

Determinants of Clinically Significant Depressive Symptoms among Adults Re-engaging in HIV Care after Antiretroviral Therapy Interruption at Moi Teaching and Referral Hospital, Kenya: A Mixed-Methods Cross-Sectional Study

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Abstract

Background: Mental-health conditions are common among people living with HIV and can weaken adherence, retention and quality of life. Patients re-engaging after antiretroviral therapy (ART) interruption may carry a particularly high psychosocial burden, yet evidence from this population remains limited in Kenya. Objective: To determine the socio-demographic, psychosocial and clinical factors associated with clinically significant depressive symptoms among adults returning to HIV care after ART interruption at the AMPATH Comprehensive Care Clinic, Moi Teaching and Referral Hospital, Eldoret. Methods: An analytical cross-sectional mixed methods study enrolled adults aged 18 years or older with documented ART interruption exceeding 28 days. Of a target sample of 299, 204 completed interviewer-administered questionnaires, including the Patient Health Questionnaire-9 (PHQ-9), yielding a 68.2% response rate. Associations were examined using chi-square tests and multivariable binary logistic regression. Qualitative interviews and focus-group discussions were analyzed thematically and triangulated with quantitative findings. Results: Clinically significant depressive symptoms (PHQ-9 ≥ 10) were identified in 81.4% of participants, while 47.1% had moderately severe or severe symptoms. Independent predictors included high perceived stress (adjusted odds ratio [AOR] 5.72, 95% confidence interval [CI] 2.31-14.15), age 36-50 years (AOR 4.87, 95% CI 1.67-14.19), marital disruption (AOR 3.94, 95% CI 1.52-10.24), frequent food insecurity (AOR 3.48, 95% CI 1.59-7.62), low social support (AOR 2.76, 95% CI 1.28-5.97), work/time conflict (AOR 2.63, 95% CI 1.23-5.62) and fear of disclosure stigma (AOR 2.14, 95% CI 1.02-4.48). Qualitative findings highlighted isolation, stigma, food insecurity and cumulative stress. Conclusion: Depressive symptoms were highly prevalent among adults returning after ART interruption and were driven principally by psychosocial and structural factors. Integrated mental-health screening, stepped psychosocial care, food-security referral, stigma reduction and differentiated HIV-service delivery should be embedded in re-engagement pathways.

Key Terms: Antiretroviral therapy; depression; HIV; mental-health integration; PHQ-9; psychosocial determinants; treatment interruption; Kenya.

I. INTRODUCTION

Antiretroviral therapy has transformed HIV into a manageable chronic condition, but its benefits depend on sustained medication use, follow-up and retention in care. At the end of 2024, an estimated 40.8 million people were living with HIV globally and 31.6 million were receiving treatment, yet substantial gaps in treatment continuity and viral suppression remained (WHO, 2025a; UNAIDS, 2025).

Depression is among the most common mental-health conditions affecting people living with HIV. It can impair motivation, concentration, sleep, self-efficacy and problem-solving, thereby weakening medication-taking and clinic attendance. Treatment interruption, worsening illness, stigma and economic hardship can in turn intensify depressive symptoms, producing a bidirectional cycle between psychological distress and disengagement from care.

Recent evidence continues to support this relationship. A 2024 systematic review and meta-analysis found depression to be an important risk factor for ART non-adherence among women living with HIV, while newer reviews identify mental-health symptoms, stigma, social support and economic conditions among the recurrent determinants of adherence (Desta et al., 2024; Hunt et al., 2024; Saenjun et al., 2025). WHO's updated 2025 HIV service-delivery guideline therefore recommends integration of mental-health services, including care for depression, anxiety and substance use, into HIV programmes (WHO, 2025b).

Kenya has made substantial progress in HIV treatment, but service continuity remains vulnerable to economic shocks, programme disruption and uneven access to psychosocial care. Reports in 2025 also showed how financing interruptions could reduce service capacity and compromise information systems, reinforcing the need for resilient, person-centred and integrated HIV care (UNAIDS, 2025b).

Adults who return after ART interruption are clinically important because they may carry accumulated treatment fatigue, disease-related worry, stigma, financial strain and loss of social support. Yet most studies assess depression among people currently retained in care rather than those re-engaging after interruption.

A. Problem Statement

Depressive symptoms may remain undetected during ART re-engagement even though they can compromise counselling, treatment restart and future retention. At MTRH, evidence on the socio-demographic, psychosocial and clinical determinants of depression among returning ART clients was limited. Without context-specific evidence, interventions may overlook the combined influence of perceived stress, food insecurity, relationship disruption, stigma and competing work demands.

B. Study Objective

The study aimed to determine the socio-demographic, psychosocial and clinical determinants of clinically significant depressive symptoms among adults re-engaging in HIV care after ART interruption at the AMPATH Comprehensive Care Clinic, MTRH.

C. Conceptual Orientation

The study was informed by the Health Belief Model and stress-buffering theory. Depression was conceptualized as both an outcome of cumulative stress and a condition that may alter perceived susceptibility, severity, barriers, benefits and self-efficacy related to HIV treatment. Social support was treated as a potential buffer against stigma, material hardship and treatment fatigue.

II. MATERIALS AND METHODS

A. Study Design and Setting

An analytical cross-sectional mixed-methods design was used to estimate the burden of depressive symptoms, identify associated factors and explore participants lived experiences. The study was conducted at the AMPATH Comprehensive Care Clinic, Moi Teaching and Referral Hospital, Eldoret, Uasin Gishu County, Kenya. The clinic serves urban, peri-urban and rural populations and provides ART through standard and differentiated care models.

B. Study Population and Eligibility

The study population comprised adults living with HIV who had documented ART interruption exceeding 28 days and subsequently returned to care. Participants were eligible if they were aged 18 years or older, enrolled at the clinic and able to provide informed consent. Patients who were acutely unwell and unable to participate, or who could not provide informed consent, were excluded.

C. Sample Size and Sampling

The quantitative sample size was calculated using Fisher's formula with an assumed depression prevalence of 33.5%, a 95% confidence level and a 5% margin of error. After finite-population correction for an estimated population of 1,260 clients with treatment interruption and a 10% allowance for non-response, the target sample was 299. Simple random sampling was used for the quantitative component. Purposive sampling was used for qualitative interviews and focus-group discussions to capture variation in age, sex, socioeconomic position and treatment experience.

D. Measures

The primary outcome was clinically significant depressive symptoms, defined as a PHQ-9 score of 10 or above. Independent variables were grouped into socio-demographic, psychosocial and clinical domains. Socio-demographic variables included sex, age, marital status, education, employment, income, housing and health insurance. Psychosocial variables included perceived stress, social support, stigma, food insecurity, substance use, intimate-partner violence, transport barriers and work/time conflict. Clinical variables included WHO stage, viral load, regimen history, previous treatment interruption, missed appointments, comorbidity, side effects and participation in adherence counselling.

E. Data Collection and Quality Assurance

Trained research assistants administered structured questionnaires in English or Kiswahili and reviewed clinic records to verify clinical information. Qualitative data were collected using semi-structured interviews and focus-group guides. Tools were piloted in a comparable clinic population, and item wording and sequencing were refined. Internal-consistency coefficients reported for the pilot instruments ranged from 0.781 to 0.842, with an overall coefficient of 0.813.

F. Data Analysis

Quantitative data were analyzed in Stata/SE version 15. Frequencies and percentages summarized participant characteristics and PHQ-9 categories. Bivariate associations were examined using Pearson chi-square tests. Variables selected on statistical or theoretical grounds were entered into a multivariable binary logistic-regression model. Adjusted odds ratios, 95% confidence intervals and p-values were reported. Model performance was assessed using the likelihood-ratio test, Hosmer-Lemeshow goodness-of-fit statistic, Nagelkerke R^2 and classification accuracy. Qualitative data were transcribed, coded and analyzed thematically; themes were compared with quantitative findings during triangulation.

G. Ethical Considerations

Ethical approval was obtained from the Maseno University Scientific and Ethics Review Committee, and research authorization was granted by the National Commission for Science, Technology and Innovation. Informed consent was obtained before participation. Confidentiality was maintained through coded identifiers and secure storage. Participants with severe depressive symptoms or safety concerns were referred for assessment and care at the MTRH Mental Health Unit. The ethics approval number, NACOSTI permit number and exact data-collection dates should be inserted before final publication.

III. RESULTS

A. Participant Characteristics and Depression Burden

Of the 299 adults targeted, 204 completed the survey, corresponding to a response rate of 68.2%. Women constituted 67.6% of participants, 52.0% were aged 36-50 years, and 33.3% were separated or divorced. Most participants were unemployed or engaged in informal or casual work, 62.7% reported monthly household income below KES 10,000, and 76.5% had no health-insurance coverage.

Clinically significant depressive symptoms were present in 81.4% of participants. Nearly half of the sample (47.1%) had moderately severe or severe symptoms, while 18.6% scored below the PHQ-9 threshold of 10.

Table 1. Selected socio-demographic characteristics of participants (N = 204)

Variable	Category	n	%
Sex	Female	138	67.6
	Male	66	32.4
Age, years	18-24	16	7.8
	25-35	52	25.5

Variable	Category	n	%
	36-50	106	52.0
	51 and above	30	14.7
Marital status	Married/cohabiting	54	26.5
	Never married	58	28.4
	Separated/divorced	68	33.3
	Widowed	24	11.8
Employment	Formal employment	10	4.9
	Casual labour	58	28.4
	Informal/self-employed	66	32.4
	Unemployed	70	34.3
Monthly income	Below KES 10,000	128	62.7
	KES 10,000-19,999	60	29.4
	KES 20,000 or above	6	3.0
	Prefer not to say	10	4.9
Health insurance	SHA	46	22.5
	Private	2	1.0
	None	156	76.5

B. Psychosocial and Clinical Findings

Psychosocial vulnerability was extensive. About one-third of participants reported having no reliable person with whom to discuss personal problems or from whom to obtain practical support. High perceived stress, food insecurity and anticipated disclosure stigma were common. Participants also reported transport costs, work/time conflicts, substance use and intimate-partner violence.

Qualitative analysis generated four principal themes: social isolation and insufficient support; stigma and fear of disclosure; economic hardship and food insecurity; and cumulative psychological stress. Participants described concealment of HIV status, difficulty taking medication without food, competing work responsibilities and limited emotional support as mutually reinforcing barriers to sustained treatment.

Clinically, 38.2% of participants were in WHO stages III or IV, approximately one-quarter had viral loads of at least 1,000 copies/mL, 75.5% had experienced a regimen change, and 92.2% reported a previous treatment-interruption episode. Only 25.5% had participated in adherence counselling.

C. Independent Predictors of Depression

The final logistic-regression model was statistically significant (model chi-square = 72.84, $p < .001$), demonstrated adequate calibration (Hosmer-Lemeshow $p = .634$), explained 42.6% of the variance in depression status and correctly classified 84.3% of participants.

Table 2. Independent predictors of clinically significant depressive symptoms (PHQ-9 ≥ 10)

Predictor	AOR	95% CI	p-value
Age 25-35 years (reference: 18-24)	3.12	1.01-9.64	.048
Age 36-50 years (reference: 18-24)	4.87	1.67-14.19	.004
Age 51 years or older (reference: 18-24)	4.21	1.12-15.84	.033
Separated/divorced/widowed (reference: married/cohabiting)	3.94	1.52-10.24	.005
Never married (reference: married/cohabiting)	1.89	0.79-4.55	.150
High perceived stress	5.72	2.31-14.15	<.001
Frequent food insecurity	3.48	1.59-7.62	.002
Low perceived social support	2.76	1.28-5.97	.010
Fear of disclosure stigma	2.14	1.02-4.48	.043
Work/time conflict	2.63	1.23-5.62	.013

High perceived stress was the strongest independent predictor. Age, marital disruption, food insecurity, low social support, fear of disclosure and work/time conflict also remained significant. WHO stage and previous treatment interruption were associated with depression in bivariate analysis but did not remain independently significant after adjustment, suggesting that psychosocial burden may partly account for their observed associations.

IV. DISCUSSION

This study identified an exceptionally high burden of clinically significant depressive symptoms among adults re-engaging in HIV care after ART interruption. The estimate exceeds most pooled prevalence estimates among general ART populations in Africa, including a recent meta-analysis published in 2025, which underscores that returning clients may represent a distinctly high-risk subgroup rather than the wider population receiving HIV treatment (Tsegaye et al., 2025).

Perceived stress was the strongest independent predictor. Chronic stress can impair sleep, concentration, motivation and decision-making, while increasing the subjective burden of treatment. The qualitative findings showed that distress was not isolated from material conditions; it was embedded in unstable income, food insecurity, relationship disruption and fear of disclosure.

Food insecurity was strongly associated with depression. It may increase distress through uncertainty about household survival, inability to meet nutritional needs and competition between transport, food and other expenses. Evidence from systematic reviews continues to show that food insecurity is closely linked to depression among people living with HIV and can weaken treatment adherence (Ayano et al., 2020; Saenjun et al., 2025).

Low social support and marital disruption were important correlates. Supportive relationships provide emotional reassurance, practical assistance and encouragement to remain in care. Separation, divorce and widowhood may remove these resources while intensifying financial and caregiving pressure. These findings remain consistent with the stress-buffering model and newer adherence literature that identifies social and family context as central to sustained treatment (Cohen & Wills, 1985; Hunt et al., 2024).

Fear of disclosure stigma remained significant after adjustment. Anticipated judgement may encourage concealment of medication, avoidance of clinic visits or delayed re-engagement. A 2022 systematic review found HIV-related stigma to be associated with depression, anxiety, low social support and suicidal ideation, highlighting the need for confidential, rights-based and community-sensitive interventions (Armoon et al., 2022).

Work/time conflict was independently associated with depression and reinforces the importance of person-centred service design. Fixed clinic schedules and long waiting times can impose substantial costs on people in informal or casual employment. Reviews of differentiated service-delivery models show that client-centred approaches can improve retention and viral suppression, while WHO's 2025 guideline recommends integrating mental-health services and enhanced adherence support into HIV delivery platforms (Bwire et al., 2023; WHO, 2025b).

Advanced WHO stage and previous treatment interruption were associated with depression before adjustment, but their effects weakened after psychosocial variables were included. This suggests that clinical severity alone does not fully explain depression in this population. Psychosocial conditions accompanying advanced disease may be more immediate drivers of distress.

A. Implications for Practice and Policy

- i. Integrate routine PHQ-9 screening into ART re-engagement, supported by defined referral, safety assessment and follow-up pathways.
- ii. Adopt stepped mental-health care that combines brief psychological interventions, peer support, task-sharing and specialist referral for severe or persistent symptoms.
- iii. Link food-insecure households to nutrition, social-protection and livelihood programmes rather than treating adherence as an individual behaviour alone.
- iv. Strengthen confidential stigma-reduction counselling, supported disclosure and community education.
- v. Expand differentiated ART delivery through multi-month dispensing, community refills, extended clinic hours and appointment systems responsive to informal workers.
- vi. Use risk-based follow-up for clients with high stress, weak social support, recurrent interruption, marital disruption or poor treatment access.
- vii. Train HIV-care providers in recognition and first-line management of common mental-health conditions, consistent with WHO's integrated HIV service-delivery guidance.
- viii. Protect HIV information systems and essential service continuity from financing shocks through sustainable domestic financing and resilient data infrastructure.

B. Strengths and Limitations

The mixed-methods design enabled triangulation of statistical associations with lived experiences. Use of the PHQ-9 and multivariable modelling strengthened the analysis. However, the cross-sectional design precludes causal inference and cannot establish whether depression preceded ART interruption. The study was conducted at one referral hospital, limiting generalisability. The response rate of 68.2% raises the possibility of non-response bias, and the very high prevalence may partly reflect selection of a particularly vulnerable re-engaging population. Self-reported psychosocial exposures may be affected by recall or social-desirability bias. The PHQ-9 is a screening rather than diagnostic instrument. The exact qualitative sample size, data-collection dates, ethics reference numbers, variable-coding procedures and full regression diagnostics should be confirmed before publication.

V. CONCLUSION

Clinically significant depressive symptoms were highly prevalent among adults re-engaging in HIV care after ART interruption at MTRH. High perceived stress, food insecurity, low social support, disclosure stigma, work/time conflict, older age and marital disruption were the principal independent correlates.

The findings support a biopsychosocial and structural understanding of depression and show that re-engagement should involve more than medication restart. Embedding mental-health screening, stepped psychosocial care, food-security referral, stigma

reduction and flexible ART delivery within routine HIV services may help interrupt the mutually reinforcing relationship between psychological distress and treatment disengagement.

VI. DECLARATIONS

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Maseno University Scientific and Ethics Review Committee, and research authorisation was granted by NACOSTI. The specific approval and permit numbers should be inserted before publication. All participants provided informed consent.

Consent for Publication

Not applicable. No directly identifying participant information is presented.

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Conflict of Interest

The authors declare no conflict of interest.

Data Availability

The de-identified dataset may be made available by the corresponding author upon reasonable request and subject to institutional and ethical approval.

Author Contributions

Judith Kerubo Kambona conceptualised the study, collected and analysed the data and drafted the manuscript. Margaret Disiye and Peter Onderi supervised the study, contributed to interpretation and critically reviewed the manuscript. All authors approved the final version.

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AI and Digital Tool Disclosure

Digital tools were used for language refinement, formatting and reference organisation. The authors reviewed the manuscript and accept responsibility for its accuracy, interpretation and originality.

VII. ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMPATH	Academic Model Providing Access to Healthcare
AOR	Adjusted Odds Ratio
ART	Antiretroviral Therapy
CCC	Comprehensive Care Clinic
CI	Confidence Interval
FGD	Focus Group Discussion
HBM	Health Belief Model
HIV	Human Immunodeficiency Virus
MTRH	Moi Teaching and Referral Hospital
NACOSTI	National Commission for Science, Technology and Innovation
OR	Odds Ratio
PHQ-9	Patient Health Questionnaire-9
PLHIV	People Living with HIV
WHO	World Health Organization

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