

# The demographic and clinical characteristics of women living with HIV and the opportunistic infections they experience in Manokwari Regency, West Papua

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**Abstract.** The number of women living with HIV (WLHIV) in Indonesia, especially Papua, is increasing yearly, along with the increasing number of men who transmit HIV to their partners. WLHIV are susceptible to opportunistic infections, leading to increased morbidity and mortality. This study, aiming to identify the characteristics and opportunistic infections among WLHIV in Manokwari Regency, West Papua, was descriptive with a cross-sectional study design involving 70 WLHIV who routinely received antiretroviral treatment at the VCT of RSUD Manokwari as respondent. Data on demographic and clinical variables were obtained through interviews using structured questionnaires. Data were analyzed by Fisher exact tests to measure the association of opportunistic infections with demographic and clinical variables. The results showed that the demographic characteristics of WLHIV: aged 18-35 years (47.1%), high school education (42.9%), private employment (47.1%), married (65.7%), ethnic Papuan (65.7%), and heterosexual risk factor (97.1%). Meanwhile, their clinical characteristics were clinical stage III (62.9%), CD4<sup>+</sup>  $\geq$ 350 cell/mm<sup>3</sup> (62.9%), detectable viral load (55.7%), and underweight (38.6%). The most opportunistic infections among them were pulmonary tuberculosis (58.6%). The clinical stage of HIV and CD4<sup>+</sup> cells was significantly associated with opportunistic infections among WLHIV. For these reasons, it is necessary to intervene by applying antiretroviral administration strategies and specific antimicrobial therapy.

## 1 Introduction

HIV/AIDS has become a global problem since over 37 million people live with it throughout the world. As of 2020, HIV had infected 19 million women aged 15 years and over and claimed a total of 240,000 deaths [1]. From 1987 to 2019, 463 (90.07%) districts/cities in all

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provinces in Indonesia reported a total of 349,882 HIV/AIDS cases. The top 5 provinces, in this case, were DKI Jakarta, East Java, West Java, Papua, and Central Java [2].

Data from the Indonesian Ministry of Health in 2021 showed that of the total population of people living with HIV/AIDS in Indonesia, 35% were women living with HIV (WLHIV), and 33% were women living with AIDS. In addition, those in the heterosexual group contributed 70% to the new cases. In 2018, the number of housewives infected with HIV/AIDS reached 16,405, showing their high vulnerability to being infected through their partners [3]. Almost half of HIV patients were women of reproductive age [4]. Women are more likely to be infected with HIV than men [5], as a previous study reported that HIV transmission is generally higher in women.

Risky sexual behavior, coupled with women's physiological factors different from men's, is the cause of women being vulnerable to HIV infection. Complications and anemia during pregnancy and childbirth, including low access to information and treatment, make HIV transmission and AIDS development higher in women [6]. HIV transmission is also caused by socioeconomic behavior and demographic factors, including the age of having the first sexual intercourse, inconsistent condom use, multiple sexual partners, and sexual partner behavior [7].

Opportunistic infections (OIs) are the causes of morbidity and mortality of people living with HIV/AIDS in both developing and developed countries. By estimation, one-third of people living with HIV/AIDS die from opportunistic infections (OIs) [8]. Although HIV therapy with antiretroviral has substantially reduced the risk of suffering from OIs, in HIV-positive people with low income, the risk of acquiring opportunistic infections remains high. This phenomenon is related to slow initial diagnosis, poverty, drug resistance, non-adherence to taking medication, and even malnutrition [9]. Opportunistic infections are caused by microorganisms attacking the immune system under either normal or weakened conditions. In the human body, there are many bacteria, fungi, and viruses, but the immune system can usually control these germs. OIs attack when the CD4<sup>+</sup> count shows under 200 cells/mm<sup>3</sup> [10].

Several types of OIs come from fungal infections from *Candida* species and often attack and even become the common causes of morbidity and mortality among people living with HIV/AIDS [11]. Esophageal-oral candidiasis reaches 80.8% of all OIs in Indonesia. This figure depicts the IO pattern commonly found in low-income countries. Meanwhile, tuberculosis is the most common infection (40.1%) found in people living with HIV in Indonesia. The other popular OIs are cytomegalovirus, toxoplasmosis, and pneumonia [12].

Almost half the cases of these opportunistic infections often occur in women. Women with severe HIV are at high risk of opportunistic infections. This study aimed to determine the characteristics of WLHIV who experience opportunistic infections and the relationship between their demographic and clinical characteristics with opportunistic infections in Manokwari Regency, West Papua.

## **2 Materials and methods**

### **2.1. Study design and subject**

This study was a cross-sectional study design conducted in Manokwari Regency at the Voluntary counseling and testing (VCT) Center of Manokwari Hospital, Manokwari Regency, from March to September 2019. The study subjects consisted of 70 WLHIV patients who had received antiretroviral therapy for over 6 (six) months, visited VCT during the study period, and met the criteria to participate in this study. From the total of 116

participants from the VCT Center of Manokwari Hospital who were willing to participate, we only found 70 participants who met the criteria of this study to be analyzed.

## **2.2. Eligible criteria**

The participants should be WLHIV patients aged > 18 years at the initiation of therapy, having completed medical record and received antiretroviral therapy for at least six months, and willing to participate in the study voluntarily. Patients who were seriously ill due to other medical conditions and pregnant women were excluded from the study.

## **2.3. Data collection and laboratory assay**

The researchers collected the sociodemographic characteristics and the clinical data needed through a structured questionnaire. Data were collected through interviews and reviewing medical records. Demographic variables were from the medical records, while clinical variables were from the laboratory examination results. Body mass index data were from height and weight measurements. The viral load was checked using quantitative PCR, while the CD4<sup>+</sup> cells were checked using a CD4<sup>+</sup> cell counter.

## **2.4. Data analysis and interpretation**

The data were coded, edited, cleaned, and input into SPSS version 20 software. A univariate analysis was performed for the sociodemographic and clinical variables. The Fisher exact test analysis was done to determine the factors that influenced the occurrence of opportunistic infections. The *p*-value < 0.05 indicated a variable significance in the incidence of opportunistic infections.

## **2.5. Ethical clearance**

The research ethical clearance number: LB.02.01/2/KE.008/2019 was obtained from the Health Research Ethics Commission, National Institute of Health Research and Development, Ministry of Health Republic of Indonesia.

# **3 Results and discussion**

In this study, most WLHIV, based on their demographic characteristics, were aged 18-35 years (47.1%), graduated from junior high school (42.9%), were private employees (47.1%), got married (65.7%), were Papuan (65.7%), had no stigma at the health service (97.1%), had family support (72.9%), and had health insurance (70.0%) (Table 1).

The results of the study showed that, based on the clinical characteristics, most WLHIV were underweight (38.6%), had HIV clinical stage III (62.9%), had a CD4<sup>+</sup> count of 350 cells/mm<sup>3</sup> (62.9%), had a detectable viral load (55.7%), had partners diagnosed with HIV first (78.6%), suffered from opportunistic infection as the reason for taking HIV test (44.3%) (Table 1).

The results of the study showed that the most common opportunistic infection among WLHIV was tuberculosis (58.6%), followed by oral candidiasis (18.6%) (Table 1).

**Table 1.** Characteristics of demographic, clinical, and opportunistic infections among women living with HIV in VCT Center of Manokwari Hospital, Manokwari Regency.

<b>Demographic variables</b>		<b>Frequency</b>	<b>Percent</b>
Age groups	18-35 years	33	47.1
	36-45 years	22	31.4
	46-55 years	13	18.6
	>55 years	2	2.9
Education	Primary school	2	2.9
	Junior high school	16	22.9
	Senior high school	30	42.9
	University	22	31.4
Occupation	Housewife	31	44.3
	Private employee	33	47.1
	Government employee	6	8.6
Marital status	Unmarried	24	34.3
	Married	46	65.7
Ethnicity	Non-Papuan	24	34.3
	Papuan	46	65.7
Risk factor	Heterosexual	68	97.1
	Other	2	2.9
Stigma	Yes	2	2.9
	No	68	97.1
Family support	Yes	51	72.9
	No	19	27.1
Had health insurance	Yes	49	70.0
	No	21	30.0
<b>Clinical variables</b>			
Body Mass Index	Underweight	27	38.6
	Normal weight	13	18.6
	Overweight	16	22.9
	Obesity	14	20.0
HIV clinical stage	Stage I	15	21.4
	Stage II	5	7.1
	Stage III	44	62.9
	Stage IV	6	8.6
CD4 <sup>+</sup> count	<350 cell/mm <sup>3</sup>	26	37.1
	≥350 cell/mm <sup>3</sup>	44	62.9
Viral load	Undetectable	31	44.3
	Detectable	39	55.7
Diagnosed with HIV first	Respondent	15	21.4
	Respondent partner	55	78.6
Reason for taking HIV test	Suffering from tuberculosis	12	17.1
	Pregnant	5	7.1
	A couple being treated for illness	13	18.6
	Suffering from opportunistic infection	31	44.3
	Groups at high risk of contracting HIV	9	12.9
<b>Opportunistic infections</b>			
Types of infections/diseases	Tuberculosis	41	58.6
	Oral candidiasis	13	18.6
	Candidiasis	4	5.7
	Diarrhea	4	5.7
	Pruritic papular eruption (PPE)	4	5.7
	Anemia	3	4.3
	Sexually transmitted infection	1	1.4
Total		70	100.0

The results of the bivariate analysis between demographic and clinical variables on the incidence of opportunistic infections showed a significant relationship between the clinical stage of HIV and the CD4<sup>+</sup> count on the incidence of tuberculosis ( $p < 0.05$ ) (Table 2).

**Table 2.** Relationship between demographic and clinical characteristics with tuberculosis infections among WLHIV in VCT Center of Manokwari Hospital, Manokwari Regency ( $n=70$ )

Characteristics	Tuberculosis opportunistic infection status		Frequency	P*
	HIV-Non TB	HIV-TB		
<b>Age</b>				0.628
18 -35 years	15	18	33	
>35 years	14	23	37	
<b>Education</b>				0.418
Primary-junior high school	9	9	18	
Senior high school-university	20	32	52	
<b>Occupation</b>				0.563
Housewife	11	26	37	
Others	18	25	43	
<b>Ethnicity</b>				0.134
Non-Papuan	13	11	24	
Papua	16	30	46	
<b>Body Mass Index</b>				0.214
Underweight	15	28	43	
Normal weight	14	13	27	
<b>HIV clinical stage</b>				0.025**
Stages I & II	12	6	18	
Stages III & IV	17	35	52	
<b>CD4<sup>+</sup> count</b>				0.005**
<350 cell/mm <sup>3</sup>	5	21	26	
≥350 cell/mm <sup>3</sup>	24	20	44	
<b>Viral Load</b>				0.566
Undetectable	13	18	31	
Detectable	16	23	39	

\*Fisher exact test; \*\*Significant level  $p < 0.05$

### 3.1. The demographic characteristics of women living with HIV in West Papua

Almost half of WLHIV, namely 47.1%, were in the productive age group of 18-35 years. Adolescents and those in that age group are at high risk of HIV transmission. Research in Sorong found a significant difference in the proportions of the old and the young people living with HIV and revealed that HIV infection was more commonly occurring in the young people for their behavior: engaging in unsafe sex that poses a risk of HIV transmission and having less awareness of taking steps to prevent HIV transmission [13].

The high prevalence of HIV-AIDS in the productive age is because people in this age group are active in various activities. They are often in contact with other people, including people living with HIV-AIDS. In addition to the intense physical activities in this age group, the production of sex hormones in this age group is very high, thus increasing sexual activities. Without self-control, they will fall into free sex, which is the HIV-AIDS transmission way [14].

WLHIV in Manokwari varied in their educational background, including primary, junior high school, senior high school, and university. Most of them graduated from senior high schools (42.9%). Education plays a role in the actions to be taken, including in the efforts to prevent HIV. The higher the education, the lower the vulnerability to contract HIV [15]. A study in America found that 96% of students at high schools and 99% of college students had known that HIV transmission occurs among the heterosexual population. However, most of the students continued to have unprotected sex, and 26% of American young adults practiced anal sex. This data showed that a higher level of education does not necessarily bring a person to take steps to prevent HIV transmission well [16].

In terms of employment, WLHIV in Manokwari were housewives, private employees, and government employees. Most of them were housewives and private workers. These findings were in line with the report on the development of HIV and sexually transmitted infections in the second quarter of 2019, revealing that, in 2019, most HIV infections occurred in private employees, housewives, and entrepreneurs [17].

Private employees with high mobility, work stress factors, and adequate income that can trigger deviant sexual behaviour are vulnerable to contract HIV. They are more likely to suffer from HIV because of their behaviour, such as a sedentary lifestyle. A person who works has a higher level of income than a person who does not work. High income makes a person tend to do things at risk of contracting HIV, such as having unsafe sex and using injected drugs [18]. Apart from private employees, WLHIV from the housewife group also has a high percentage in Manokwari. According to the UNAIDS report, over 1.7 million women in Asia are living with HIV, and 90% of them are infected with the virus through their husbands or sexual partners [19].

In this study, we found that more WLHIV were married. The high number of cases of HIV in married women could be due to the transmission through sexual activity with their partners (husbands/wives). The risk of HIV transmission from male to female is higher than that from female to male. In contrast, HIV transmission among unmarried individuals is associated with risky sexual behaviour with sex workers, compared to that in married individuals (56% vs. 44%) [13]. The vulnerability of married women is also due to gender inequality and injustice, causing an unequal relationship between the husband and the wife, where the wife cannot ask the husband to use a condom or refuse when he forces her to do unsafe sexual intercourse [19].

### **3.2. Clinical characteristics of women living with HIV in Manokwari, West Papua**

The clinical characteristics of WLHIV showed diversity, namely underweight, normal, overweight, and obese. The prevalence of WLHIV with lean body mass index was higher (38.6%). A study in America found that 36.5% of HIV patients were in the low body weight group, while 30.9% were in the normal weight group [20]. One of the factors responsible for malnutrition in patients with HIV is their decreased appetite because of difficulty eating due to infections like oral thrush or esophagitis caused by *Candida*. In addition, poor absorption of nutrients is usually accompanied by diarrhea caused by infection with *Salmonella* or *Mycobacterium avium*, viruses like *cytomegalovirus*, or parasites like *Giardia*. In addition, infections can also cause nausea and vomiting. The gastrointestinal tract is the organ with the largest lymphoid tissue in the body and is directly related to HIV infection. HIV infection causes intestinal cell damage due to the flattening of the villi and the decreased absorption of D-xylose [21]. These cause the malabsorption of nutrients from carbohydrates and fats, bringing fat-soluble vitamins that are very influential on the immune system to be uneasy to absorb. In addition, the need for more nutrients in conditions of fever and infection worsens weight loss [21].

In this study, most of the WLHIV were in clinical stage III at the time of starting antiretroviral therapy. In addition, most of the WLHIVs had a CD4<sup>+</sup> count of 350 and a detectable viral load. The trend of increasing CD4<sup>+</sup> count after undergoing antiretroviral therapy can be caused by several factors, such as the level of adherence, the nutritional status of the patient, and the incidence of drug poisoning [22]. Patients with a CD4<sup>+</sup> count of fewer than 200 cells/mm<sup>3</sup> were 3.5 times more likely to be co-infected with HIV tuberculosis than those with higher CD4<sup>+</sup> counts. Patients with advanced WHO clinical stages have a 6.81 times risk of being co-infected with HIV tuberculosis than patients with WHO clinical stage I. WHO stages III and IV are clinically characterized by the emergence of co-infected diseases due to HIV, one of which is tuberculosis [23].

### **3.3. Relationship between the clinical stage of HIV and CD4<sup>+</sup> to the incidence of opportunistic infections**

As many as 58.6% of WLHIV experienced tuberculosis as an opportunistic infection, while the rest suffered from oral candidiasis, candidiasis, pruritic papular eruption, anemia, and sexually transmitted infections. The results of the analysis showed that there is a significant relationship between the clinical stage of HIV and CD4<sup>+</sup> and opportunistic infections.

Stages III and IV in HIV have been associated with the incidence of tuberculosis coinfection compared to stages I and II, following the World Health Organization (WHO) criteria that tuberculosis is an opportunistic infection that often appears in stage III of HIV disease [24]. In addition, CD4<sup>+</sup> <350 cells/mm<sup>3</sup> was associated with the incidence of tuberculosis coinfection, compared to CD4<sup>+</sup> 350 cells/mm<sup>3</sup>, because the body's primary defense response against tuberculosis is mediated by cellular immunity involving the response of helper T lymphocytes (CD4<sup>+</sup>) and cytotoxic T lymphocytes (CD8<sup>+</sup>). Interferon-gamma is a key cytokine involved in the immune response to tuberculosis infection. Cytokines mediate the activity of macrophages to kill *Mycobacterium* and enhance cellular immune responses. Interferon-gamma production decreases in people infected with HIV [25]. A low CD4<sup>+</sup>/CD8<sup>+</sup> ratio is independently associated with an increased risk of developing tuberculosis despite viral suppression [26].

A previous study in Ethiopia reported that a state of advanced immune suppression before undergoing antiretroviral treatment, where one of the signs of this condition is a decrease in CD4<sup>+</sup> counts, is a contributing factor to the emergence of opportunistic infections among people living with HIV [27]. Another study also revealed that advanced clinical disease stages IV as well as low CD4<sup>+</sup> count were predictors of opportunistic infections in addition to poor adherence to antiretroviral medication [28, 29].

## **4 Conclusion**

The demographic and clinical characteristics of women living with HIV in Manokwari showed that they were of reproductive age, in private employment, had high school educational backgrounds, and had married status. The clinical features associated with the incidence of tuberculosis opportunistic infections are the clinical stage of HIV and CD4<sup>+</sup> levels. Successful intervention requires collaboration program improvement, patient-provider communication, mitigation of stigma, and a shift from a vertical to a more comprehensive care model. We suggested that TB control should be part of the standard care in the HIV program, and furthermore, sensitivity to the patients and trustworthiness to become inextricable parts of the culture of TB control.

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