International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 13, Issue 1, pp: (233-249), Month: April 2025 - September 2025, Available at: www.researchpublish.com

Prevalence and Factors Associated with Depression among People Living with Hiv in Kicukiro Health Center, Rwanda

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DOI: https://doi.org/10.5281/zenodo.15671809

Published Date: 16-June-2025

Abstract: **Background: Depression is a common mental health issue among people living with HIV (PLWH), significantly affecting their quality of life, treatment adherence, and overall health outcomes. While adolescent depression in HIV-positive populations has been studied, adult-focused research in Rwanda is limited. This study assessed the prevalence and associated factors of depression among HIV-positive adults aged 18 and above attending Kicukiro Health Center in Kigali.**

Materials and Methods: Using a descriptive cross-sectional design, 349 participants were systematically selected from 2,278 ART clients. Data collection employed structured questionnaires, including the Patient Health Questionnaire-9 (PHQ-9) for depression screening. Analysis involved descriptive statistics, chi-square tests, and logistic regression.

Results; Findings revealed that 30.09% of participants exhibited symptoms of depression, a rate consistent with other resource-limited settings. Key factors associated with increased depression risk included being female (COR = 1.88), being single, widowed, or divorced (COR = 2.28), and inconsistent adherence to antiretroviral therapy (ART) (COR = 4.59). The most significant barrier to accessing mental health care was financial cost (COR = 8.66).

This study highlights the urgent need to integrate mental health services within HIV care, especially in resource-limited settings. Its findings provide critical insights for healthcare providers, emphasizing the importance of regular depression screening and targeted interventions to improve mental health and ART adherence. The research supports the development of mental health training programs for HIV care providers and informs data-driven policymaking and resource allocation.

Conclusion: By addressing depression in PLWH, particularly at facilities like Kicukiro Health Center, this study contributes to improving overall patient outcomes and raising community awareness about the intersection of HIV and mental health. Ethical clearance was secured from Mount Kenya University's Institutional Review Board, ensuring confidentiality and informed consent.

Keywords: **Prevalence, Depression, People Living with HIV, Kicukiro Health Center, Rwanda.**

I. INTRODUCTION

A common mental health condition called depression manifested through protracted depressive episodes or a decline in interest activities (WHO, 2023). Prolonged depressive and dismal feelings together with a decreased interest in activities are its hallmarks. It affects a person's thoughts, feelings, and physical health and can even cause suicide. It extends beyond

the typical ups and downs of daily existence. Based on the latest data from the World Health Organization (WHO), over 300 million people globally experience depression, and over 800,000 of them take their own lives annually. HIV is one of the leading causes of mortality and disability worldwide, especially in low- and middle-income nations. A Joint United Nations Program on HIV/AIDS 2020 study project estimates that 38.9 million individuals globally are HIV positive, 25.4 million are receiving antiretroviral medication (ART), 1.7 million will relapse into infection, and 690,000 will die from AIDS-related causes. Depressive disorders are thought to be the primary cause of non-fatal health loss because they account for about 50 million years of disability lived with (YLD) worldwide, representing 7.5% of the whole YLD **(**Ying & Zhang, 2019).

Worldwide, around 5% of adults are affected by depression, impacting about 280 million individuals. Each year, over 700,000 people die by suicide related to depression (WHO, 2023). Among adults with HIV, depression is a frequent comorbidity, with a global prevalence ranging from 20% to 40% (Fuenmayor & Pardes, 2022). Research has shown that incidence of depression among HIV-positive individuals are three to four times greater compared to those without HIV (Pavón, 2020). Depressive symptoms are present in up to 78% PLWHIV worldwide (Necho et al., 2022).

The Depression CES-D Scale from the Center for Epidemiological Study indicated 53.8% of Africans suffered from it. None of the individuals had ever gotten effective treatment for depression, according to the study (Coppenhagen et al., 2019). A lower CD4 count is linked to a higher incidence of depressive symptoms, particularly in individuals having a CD4 level of 50 or lower. Depression is very prevalent among individuals in sub-Saharan Africa who are HIV positive, with prevalence rates varying from 9% to 32% (Mohamud, 2023).

In Rwanda Mental health issues in those with HIV is still a big health problem but it is also still problem to know the exact number of people with depression in people with HIV. But the research done in Rwanda through Global Health Equity University, Butaro**,** among HIV-positive patients children 7-14 years old, the prevalence of depression ranges between 10% and 37 % (UGHE, 2020). The main objective of this study was to assess the prevalence and factors associated with depression among people living with HIV on ART at Kicukiro health center Kigali, Rwanda. It was guided by the following specific objectives:

i. To assess prevalence of depression among people living with HIV on ART at Kicukiro health center, Rwanda.

ii. To identify factors associated with depression among people living with HIV on ART at Kicukiro health center, Rwanda.

II. THEORETICAL FRAMEWORK

Social Ecological Model

This study is grounded in the Social Ecological Model (SEM) framework, which helps in understanding the complex interactions of individual, interpersonal, community, and societal factors that influence health outcomes. SEM has been applied in various fields such as HIV/AIDS prevention and care, as well as mental health. In the context of HIV/AIDS, SEM has been used for educating individuals, providing peer support, mobilizing communities, implementing healthcare policies, and advocating for national policies. In mental health, SEM plays a key role in strategies such as cognitive-behavioral therapy, family support, community mental health programs, workplace mental health policies, and national mental health policies (Sallis et al., 2008).

Following the findings of this study, SEM was applied to understand the multifaceted factors affecting depression among people living with HIV (PLWH) at Kicukiro Health Center. At the individual level, factors such as age, gender, and coping mechanisms were identified as significant influences on mental health. Interpersonal dynamics, including family support and peer support, were crucial to participants' coping abilities and overall well-being. At the community level, the impact of stigma and social norms was found to be substantial in exacerbating depressive symptoms. At the organizational level, healthcare practices, including ART adherence and the healthcare environment at the center, were shown to either mitigate or contribute to depression. Finally, at the societal level, national policies on HIV and mental health played an influential role in shaping both the resources available to PLWH and societal attitudes toward their mental health.

In conclusion, the study findings demonstrate the applicability of SEM in comprehensively understanding the factors contributing to depression in PLWH, emphasizing the need for interventions targeting each level of the model. This holistic approach highlights the importance of addressing personal, social, community, organizational, and policy-related factors to improve mental health outcomes among PLWH.

III. CONCEPTUAL FRAMEWORK

This study focused on identifying and analyzing the factors contributing to depression among people living with HIV (PLWH) at Kicukiro Health Center in Rwanda, with a particular emphasis on HIV-related stressors. The findings highlighted that significant triggers for distress include stigma, health complications, and medication side effects. These factors were found to play a crucial role in the mental health challenges faced by PLWH in this setting. By analyzing how PLWH navigate these stressors, the study revealed that coping mechanisms, such as seeking social support and adhering to ART, influenced their mental well-being. The findings suggest that depression among PLWH is not solely influenced by the biological aspects of HIV but also by social, psychological, and environmental factors. This framework, which emphasizes the interplay between HIV-related stressors and mental well-being, provides critical insights for designing tailored interventions and support programs. These programs should address both the psychological and social challenges that contribute to depression, offering strategies to improve coping mechanisms and reduce the adverse effects of HIV-related stressors. The study's results offer valuable recommendations for healthcare providers to enhance mental health care services for PLWH at Kicukiro Health Center and similar settings.

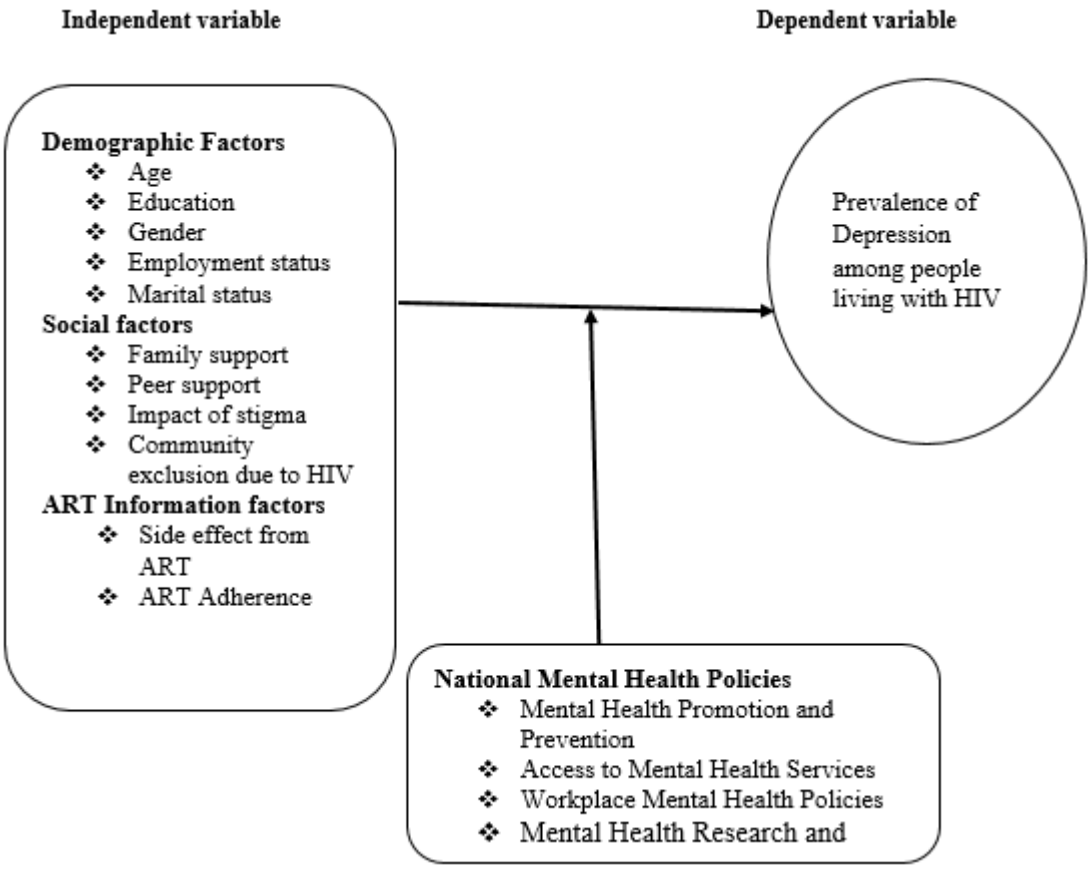

Figure 1: conceptual framework

In summary, the literature review provides a comprehensive overview of depression, its symptoms, risk factors, and complications, particularly in the context of people living with HIV (PLWH). The review begins by defining depression and examining its negative impact on HIV treatment adherence and overall health outcomes. It explores both modifiable and non-modifiable risk factors for depression among PLWH, such as age, family history, ART adherence, substance use, social support, unemployment, and stigma.

The review also discusses various prevention strategies for depression, including mental health screening, social support interventions, and lifestyle modifications. Empirical studies from diverse regions are cited to demonstrate varying prevalence rates of depression among PLWH and identify associated factors, including socioeconomic status, gender, and clinical variables like CD4 counts and opportunistic infections. These studies highlight the critical need for tailored interventions and support programs to address depression in PLWH, particularly in settings where mental health services are limited.

Additionally, the literature review underscores existing gaps in the current body of research, emphasizing the need for more targeted studies on depression in PLWH. Theoretical and conceptual frameworks are explored, with the Social Ecological Model (SEM) serving as the theoretical lens to understand the complex interactions between social, interpersonal, communal, and individual factors influencing depression. The conceptual framework focuses on HIV-related stressors and coping mechanisms, offering insights that can guide the development of tailored interventions and support programs for PLWH, especially in the context of Kicukiro Health Center in Rwanda.

IV. RESEARCH METHODOLOGY

Research design

This study employed a cross-sectional design, utilizing a quantitative approach to collect data from a sample of HIV patients attending Kicukiro Health Center. Structured instruments, including questionnaires, were used to assess the prevalence of depression and identify associated risk factors. Statistical analyses, including descriptive statistics, Bivariate association and logistic regression, were conducted to determine the frequency of depression and examine the factors contributing to its occurrence among people living with HIV at the health center.

Study Population

The study targeted people living with HIV (PLWH) aged 18 years and older, who were currently on antiretroviral therapy (ART) at Kicukiro Health Center during the study period. Kicukiro Health Center, one of the largest and oldest health centers in Rwanda, is a faith-based institution under the leadership of the Catholic Church. It is located in Kicukiro District, within the Niboye Sector of Kigali City. The health center primarily serves two sectors, Niboye and Kagarama, with a total of 2,278 clients currently on ART. The study population consisted of clients aged 18 and above who were receiving ART at the time of data collection, which took place over two months. Clients who had already been clinically diagnosed with severe mental illness were excluded from the study.

Sample Design

Sample Size Determination

A sample in research represents a subset of a larger population, selected to accurately reflect the characteristics of that population (Ngechu, 2014). The goal of the study is to analyze the sample in detail and then generalize the findings to the broader population. The accuracy with which the sample reflects the population is critical to ensuring the validity of these conclusions. Given the large population size of 2,278 clients currently on ART at Kicukiro Health Center, the study will utilize Slovin's Formula to determine the appropriate sample size. Slovin's Formula is designed for cases where the population is large, and it is calculated as follows:

Where n was the sample size, N is the population size=2278, and e is the level of precision= 5%.

Let's calculate the sample size:

$$n = \frac{N}{1 + N(e)^2}$$

$$\boldsymbol{n} = \frac{2278}{1 + \boldsymbol{2278(0.05)^2}} == 340.25 \approx 340 \text{ PLWH}$$

Rounding up to the next whole number, the required sample size was 340.

Sampling Technique

This study used a probabilistic sampling method, specifically simple random sampling, to ensure unbiased participant selection and representativeness of the target population. The target population included adults aged 18 and above, living with HIV, and receiving antiretroviral therapy (ART) at Kicukiro Health Center, excluding those diagnosed with severe mental illness. A comprehensive list of eligible individuals was obtained from the health center's database, with each individual assigned a unique identifier to maintain confidentiality.

In this study, I used simple random sampling to select 340 participants from a total population of 2278 people living with HIV (PLWH) at Kicukiro Health Center. To begin, I created a complete list of all PLWH at the health center, which served

as the sampling frame. Each individual was assigned a unique identification or record number. Using a random number generator, I randomly selected 340 numbers from this range, ensuring that each individual had an equal chance of being selected. The individuals whose numbers matched the selected random numbers were included in the sample. This method eliminated any selection bias, allowing for a representative sample of the population. The data collection process then proceeded with these 340 selected participants, ensuring confidentiality and adherence to ethical guidelines.

Data Collection Method

Data Collection Instruments

A structured questionnaire was developed and administered to all participants, consisting of five sections. Section one collected demographic characteristics of the participants, including age, sex, education level, employment status, and marital status. Section two gathered information on social factors, including stigma related to HIV, family support, and peer support. Section three focused on ART-related information, including adherence to ART and any side effects experienced, which were retrieved from participants' medical records. Section four explored intervening factors, with a particular focus on national mental health policies. Finally, section five assessed depression using the PHQ-9, a widely adopted tool for measuring psychological problems. These sections provided comprehensive data on the factors associated with depression among people living with HIV, offering valuable insights into the demographic, social, medical, and policy-related influences on mental health in this population.

Procedures of Data Collection

Before administering the data collection instruments, all eligible participants who agreed to voluntarily participate in the study were met with in person. During this meeting, the purpose of the research, the aspects to be measured, and the expectations from the study were clearly explained to the participants. The content and objectives of the questionnaire were outlined, and participants were instructed on how to answer the questions. After ensuring that participants fully understood the study, an informed consent form was provided, which they were asked to sign before proceeding. Once consent was obtained, the questionnaires were administered to the participants for completion. This process ensured that participation was voluntary and informed, maintaining ethical standards throughout the study.

V. RESEARCH FINDINGS AND DISCUSSION

The Socio-Demographic characteristics of people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024**,** Kigali is presented in Table 1.

Table 1: Socio-Demographic characteristics of people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024

Characteristic	Frequency (n)	Percentage (%)
Age		
Mean	36.83	
SD	8.67	
Min	22	
Max	66	
Age category		
22-34	124	35.53
35-44	161	46.13
45-54	55	15.76
55 and above	9	2.58
Sex		
Male	131	37.54
Female	218	62.46
Marital status		
Single	7	2.01
Married	186	53.3

Cohabitant	99	28.37
Widower	8	2.29
Divorced/Separated	49	14.04
Education		
No formal education	41	11.75
Primary	172	49.28
Secondary/TVET	82	23.5
Tertiary	54	15.47
Occupation		
Unemployed	265	75.93
Farming	34	9.74
Business/Others	28	8.02
Government employment	22	6.3

SD: Standard deviation; Min, Max, minimum, maximum;

Table 1 summarizes the socio-demographic characteristics of individuals living with HIV at Kicukiro Health Center as of 2024. The characteristics analyzed include age distribution, gender, marital status, education level, and occupation. For age distribution, the mean age of participants is 36.83 years (SD = 8.67), with ages ranging from 22 to 66 years. Most participants are aged 35–44 years 161 (46.13%), followed by those aged 22–34 years 124 (35.53%). A small proportion of participants are 55 years or older 9 (2.58%). In terms of gender, the majority of participants are female 218 (62.46%), while males account for 131 (37.54%). Regarding marital status, married individuals represent the largest group 186 (53.3%), followed by cohabitants 99 (28.37%). Smaller proportions are divorced or separated 49 (14.04%), single 7 (2.01%), and widowed 8 (2.29%).

When considering education levels, nearly half of the participants 172 (49.28%) have attained primary education. Secondary or TVET (Technical and Vocational Education Training) education is reported by 8 (23.5%), while 54 (15.47%) have completed tertiary education. A notable 41 (11.75%) of participants have no formal education. For occupation, a significant majority of participants are unemployed 265 (75.93%). Among those employed, farming 34 (9.74%), business or other activities 28 (8.02%), and government employment 22 (6.3%) constitute the primary forms of livelihood. The antiretroviral therapy information and social characteristics of people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024 are shown in Table 2

Table 2: ART information and social characteristics of people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024

Characteristic	Frequency (n)	Percentage (%)
ART information		
ART adherence		
All time	115	32.95
Sometime	234	67.05
ART side effects		
NO	293	83.95
Yes	56	16.05
Social characteristics		
Family support		
Extremely	90	25.79
A Little	102	29.23
Never	157	44.99
Friend support		
Extremely	14	4.01

A little	56	16.05
Moderately	27	7.74
Never	252	72.21
Stigma		
No	284	81.38
Yes	65	18.62
Mental Health aware campaign		
No	223	63.9
Yes	126	36.1
Access Mental Health services		
No	293	83.95
Yes	56	16.05
Barriers for access mental health		
Cost	50	16.72
Availability	91	30.43
Transport	144	48.16
No needed	14	4.68

Table 2: Presents data on ART adherence, side effects, social support, stigma, mental health awareness, access to mental health services, and barriers to such access among individuals living with HIV at the Kicukiro Health Center in Kigali, Rwanda, as of 2024. A significant portion of participants, 234 (67.05%), reported inconsistent adherence to ART, though 115 (32.95%) adhered consistently. Most individuals, 293 (83.95%), did not experience side effects from ART, while 56 (16.05%) reported side effects. Family support varied widely, with 157 (44.99%) receiving no support, 210 (29.23%) receiving little support, and 90 (25.79%) receiving extreme support.

Support from friends was minimal, with 252 (72.21%) reporting no support, 56 (16.05%) reporting little support, 27 (7.74%) reporting moderate support, and only 14 (4.01%) reporting extreme support. The majority of participants, 284 (81.38%), did not experience stigma related to their condition, while 65 (18.62%) did. Mental health awareness campaigns reached1 26 (36.1%) of participants, and access to mental health services was limited to 56 (16.05%). Among the barriers to mental health access, transport was reported by 144 (48.16%), availability by 91 (30.43%), cost by 50 (16.72%), and 14 (4.68%) indicated no need for mental health services.

2. Presentation of Findings

The findings are presented based on the specific objectives**.**

The Patient Health Questionnaire-9 (PHQ-9) responses of people living with HIV at Kicukiro Health Center, Kigali, Rwanda, in 2024 are presented in Table 3 below:

Table 3: PQH9 Response of people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024

Characteristic (score)	Frequency (n)	Percentage (%)
PHQ9_1		
not at all (0)	259	74.21
several days(1)	66	18.91
more than half day(2)	6	1.72
nearly every day(3)	18	5.16
PHQ9_2		
not at all (0)	208	59.6
several days(1)	98	28.08
more than half day(2)	12	3.44
nearly every day(3)	31	8.88

PHQ9_3		
not at all (0)	208	59.6
several days(1)	97	27.79
more than half day(2)	8	2.29
nearly every day(3)	36	10.32
PHQ9_4		
not at all (0)	154	44.38
several days(1)	140	40.35
more than half day(2)	13	3.17
nearly every day(3)	42	12.1
PHQ9_5		
not at all (0)	251	71.84
several days(1)	72	20.69
more than half day(2)	4	1.15
nearly every day(3)	22	6.32
PHQ9_6		
not at all (0)	278	79.66
several days(1)	49	14.04
more than half day(2)	5	1.43
nearly every day(3)	17	4.87
PHQ9_7		
not at all (0)	273	78.16
several days(1)	54	15.52
more than half day(2)	1	0.29
nearly every day(3)	21	6.03
PHQ9_8		
not at all (0)	271	77.65
several days(1)	65	18.62
more than half day(2)	1	0.29
nearly every day(3)	12	3.44
PHQ9_9		
not at all (0)	313	89.68
several days(1)	26	7.45
more than half day(2)	3	0.86
nearly every day(3)	7	2.01

This section presents an overview of the PHQ-9 responses, which assess the frequency of depressive symptoms among individuals living with HIV at Kicukiro Health Center in Kigali, Rwanda, as of 2024, where the total score is calculated by summing up the responses (0–27) where the people with the score above 4 to 27 are classified to have depression ranging from mild to severe.For PHQ9_1 (loss of interest), the majority of participants 259 (74.21%) reported no loss of interest, 66 (18.91%) experienced it several days, 6 (1.72%) more than half the days, and 18 (5.16%) nearly every day.

Regarding PHQ9_2 (feelings of hopelessness), most participants 208 (59.6%) reported no such feelings, 98 (28.08%) experienced them several days, 12 (3.44%) more than half the days, and 31 (8.88%) nearly every day.For PHQ9_3 (trouble sleeping), 208 (59.6%) did not experience sleep difficulties, 97 (27.79%) reported trouble sleeping several days, 8 (2.29%) more than half the days, and 36 (10.32%) nearly every day. In PHQ9_4 (fatigue), 154 (44.38%) did not feel fatigued, while 140 (40.35%) reported it several days, 13 (3.17%) more than half the days, and 42 (12.1%) nearly every day.

For PHQ9_5 (appetite changes), 251 (71.84%) did not experience appetite problems, 72 (20.69%) experienced them several days, 4 (1.15%) more than half the days, and 22 (6.32%) nearly every day. Responses to PHQ9_6 (feelings of worthlessness) show that 278 (79.66%) of participants reported no such feelings, 49 (14.04%) experienced them several days, 5 (1.43%) more than half the days, and 17 (4.87%) nearly every day. In PHQ9_7 (difficulty concentrating), 273 (78.16%) reported no difficulty concentrating, 54 (15.52%) experienced it several days, 1 (0.29%) more than half the days, and 21 (6.03%) nearly every day. For PHQ9_8 (feelings of being slowed down or restless), 271 (77.65%) did not experience these feelings, 65 (18.62%) reported them several days, 1 (0.29%) more than half the days, and 12 (3.44%) nearly every day. Finally, for PHQ9_9 (thoughts of self-harm), the majority 313 (89.68%) did not experience such thoughts, 26 (7.45%) reported them several days, 3 (0.86%) more than half the days, and 7 (2.01%) nearly every day.

The Prevalence of Depression Among People Living with HIV At Kicukiro Health Center Kigali-Rwanda in 2024

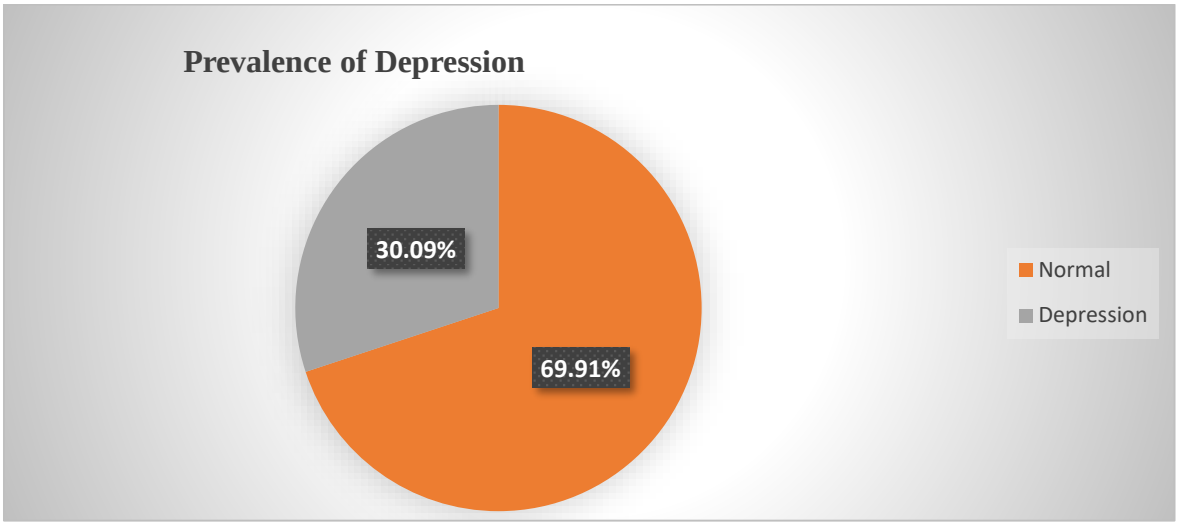

Figure 2: Prevalence of depression,2024

According to the Patient Health Questionnaire-9 depression screening tool, the prevalence of depression in this cross-section study is **30.09%,** indicating that about one-third of individuals living with HIV at the Kicukiro Health Center may experience moderate to severe depressive symptoms.

Table 4: Bivariate association of socio-Demographic characteristics and depression among people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024(n=349)

Variable	Depression				Chi-square	p-value
	No(n=244)		Yes(n=105)			
	n	%	n	%		
Age category					0.7443	0.841
22-34	87	70.16	37	29.84		
35-44	115	71.43	46	28.57		
45-54	36	65.45	19	34.55		
55 and above	6	66.67	3	33.33		
Sex					**6.2992**	**0.012**
Male	102	77.86	29	22.14		
Female	142	65.14	76	34.86		
Marital status					**8.0224**	**0.018**
Single/widower/divorced	37	57.81	27	42.19		
Married	141	75.81	45	24.19		
Cohabitant	66	66.67	33	33.33		
Education					3.5586	0.313

No formal education	25	60.98	16	39.02		
Primary	117	68.02	55	31.98		
Secondary/TVET	62	75.61	20	24.39		
Tertiary	40	74.07	14	25.93		
Occupation					3.3738	0.066
Unemployed	192	72.45	73	27.55		
Employed	52	61.9	32	38.1		

Table 4 Explores the relationship between socio-demographic characteristics and depression among individuals living with HIV at the Kicukiro Health Center, Kigali, Rwanda, in 2025. The table presents depression prevalence across various demographic groups, along with chi-square values and p-values to test for statistical significance. Age Category**:** Depression prevalence does not vary significantly by age, as indicated by a chi-square value of 0.7443 and a p-value of 0.841. Across all age categories, the proportion of participants experiencing depression remains relatively consistent. Sex**:** Gender shows a significant association with depression (chi-square = 6.2992, p = 0.012). Females have a higher prevalence of depression (34.86%) compared to males (22. 14%). Marital Status**:** Marital status is significantly associated with depression (chi-square = 8.0224, p = 0.018). Single, widowed, or divorced participants report the highest prevalence of depression (42.19%), followed by cohabitants (33.33%), while married individuals have the lowest prevalence (24. 19%). Education Level**:** There is no significant association between education level and depression (chi-square = 3.5586, p = 0.313). However, participants with no formal education report the highest prevalence (39.02%), while those with tertiary education have the lowest (25. 93%). Occupation**:** Employment status shows a borderline association with depression (chi-square = 3.3738, p = 0.066). Unemployed participants have a lower prevalence of depression (27.55%) compared to those who are employed (38.1%).

Factors Associated with Depression

Table 5: Bivariate association of ART information and social characteristics and depression among people living with HIV at Kicukiro Health center, Kigali-Rwanda, 2024 (n=349)

Variable	Depression				Chi-square	p-value
	No(n=244)		Yes(n=105)			
	n	%	n	%		
ART information						
ART adherence					**26.1619**	**0.001**
All time	101	87.8	14	12.17		
Sometime	143	61.1	91	38.89		
ART side effects					0.8203	0.3565
NO	202	68.9	91	31.06		
Yes	42	75	14	25		
Social characteristics						
Family support					2.8866	0.236
Extremely	67	74.4	23	25.56		
A Little	65	63.7	37	36.27		
Never	112	71.3	45	28.66		
Friend support					0.6368	0.908
Extremely	11	78.6	3	21.43		
A little	39	69.6	17	30.36		
Moderately	18	66.7	9	33.33		
Never	176	69.8	76	30.16		

Stigma					0.5369	0.464
No	201	70.8	83	29.23		
Yes	43	66.2	22	33.85		
Mental Health aware campaign					0.0704	0.791
No	157	69.1	66	29.6		
Yes	87	69.1	39	30.95		
Access Mental Health services					0.1342	0.714
No	206	70.3	87	29.69		
Yes	38	67.9	18	32.14		
Barriers for access mental health					**8.7548**	**0.033**
Cost	30	60	20	40		
Availability	57	62.6	34	37.36		
Transport	106	71.6	38	26.39		
No needed	13	92.9	1	7.14		

Table 5 Examines the relationship between ART adherence, ART side effects, social support, stigma, access to mental health services, and barriers to accessing mental health care with the prevalence of depression among individuals living with HIV at the Kicukiro Health Center, Kigali, Rwanda, in 2024. The table reports chi-square values and p-values to assess statistical significance. ART Adherence: A significant association is observed between ART adherence and depression (chi-square = 26.1619, p = 0.001). Participants adhering to ART "all the time" have a lower prevalence of depression (12.17%) compared to those adhering "sometimes" (38.89%). ART Side Effects: There is no significant relationship between ART side effects and depression (chi-square = 0.8203, p = 0.3565). Depression prevalence is slightly lower among participants without side effects (31.06%) compared to those experiencing side effects (25%). Family Support**:** Family support does not show a statistically significant association with depression (chi-square = 2.8866, p = 0.236). However, depression prevalence is lowest among participants with "extreme" family support (25.56%) and highest among those with "a little" support (36.27%). Friend Support**:** No significant relationship is found between friend support and depression (chi-square = 0.6368, p = 0.908).

Depression prevalence varies slightly across support levels, ranging from 21.43% among those with "extreme" support to 30.16% among those with "no support." Stigma: Stigma is not significantly associated with depression (chi-square = 0.5369, p = 0.464). Depression prevalence is higher among participants experiencing stigma (33.85%) compared to those who do not (29.23%). Mental Health Awareness Campaigns: No significant association is observed between awareness campaigns and depression (chi-square = 0.0704, p = 0.791). Depression prevalence is similar among participants aware of campaigns (30.95%) and those who are not (29.6%). Access to Mental Health Services**:** Access to mental health services does not significantly relate to depression (chi-square = 0.1342, p = 0.714). Depression prevalence is slightly higher among those with no access (29.69%) compared to those with access (32.14%). Barriers to Mental Health Access: Barriers show a significant association with depression (chi-square = 8.7548, p = 0.033). Participants citing cost (40%) or availability (37.36%) as barriers report higher depression prevalence, while those stating no need for services have the lowest prevalence (7.14%).

Table 6: Multivariable Analysis of Depression Among People Living with HIV at Kicukiro Health Center, Kigali, Rwanda, 2024

Factor	COR	95% CI	p-value
Sex			
Male		Reference	
Female	1.88	1.14 - 3.09	**0.013**
Marital status			
Cohabitant		Reference	
Single/widower/divorced	2.28	1.25 - 4.16	**0.007**
Married	0.63	0.37 - 1.09	0.1

ART adherence			
All time		Reference	
Sometime	4.59	2.47- 8.51	**0.001**
Barriers for access mental health			
No needed		Reference	
Cost	8.66	1.04- 71.56	**0.045**
Availability	7.75	0.97- 61.93	**0.053**
Transport	4.91	0.58-36.8	0.145

COR: Crude Odds Ratio, CI: 95 % confidence interval

Table 6. Presents the results of multivariate analysis examining factors associated with depression among individuals living with HIV at the Kicukiro Health Center, Kigali, Rwanda, in 2024. The analysis includes odds ratios (OR), 95% confidence intervals (CI), and p-values for variables such as sex, marital status, ART adherence, and barriers to mental health care access

Sex: Female participants are significantly more likely to experience depression compared to males, with an odds ratio (OR) of 1.88 (95% CI: 1.14–3.09, p = 0.013). **Marital Status:**

Single, widowed, or divorced individuals have significantly higher odds of depression compared to cohabitants (OR = 2.28, 95% CI: 1.25–4.16, p = 0.007). Married individuals, however, are less likely to experience depression (OR = 0.63, 95% CI: 0.37–1.09), though this finding is not statistically significant (p = 0.1). **ART Adherence:**

Participants who adhere to ART only "sometimes" have significantly higher odds of depression compared to those adhering "all the time" (OR = 4.59, 95% CI: 2.47–8.51, p = 0.001). **Barriers to Mental Health Care Access:** Cost is the most significant barrier associated with depression, with an odds ratio of 8.66 (95% CI: 1.04–71.56, p = 0.045). Availability of mental health services also shows a borderline association with depression (OR = 7.75, 95% CI: 0.97–61.93, p = 0.053). Transport as a barrier has a weaker and non-significant association (OR = 4.91, 95% CI: 0.58–36.8, p = 0.145). The analysis highlights key factors associated with depression among individuals living with HIV, emphasizing the roles of gender, marital status, ART adherence, and barriers to accessing mental health care. Female participants and those with inconsistent ART adherence face higher risks of depression, while cost and availability of mental health services are critical barriers. These findings underscore the need for targeted interventions to improve ART adherence, support vulnerable groups such as women and single individuals, and address financial and logistical barriers to mental health care access.

VI. DISCUSSION

The prevalence of depression in this study, is 30.09 %, is consistent with findings in other resource-constrained settings, reflecting the significant burden of mental health disorders among individuals living with HIV (PLHIV). Depression in this population is associated with worse HIV-related outcomes, including lower adherence to antiretroviral therapy (ART), faster disease progression, and higher mortality.

The reported 30% prevalence of moderate to severe depressive symptoms among PLHIV at the Kicukiro Health Center aligns with findings from recent studies. A meta-analysis by Ayano et al. (2018) estimated the global prevalence of depression among PLHIV at 36%, with sub-Saharan Africa having the highest rates due to factors such as stigma, poverty, and inadequate mental health care systems. Similarly, a study conducted in Ethiopia by Dessie et al. (2020) reported a prevalence of 29.7%, consistent with this study's findings. These figures highlight the pressing need for routine screening and integration of mental health services into HIV care programs.

In Rwanda, limited studies have focused on depression among PLHIV, often targeting specific subgroups or regions. For instance, a study conducted in Gasabo District reported a 31% prevalence of depressive symptoms among adolescents living with HIV (Mukangabire et al., 2021), which is comparable to the findings of the current study in Kicukiro Health Center of 30% prevalence of depression among PLWH. This consistency suggests that mental health challenges among PLHIV are widespread across different age groups and districts in Rwanda, further underscoring the importance of addressing mental health in HIV care nationwide. The findings also emphasize the need to consider contextual factors, such as stigma and limited access to mental health services, that are prevalent across Rwandan settings. Depression has been recognized as a major determinant of poor health outcomes in PLHIV, affecting not only mental well-being but also ART adherence and

immune system functioning. Studies, such as that by Wykowski et al. (2020), underscore the need for mental health assessments as part of comprehensive HIV care to enhance both psychological and physical outcomes. The finding that female participants are significantly more likely to experience depression compared to males (OR = 1.88, p = 0.013) is supported by recent studies. A systematic review by Remien et al. (2019) emphasized that women living with HIV are disproportionately affected by mental health disorders due to intersecting factors, including caregiving responsibilities, intimate partner violence, and stigma.

In a study conducted in Nigeria, Umeh et al. (2018) found that women living with HIV were 2.1 times more likely to experience depressive symptoms than men, which mirrors the results from the current study. The association between marital status and depression, where single, widowed, or divorced individuals are more likely to experience depression (OR = 2.28, p = 0.007), aligns with the findings of other studies in similar contexts. Married individuals often have stronger social support networks that act as a buffer against depressive symptoms, as noted in a study by Alemu et al. (2021) conducted in Ethiopia.

Conversely, widowed or divorced individuals face increased social isolation, financial hardships, and stigma, all of which contribute to higher rates of depression. Recent research, such as the work by Duko et al. (2021), emphasizes that social support is a critical protective factor against depression in PLHIV. Interventions targeting widowed, divorced, or single individuals should prioritize strengthening community networks and peer support groups to mitigate these risks. Participants with inconsistent ART adherence were found to have significantly higher odds of depression (OR = 4.59, p = 0.001). This finding underscores the bidirectional relationship between depression and ART adherence, as depression often impairs the motivation and cognitive ability to adhere to treatment, while poor adherence exacerbates HIV progression and associated psychological stress. A study by Heestermans et al. (2016) highlighted how mental health conditions like depression are among the most significant barriers to ART adherence, particularly in resource-constrained settings. More recent research by Endeshaw et al. (2022) reaffirmed this association, showing that PLHIV with depression were nearly three times more likely to demonstrate suboptimal ART adherence compared to their non-depressed counterparts. The identification of cost (OR = 8.66, p = 0.045) and availability of services (OR = 7.75, p = 0.053) as significant barriers to mental health care reflects ongoing challenges in low-income settings.

A study by Nyamayaro et al. (2020) conducted in Zimbabwe similarly identified financial constraints and the scarcity of mental health professionals as major obstacles to accessing care among PLHIV. In this study, transport showed a weaker association with depression (OR = 4.91, p = 0.145), but it remains a barrier in rural and peri-urban areas, where health facilities are often distant and poorly connected. Integrating mental health services into existing HIV care frameworks can help mitigate these barriers, as demonstrated by a study in Uganda by Kigozi et al. (2017), which showed that co-locating mental health services with HIV clinics increased uptake and reduced depressive symptoms among PLHIV.

VII. CONCLUSION

This study examined the prevalence and factors associated with depression among people living with HIV on antiretroviral therapy at Kicukiro Health Center. The findings indicate that 30.09% of participants experienced moderate to severe depressive symptoms. Regarding the first specific objective, the study confirmed that depression is highly prevalent among PLWH on ART, highlighting the need for integrated mental health care within HIV treatment programs. For the second specific objective, the study identified key factors associated with depression including gender, marital status, and ART adherence, and barriers to mental health care. Women had 1.88 times higher odds of depression than men, likely due to stigma, gender-based violence, and social marginalization. Additionally, single, widowed, or divorced individuals were more prone to depression, emphasizing the protective role of social and emotional support in mitigating mental health challenges. The study also found a strong link between ART adherence and depression. Individuals with inconsistent adherence had higher odds of depression, reinforcing the bidirectional relationship where depression reduces ART adherence, leading to worsening health outcomes. Addressing mental health within HIV care is essential to improving ART adherence and overall health. Barriers to mental health care, such as high costs and a lack of trained professionals, further exacerbate depressive symptoms. Expanding affordable mental health services, integrating psychological support into HIV care, and training community health workers to provide basic mental health services are critical strategies for improving access to care. Policymakers, healthcare providers, and community organizations must collaborate to create accessible, affordable, and comprehensive care models. Future research should explore additional contributing factors, such as cultural beliefs and substance use, to develop targeted interventions.

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