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Research Article

## Factors associated with High Viral Loads among HIV Patients Under ARV at Gitwe District Hospital

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### Abstract

**Background:** High viral load is a condition of rapid multiplication in blood stream. The high viral load among HIV patients under ARV may also occur due to the rapid multiplication of virus leading to compromise immune system of living organism up to death. The vast majority of people living with HIV virus face with persistent of high viral load while were under treatments (ARV).

**Aim:** The aim of the study was to evaluate and assess the factors associated with high viral load among HIV patients under ARV at Gitwe District Hospital.

**Methodology:** The retrospective study was conducted to assess high viral load of HIV patients under ARV. The only significance factor for viral load were adherence with ( $p=0.000173$ ) and ages with ( $p=0.00023$ ).

**Results and conclusion:** A large of number of PLWH were highly VL tested, and 95 subjects were recorded for study. Among 95 subjects, 54.73% were female and 45.26% male. All data were analyzed using statistical package for social science (SPSS) version 20. The results have showed provider's advices and ART use, adherence counselling.

**Keywords:** High viral load, HIV, Antiretroviral therapy, Gitwe District Hospital.

## INTRODUCTION

Adherence to antiretroviral therapy is perhaps the most critical factor influencing viral load outcomes in HIV patients. The effectiveness of ARV depends on the patient's consistent and correct use of the prescribed regimen. Inadequate adherence can result in suboptimal drug levels in the bloodstream, allowing the virus to replicate and potentially leading to an increase in viral load<sup>1</sup>. Several barriers to adherence have been identified in various studies, including the complexity of treatment regimens, side effects of medications, and psychosocial factors such as stigma and mental health disorders<sup>2</sup>.

Complex ARV regimens that require multiple daily doses or involve dietary restrictions can be difficult for patients to manage, particularly those with limited access to healthcare or support services. Side effects

from ARV medications, such as nausea, fatigue, and gastrointestinal issues, are also common reasons for patients to miss doses or discontinue treatment altogether<sup>3</sup>.

Stigma and discrimination associated with HIV further exacerbate these challenges, discouraging patients from seeking care or adhering to their treatment plan.

Recent studies emphasize the importance of addressing mental health in improving adherence to ARV therapy. Depression, anxiety, and other mental health disorders are prevalent among PLHIV, and these conditions can significantly impair adherence, leading to treatment failure and higher viral loads<sup>4</sup>.

Integrating mental health support into HIV care programs has been shown to improve adherence rates and, consequently, viral suppression. Additionally,

interventions that simplify ARV regimens, such as single-pill combinations, have demonstrated success in improving adherence and reducing the likelihood of high viral loads<sup>5</sup>.

The emergence of drug resistance is another significant factor contributing to high viral loads in patients receiving ARV therapy. HIV is a highly mutable virus, and resistance to antiretroviral drugs can develop when the virus replicates in the presence of suboptimal drug concentrations, often as a result of poor adherence. Once resistance develops, the effectiveness of the ARV regimen is diminished, leading to an increase in viral load and a higher risk of treatment failure<sup>5</sup>.

Drug resistance is particularly problematic in resource-limited settings where access to second- and third-line treatment options may be restricted. In these contexts, patients with resistant strains of HIV may have limited alternatives, resulting in sustained high viral loads and increased transmission risks<sup>6</sup>. Recent research has highlighted the growing prevalence of drug-resistant HIV, particularly in sub-Saharan Africa, where ARV programs have been scaled up rapidly but face challenges in ensuring consistent medication supply and patient adherence<sup>2</sup>.

Efforts to manage drug resistance include routine viral load monitoring and resistance testing, which can help identify patients at risk of treatment failure and enable timely adjustments to their treatment regimens. However, these services are often underutilized in low-resource settings, necessitating greater investment in laboratory infrastructure and healthcare systems to combat the spread of drug-resistant HIV strains<sup>3</sup>.

Socioeconomic and structural factors also play a significant role in determining viral load outcomes among HIV patients on ARV therapy. In low- and middle-income countries, where the burden of HIV is greatest, access to healthcare is often constrained by poverty, lack of infrastructure, and limited healthcare resources. Patients in these settings may experience interruptions in treatment due to stockouts of medications, long travel distances to healthcare facilities, or out-of-pocket costs that they cannot afford<sup>6</sup>. These factors can lead to inconsistent ARV use, which in turn increases the risk of viral rebound and higher viral loads.

Stigma and discrimination associated with HIV also contribute to poor treatment outcomes, as they can deter individuals from accessing healthcare services or adhering to their prescribed treatment. This is particularly true for marginalized populations, such as men who have sex with men, sex workers, and people who inject drugs, who often face additional barriers to care due to criminalization and social exclusion<sup>2</sup>.

Addressing these structural barriers requires a multifaceted approach that includes expanding access to healthcare services, improving the availability of ARV medications, and implementing strategies to reduce HIV-related stigma. Community-based care models, mobile health clinics, and telemedicine have shown promise in reaching underserved populations and

improving adherence to treatment in resource-limited settings.

The presence of comorbid conditions, such as tuberculosis (TB), hepatitis, and non-communicable diseases (NCDs), can further complicate the management of HIV and contribute to higher viral loads. HIV-infected individuals are more susceptible to co-infections like TB, which is a leading cause of death among people living with HIV. Co-infections can make it more difficult to achieve viral suppression, as they often require additional treatments that may interfere with ARV therapy or increase the risk of drug-drug interactions<sup>4</sup>.

NCDs, such as cardiovascular disease, diabetes, and chronic kidney disease, are also becoming more common among people living with HIV as the population ages. These conditions can complicate HIV treatment by increasing the complexity of care and potentially interfering with ARV medications. Managing these comorbidities requires a holistic approach to HIV care that addresses the overall health of the patient, rather than focusing solely on viral suppression<sup>3</sup>.

## METHODOLOGY

### Study area

This study was conducted in ARV department of Gitwe District hospital. It is located in Ruhango district, Southern Province.

### Study design

This was a retrospective study that was conducted in period of one month to gather the data at Gitwe district Hospital.

### Data collection

A data capture sheet was used to collect information from patients whose files are available in log book and electronic management tools.

The participants included in this study were patients known to have HIV and admitted in ARV department of Gitwe District hospital. It excluded HIV negative patients.

### Statistical analysis

The descriptive statistic and tables were used for data presentation. Statistical package for social sciences (SPSS) version 22 software was used for data analysis and the significance level was considered.

## RESULTS AND DISCUSSION

### Socio-demographic characteristic of study population

The analysis of factors such as age, sex, adherence, socioeconomic status, and marital status in relation to HIV prevalence and viral load offers valuable insights into the epidemiology of the virus, especially among patients under antiretroviral (ARV) treatment. The data suggests that middle-aged patients, specifically those between 50-59 years, exhibit the highest frequency and percentage of HIV infection, followed by patients aged

40-49 years. This is in line with recent studies, which show that the burden of HIV is increasingly shifting toward older populations, particularly in regions where ARV programs have been successful in extending the life expectancy of people living with HIV (PLHIV). For instance, evidence from research indicates that PLHIV are aging due to the effectiveness of ARV therapy, leading to a larger proportion of middle-aged and older adults living with HIV<sup>7</sup>.

The lower prevalence of HIV among younger adults, such as those aged 20-29 years, which is reported at only 2.1%, can be attributed to improved awareness, prevention campaigns, and testing among younger populations in recent years. Programs targeting young adults have been relatively successful in promoting safer sexual practices and earlier HIV diagnosis, which might contribute to the lower viral load in this group. However, it is essential to note that the lower prevalence in this group does not necessarily mean a lower risk, as younger people may still engage in high-risk behaviors, but early intervention could be limiting the viral replication in those diagnosed.

The results indicate that females have a higher frequency and percentage of HIV infection, covering 54.73% compared to 45.26% among males. This gender disparity aligns with global trends showing that women, especially in sub-Saharan Africa, are disproportionately affected by HIV. According to the Joint United Nations Program on HIV/AIDS (UNAIDS), women and girls account for nearly half of all people living with HIV globally, and they are particularly vulnerable due to a combination of biological, cultural, and socioeconomic factors<sup>8</sup>. Women are more biologically susceptible to HIV transmission during heterosexual intercourse, and gender inequalities often limit their access to prevention services, education, and healthcare<sup>9</sup>. Additionally, gender-based violence and unequal power dynamics in relationships can hinder women's ability to negotiate safer sex, increasing their vulnerability to infection. These factors likely contribute to the higher percentage of HIV cases among females in this dataset.

Adherence to ARV treatment is critical for achieving viral suppression and preventing the progression of HIV infection. In this analysis, 85.26% of patients exhibited good prognosis, reflecting high adherence rates to ARV treatment, while the remaining 14.73% showed poor adherence and prognosis. This is consistent with findings from multiple studies that emphasize the importance of adherence in maintaining low viral loads<sup>1</sup>. Adherence to ARV therapy ensures that the virus remains suppressed, reducing the risk of resistance and the likelihood of treatment failure.

However, poor adherence, as observed in the minority of patients (14.73%), can lead to viral rebound and drug resistance. Factors contributing to poor adherence include socioeconomic challenges, stigma, mental health issues, and the side effects of ARV medications. Research has shown that patients with poor adherence often experience worse health outcomes, including increased viral loads and faster progression to AIDS<sup>2</sup>. Interventions aimed at supporting adherence, such as

patient education, counseling, and simplified treatment regimens, are essential for improving outcomes in this group.

The relationship between socioeconomic status and HIV outcomes is well-documented, with lower socioeconomic classes being disproportionately affected by the virus. In this dataset, class III, representing the lower socioeconomic group, had the highest frequency and percentage of HIV cases, accounting for 85.26%. Class II followed with 12.62%, while class I, representing the wealthiest group, accounted for only 2.1%. These findings mirror global trends, where poverty and low socioeconomic status are strongly associated with higher HIV prevalence<sup>8</sup>.

Individuals in lower socioeconomic classes often face multiple barriers to accessing healthcare services, including limited access to ARV medications, healthcare facilities, and prevention programs. Additionally, they may experience food insecurity, unstable housing, and unemployment, all of which contribute to poor health outcomes and hinder adherence to ARV therapy<sup>9</sup>. The high prevalence of HIV in class III may also be linked to higher rates of transactional sex, limited education, and lack of access to prevention services in this group. Addressing socioeconomic disparities is crucial for controlling the spread of HIV and improving treatment outcomes, particularly in resource-limited settings.

**Table 1: Socio-demographic characteristic of study population**

Variable	Frequency	Percentage
Age		
[20-29]	2	2.1%
[30-39]	10	10.52%
[40-49]	17	17.89%
[50-59]	44	46.31%
[60-69]	19	20%
[70-79]	3	3.15%
Sex		
Male	43	45.26%
Female	52	54.73%
Socio-economic		
Class I	2	2.1%
Class II	12	12.63%
Class III	81	85.26%
MARITAL STATUS		
Single	4	4.21%
Married	59	62.1%
Widow	5	5.26%
Divorced	27	28.41%

Marital status is another important factor in understanding HIV dynamics. In this dataset, married individuals represent the largest group affected by HIV, with a prevalence of 62.1%, followed by divorced individuals (28.42%). Single patients account for 4.12%, while widows represent 5.26%. These results suggest

that HIV transmission is prevalent among married individuals, which could be related to the fact that many married couples may not perceive themselves to be at risk and therefore may not use preventive measures consistently. Studies have shown that married women, in particular, are at risk of acquiring HIV from their spouses, especially in settings where extramarital relationships are common, and condom use is infrequent within marriage<sup>10</sup>.

Divorced and widowed individuals also appear to have a higher frequency of HIV infection, which could be due to their increased vulnerability following the dissolution of relationships. Divorce or widowhood may lead to higher risk sexual behaviors, such as engaging in new partnerships without adequate prevention measures. Single individuals, who represent a smaller portion of the HIV-positive population, may have fewer sexual partners or be more engaged in HIV prevention efforts, contributing to their lower prevalence in this dataset.

### Correlation of HIV viral load and its associated factors

The line initiation of ARV after HIV positive tests reduced the harmful effect of HIV to human body<sup>11</sup>. The table below summarizes viral load and associated factors. The aim of this study was to examine the factors associated with high viral load of HIV patients under

ARV at RRH. HIV viral load (VL) monitoring can reinforce antiretroviral therapy (ART) adherence. Standard VL testing requires high laboratory capacity and coordination between clinic and laboratory which can delay results.

The factor which is highly significant is adherence with p-value of less than 0.005 ( $<0.005$ ) which was (0.000173) meaning that there is an association within variables. The other considered factors were not significant, that means that there was no association within variables socio-economics had no significance with viral load (VL) the p-value is great than 0.790703 ( $p=0.790703$ ). Ages had no significance with viral load (VL) their p-value was greater than ( $p>0.005$ ) as indication of significance the p-value of ages was ( $p>0.789455$ ).

Gender according statistical analysis of chi-square shows there is no association or significance as variables with viral load (VL) because their (p-value =0.708708). Marital status had no association too means no significance the p-value were greater than 0.005 their (p-value =0.950486). For sex, there was no association means no significance the p-values of sex was greater than 0.005 as reference therefore was (p-values= 0.708708).

**Table 2: Correlation of HIV viral load and its associated factors**

VARIABLES	VIRAL LOAD	P-value
AGE [20-29]	2	0.789455
[30-39]	10	
[40-49]	17	
[50-59]	44	
[60-69]	19	
[70-79]	3	
TOTAL	95	
GENDER MALE	52	0.708708
FEMALE	43	
TOTAL	95	
MARITALSTATUS		0.950486
SINGLE	4	
MARRIED	59	
DIVORCED	5	
WIDOW	27	
TOTAL	95	
ADHERENCE POOR	9	0.000173
GOOD	54	
TND	32	
TOTAL	95	
SOCIO-ECONOMIC		0.790703
CLASS I	2	
CLASS II	12	
CLASS III	81	
Total	94	

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