principal Investigator: Ni Ketut Lestari, KIT Royal Tropical Institute

INTRODUCTION

You are being invited to participate in a research study conducted by Ni Ketut Lestari, as part of a thesis project at KIT Royal Tropical Institute. The purpose of this study is to explore the factors influencing antiretroviral therapy (ART) adherence among women living with HIV in Bali, Indonesia.

If you agree to participate, you will be invited to take part in an interview. During the interview, you will be asked questions about your experiences, insights, and professional perspectives regarding ART adherence among women living with HIV in Bali, Indonesia. The interview is expected to last approximately 40 minutes.

Your participation in this study is confidential. Any information you provide will be anonymized, meaning that your name and any identifying details will not be shared in any reports or publications resulting from this study.

Participation in this study is entirely voluntary. You have the right to decline to participate or to withdraw from the study at any time, without facing any negative consequences. There are no direct benefits to participating in this study. However, your insights and experiences will contribute to understanding and improving ART adherence among women living with HIV in Bali, Indonesia.

Participating in the interview involves minimal risk. The questions will be non-invasive and relate solely to your professional experiences and perspectives.

If you have any questions about the study or your participation, please feel free to contact:

Ni Ketut Lestari, n.lestari@student.kit.nl, +62 8113827788.

CONSENT

I have read and understand the information provided in this consent form. I have had the opportunity to ask questions and have received satisfactory answers. By signing below, I voluntarily agree to participate in the interview.

Participant Signature: ________________________

Date: ________________________