Prevalence and correlates of neurocognitive disorders and the impact on quality of life in women aging with HIV in KNH, Kenya.

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Abstract

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As antiretroviral therapy (ART) coverage expands, an increasing number of people living with HIV (PLHIV) are surviving into older age cohorts. In sub-Saharan Africa, women constitute the majority of PLHIV, and emerging evidence suggests that women living with HIV (WLHIV) face a disproportionate burden of neurocognitive impairment as compared to those living without HIV. Despite its clinical importance, neurocognitive impairment among older WLHIV in African settings remains under-recognized and poorly understood.

To estimate the prevalence and correlates of neurocognitive impairment and assess its association with health-related quality of life (HRQoL) in WLHIV aged 50 years and older in Kenya. We conducted a cross-sectional secondary analysis of 200 women aged 50 years and older enrolled at the Comprehensive Care Centre at Kenyatta National Hospital between September 2024 and March 2025. Cognitive function was assessed using the Montreal Cognitive Assessment (MoCA) and the score was classified as normal (26-30), mild (18-26), moderate (10-17) and severe (>10). The quality of life was measured using the WHOQOL-

BREF-HIV instrument and domains assessed were Physical, Psychological, Independence, Social Relationships, Environment and Spirituality/Religion. Depression and Post Traumatic Stress Disorder (PTSD) were evaluated using PHQ-9 and PCL-5, respectively. Logistic and linear regression models were used to identify correlates of cognitive impairment and its association with Health Related Quality of Life(HRQoL) domains. Most participants (62%) were aged 50-59 years, and the majority had completed at least primary school. The prevalence of any form of cognitive impairment was 86%, with mild impairment (66%) being the most common. Being between age 60-69 years was significantly associated with higher odds of moderate to severe impairment compared to age 50-59years. Attaining secondary education or higher was strongly protective against moderate to severe impairment after adjustment. Overall HRQoL scores did not differ significantly by cognitive status, but participants with normal or mild cognitive impairment had higher psychological QoL scores compared to those with moderate or severe impairment. Cognitive impairment was highly prevalent in our study population, with mild impairment being the most common. Advancing age and lower educational attainment are key risk factors for cognitive impairment, and cognitive challenges appear to particularly affect emotional well-being. Routine cognitive screening, integrated psychosocial support, and interventions to build cognitive reserve, especially through improved education and mental health services, are urgently needed to promote healthy aging and preserve quality of life in this population.

Background and Significance

Globally, the burden of HIV has decreased due to reduced incidence of new infections, lower AIDS-related mortality, and increased antiretroviral therapy (ART) coverage. Treatment coverage rose to 77% in 2023 from 47% in 2015[1]. This has resulted in an overall increase in older persons living with HIV. In sub-Saharan Africa, it is predicted that one in four people living with HIV (PLHIV) will be older than 50 years by 2040 as compared to the ratio of one in seven PLHIV in 2011.[2]

Healthy ageing is accompanied by a gradual, domain-specific shift in cognitive performance. Longitudinal and life-course studies show that processing speed and some executive skills begin to slow from mid-life, with this change becoming more apparent after the early sixties, whereas vocabulary and other crystallised abilities stay largely intact.[3]

Despite the scale-up of highly effective ART therapy that has increased life expectancy among PLHIV, studies show that cognitive difficulties remain more common among PLHIV. Modern regimens have shifted the clinical picture toward milder yet more diffuse deficits that involve both cortical and subcortical regions, particularly affecting executive function and working memory.[2] Evidence from a 2021 meta-analysis of 21 studies indicates that PLHIV still have more than double the odds of global cognitive impairment compared with HIV-negative adults (pooled OR = 2.44, 95 % CI 1.69–3.53)[3], highlighting a persistent vulnerability despite viral suppression.[4] Additionally, there is a high burden of comorbidities such as cardiovascular, bone, renal, and neurocognitive diseases in women living with HIV (WLHIV) compared to those living without HIV, with traditional risk factors like hypertension, diabetes, and dyslipidaemia being prevalent and often poorly managed[5].

There are differences in cognitive function between males and females living with HIV. A systematic review and meta-analysis found that WLHIV performed significantly worse than

men living with HIV in three cognitive domains: psychomotor coordination, visuospatial learning, and memory[6]. These observed disparities in neurocognitive performance between women men living with HIV raise important questions about the underlying mechanisms driving these differences. These gender differences may stem from biological, hormonal, and psychosocial factors unique to women. Hormonal fluctuations, such as those related to oestrogen levels, are known to impact cognitive functions like memory and learning, potentially exacerbating neurocognitive decline in WLHIV. Additionally, women may experience higher rates of psychosocial stressors, including stigma and caregiving responsibilities, which could influence cognitive outcomes[6].

WLHIV are disproportionately affected by mental health challenges such as depression, anxiety and post-traumatic stress disorder (PTSD), compared to their male counterparts and HIV-negative women[7]. They exhibit higher rates of comorbid mental health disorders, frequently experience simultaneous mental and physical health issues, and often report poorer overall mental well-being. These disparities underscore the need for a better understanding of the effect of the mental health burden on cognition in WLHIV and the development of tailored interventions to address their unique vulnerabilities[7].

The African Cohort Study (AFRICOS) has significantly contributed to understanding the predictors of cognitive impairment among PLHIV. The cohort consisted of 2,472 persons living with HIV in Kenya, Tanzania and Uganda with 59% of the cohort being women. There were 429 HIV-negative controls. Its findings underscore the multifaceted nature of factors influencing neurocognitive outcomes, particularly among WLHIV. Key predictors identified include advanced HIV disease, lack of viral suppression, low CD4 count, and prolonged duration of antiretroviral therapy (ART)[8].

An exploratory qualitative study with participants recruited from specialist HIV clinics in the South-East of England from January to July 2020 identified seven interrelated domains affecting the health-related quality of life (HRQoL) in PLHIV who have cognitive impairment: physical function, cognition, social connectedness, psychological and mental health, stigma, self-concept, and control and acceptance[9]. The findings highlight the complex interplay of these factors, emphasizing the need for targeted interventions to improve HRQoL in this population. The study concludes that addressing these domains can significantly enhance the overall well-being of PLHIV with cognitive impairment[9]. Complementing these domains, a cross-sectional study from coastal Kenya of 450 adults receiving ART using the FAHI instrument found that depressive symptoms, HIV-related stigma, non-disclosure of HIV status, living alone, clinic inaccessibility, and current opportunistic infection were each associated with lower HRQoL, whereas higher physician empathy, male sex, and higher BMI correlated with better HRQoL; age and longer time on cART showed domain-specific benefits. These findings reinforce the central roles of mental health, stigma, social support, and service accessibility in shaping HRQoL for PLHIV in low-resource settings.[10]

In Kenya, women constitute 58% of PLHIV, reflecting the significant gendered burden of the epidemic. This demographic highlights the unique challenges faced by women, particularly in managing comorbidities like cognitive decline. The interplay of neurocognitive disorders and HIV has far-reaching implications at both individual and societal levels. Cognitive decline among women living with HIV (WLHIV) in Kenya poses significant challenges, undermining progress in HIV management by impairing ART adherence, leading to advanced disease progression, and increasing transmission risks. This decline also escalates healthcare costs due to the need for frequent hospitalizations, specialized care, and management of related complications, further straining an already limited healthcare system. At the household level, it places a heavy burden on caregivers, often forcing them to sacrifice employment and

resources, amplifying economic hardships. On a broader scale, the reduced productivity of WLHIV, who play vital roles in the economy, hampers national development and deepens socioeconomic inequities, underscoring the urgent need for targeted interventions to address these multifaceted impacts[11].

To better understand the gaps in the recognition of neurocognitive disorders and their correlates among women living with HIV (WLHIV) aged 50 years and older in Kenya, we conducted a secondary data analysis of data from the parent study Frailty and Osteoporosis among 200 Kenyan Women Aging with HIV. Our analysis focused on determining the prevalence and correlates of neurocognitive disorders and the association with the health-related quality of life among women aging with HIV in Kenya. We hypothesized that there is a high prevalence of neurocognitive disorders with risk factors and also that the neurocognitive disorders will impact the quality of life of these women.

Methods

Study design

This is a cross sectional secondary analysis of baseline data from an observational study of 200 women living with HIV on follow-up at the Kenyatta National Hospital. Data was collected over a period of 6 months from September 2024.

Study area

The study site was the Comprehensive Care Center (CCC) at The Kenyatta National Hospital in Nairobi County established in December 2002 to offer holistic care and support to patients living with HIV. The CCC treats PLWH in its environs and also acts as the referral center for those patients who have developed complications from antiretroviral treatment from the whole country. The KNH-CCC has 3531 registered people living with HIV and aged above 50 years

on follow-up. Of these, 1994 are women. Monthly visits in this age category were approximately 220 per month.

Study population

The study recruited 200 women living with HIV on follow-up at the Comprehensive Care Clinic (CCC) at The Kenyatta National Hospital (KNH). The eligibility criteria were women aged 50 years and older, willing to participate in the study and were able to provide informed consent.

Potential study participants who met the inclusion criteria were systematically sampled until the sample size was reached.

Recruitment and Consenting Procedures

Participants for the study were identified and recruited during their routine clinic visits at Kenyatta National Hospital. Eligibility screening was conducted, and those meeting the criteria were invited to enrol. The recruitment process took place in person, with participants receiving a translated copy of the consent form to ensure clear understanding and informed decision-making. Individuals who met the inclusion criteria and willingly provided consent were enrolled in the study.

Data Collection Procedures and Measures

On the day of their routine clinic visit, research assistants reviewed patient records to identify individuals meeting the inclusion criteria. Eligibility was then confirmed by the study nurse using a tablet with a pre-programmed screening form and baseline questionnaire in RedCap. Data were collected on sociodemographic characteristics and HIV disease status. Validated questionnaires and tools were administered to assess core domains of the comprehensive geriatric assessment, including functional status, frailty, fall risk, cognition, mood, nutrition,

social support, and polypharmacy. Additionally, the WHO-QOL-BREF-HIV tool, validated for people living with HIV, was used to measure quality of life.

Global cognition was assessed using the 30-point Montreal Cognitive Assessment (MoCA), which evaluates attention, executive function, memory, language, visuospatial skills, abstraction, and orientation. We applied pre-specified cut-points to classify cognitive performance as normal (26–30), mild impairment (18–25), moderate impairment (10–17), and severe impairment (<10). For regression models, cognitive status was analysed as moderate and severe compared to normal and mild.

Assessing health-related quality of life (HRQoL) has become a central outcome in HIV research and care because most people living with HIV (PLHIV) now reach older age and face multimorbidity that may not be captured by traditional clinical endpoints. The World Health Organization's definition of QoL emphasises an individual's perception of well-being within their cultural and value context, and this concept is operationalised for PLHIV most commonly through the WHOQOL-HIV BREF, a 29-item instrument covering the following domains: physical, psychological, independence, social, environmental and spirituality/religion as well as an overall quality of life score. The domains were rated on 5-point Likert scales and scored according to the WHO manual; domain scores were transformed to a 4-20 metric, with higher scores indicating better HRQoL. We summarized domain means (SD) and compared domain-specific scores by cognitive-status groups in bivariate tests and multivariable models.

Data Analysis

Data were captured in tablets programmed with RedCap forms that allowed real-time as well as offline data capture and uploading. The data were encrypted and password protected. Data were analysed using R version 4.3.4.

Continuous variables were summarized using mean and standard deviation for normally distributed variables and median and inter-quartile range (IQR) for non-normally distributed variables. Participant characteristics were summarized at baseline and stratified by age. We estimated the prevalence of neurocognitive disorders and conducted univariate and multivariate logistic regression analyses to determine the correlates associated with these disorders. We then determined the quality of life using the WHOQOL-BREF questionnaire, which measured health-related quality of life (HRQoL) across four domains: physical health, psychological health, social relationships, and environment. Linear logistic regression models were used to examine the association between overall MoCA scores and specific cognitive domains with the quality of life scores and domains. Ninety-five percent confidence intervals (95% CI) were calculated, and a significance (α) level of 0.05 was used.

Ethical Consideration

The study procedures were approved by the University of Washington Institutional Review Board and the Kenyatta National Hospital - University of Nairobi Ethics Review Committee (KNH-UoN ERC).

Results

Baseline characteristics of study participants

Between September 2024 and March 2025, 200 women living with HIV aged 50 years and older were enrolled in the study. The median age was 58 years (Range 50.0, 82.0), and most participants (over 60%) were between 50 and 59 years old. (Table 1)

Overall, 158 (79%) had completed at least primary school education and higher, 69 (34.5%) were widowed. Majority of participants were widowed (34.5%) and just over half of the participants lived in rented housing, while others owned their homes. A majority 139 (69.5%) reported earning less than Ksh 10,000 per month. (Table 1)

The median duration on antiretroviral therapy was 11 years, with a standard deviation of 3.74. Majority (87%) were on a first line regimen (non-protease inhibitor [PI] regimen) with only 13% (39) on a second line PI based regimen. Among the 200 women, 181 (91%) were virally suppressed, defined as an HIV viral load <50 copies per ml.

Regarding mental health, just over half (106) had no or minimal PTSD symptoms, and the majority 167 (83.5%) had no or minimal depression. Moderate or severe symptoms of PTSD or depression were uncommon. (Table 1)

Prevalence of Neurocognitive impairment

Cognitive performance centred around a median score of 22.0 (range from 5 to 30). Overall, 86.0% scored below the normal range, most commonly in the mild range (66.0%), with smaller proportions in the moderate (17.5%) and severe (2.5%) ranges; 14.0% scored in the normal range. The distribution varied by age: among those 50-59 years, 18.5% were in the normal range and none were severe; in 60-69 years, 8.3% were normal and 25.0% were moderate/severe; in those ≥70 years, no participant was in the normal range and 56.3% were moderate/severe. (Figure 1)

As shown in the graph, cognitive performance declined progressively with age. Among women aged 50-59 years, most of them had scores in the mild impairment category (85 women or 68.5%), with fewer showing moderate impairment and even fewer scoring in the normal range. In the 60 to 69-year group, there was a noticeable shift, with increased representation in the moderate and severe categories. Notably, none of the participants aged 70 and above had normal cognitive scores. Over half of this group (9 women) had either moderate or severe impairment, illustrating a clear trend of worsening cognitive function with advancing age. (Figure 2)

Correlates of Neurocognitive Impairment in WLHIV

In unadjusted analyses, older age, income and lower educational attainment were significantly associated with greater odds of moderate and severe neurocognitive impairment. Women aged 60-69 years had over twice the odds of impairment compared to those aged 50-59 years (OR 2.20, 95% CI: 1.14, 4.26 p-value 0.0175), and those aged 70 years or older had over six times the odds (uOR 6.33, 95% CI: 2.06, 19.45, *p*-value 0.0014). Educational attainment showed a strong protective effect, particularly for women with secondary education (uOR 0.14, 95% CI: 0.05, 0.33, p-value < 0.001) and secondary school or higher education (uOR 0.02, 95% CI: 0.003, 0.08, p-value < 0.001). Higher income (≥10,000 KSh) was also associated with lower odds of impairment in unadjusted analysis (Odds Ratio 0.29, 95% CI 0.12, 0.61). (Table 2)

In the adjusted model, the association between age and cognitive impairment remained significant for women aged 60-69 years (aOR 2.43, 95% CI: 1.03, 5.90, p-value 0.045), though it was no longer significant for the oldest age group. The protective association with education persisted for those with secondary education and secondary or higher education. Depression showed a marginal association with lower odds of impairment (aOR 0.31, 95% CI: 0.09, 0.97, p-value 0.055).

Other variables including income, PTSD, ART duration, and viral load, were not significantly associated with cognitive impairment after adjustment. (Table 2)

Association between Quality of life domains and Cognitive Score

Mean WHOQOL-HIV BREF scores were high (mean domain score ≥16) in both groups, normal/mild impairment versus moderate/severe impairment. The highest means were Social Relationships (17.90 vs 17.67) and Spirituality/Religion (17.85 vs 17.59); Physical (17.22 vs 17.07) and Independence (17.12 vs 16.87) were similarly high, and Environment averaged 16.79 vs 16.67. The lowest mean was Overall QoL (15.21 vs 14.93), followed by Psychological

(16.10 vs 15.54). Among these, the psychological domain was the only one to show a statistically significant difference by cognitive function categories. Participants with normal or mild cognitive impairment had higher psychological QoL scores compared to those with moderate or severe impairment (p-value 0.048; 95% CI: 0.01, 1.13).

Although mean scores were consistently higher in the normal/mild group across all domains, these differences were generally small and not statistically significant. (Table 3)

Discussion

Cognitive changes were common in this ageing cohort of women living with HIV, and most of those changes were mild, affecting about two-thirds of participants (66 %), a pattern that parallels the subtle declines typically seen in normal ageing. This mirrors meta-analytic evidence from sub-Saharan Africa, where reported prevalence of neurocognitive impairment among older adults living with HIV spans 14 – 88 % but averages about 46%. [12] The meta-analysis however found some differences by assessment tool used and recommended using the MoCA because of a higher sensitivity resulting in greater yields. The wide yet consistently elevated estimates highlight the importance of integrating cognitive-health support into routine care for this growing population.[12]

As is typical with advancing age, women aged 60-69 years showed more than twice the odds of cognitive impairment compared with those aged 50-59 years. This pattern is consistent with findings from a comprehensive global meta-analysis that included data from sub-Saharan Africa, where older age was associated with a 3.7-fold increase in the odds of HIV-associated neurocognitive disorders (HAND).[13] The same review, which examined over 14,000 individuals across 28 countries, highlighted that older age remained a significant risk factor even after adjusting for education, disease stage, and depression. These findings underscore that advancing age independently amplifies the risk of HAND among PLWH, including those

on effective ART. Mild impairment can affect day-to-day efficiency (e.g., processing speed, multitasking) and may foreshadow decline for a subset of individuals. Routine symptom enquiry about memory, attention, and planning in older PLHIV is warranted, with brief screening (e.g., MoCA) when concerns arise and confirmation via targeted testing if positive.

Educational attainment emerged as a robust protective factor where secondary school or higher education significantly reduced the odds of impairment even after adjusting for other key variables. A study in Tanzania showed that a higher cognitive reserve, measured by educational and occupational experiences, was associated with lower HIV associated cognitive impairment prevalence in older adults.[14,15] These results suggest that the cognitive reserve associated with higher educational attainment may help buffer, at least in part, the clinical impacts of HIV-related brain changes.

In our study, higher income initially appeared protective against neurocognitive impairment in unadjusted analyses, but this association was attenuated after controlling for education and other covariates. This pattern aligns with research showing that socioeconomic factors, like income and education, are often entangled, with education exerting a stronger independent effect on cognitive outcomes than income alone.[15] Lower income is frequently linked to reduced opportunities for learning, poorer nutrition, and limited access to healthcare, all factors that contribute to lower cognitive reserve.

We found a marginally inverse relationship between depression and cognitive impairment, a result that contrasts with the majority of existing literature. Prior studies, such as the POPPY cohort, have demonstrated a clear association between depressive symptoms and poorer cognitive performance in people living with HIV (PLWH).[16] In that study, adjusting for depression and lifestyle factors significantly attenuated cognitive differences between HIV-

positive and HIV-negative participants, suggesting that depression may mediate or amplify cognitive dysfunction.[16]

While we used both the MoCA and PHQ-9 to assess cognitive function and depressive symptoms respectively, it is important to recognize that these are screening tools, not diagnostic instruments. According to recent consensus recommendations from the International HIV-Cognition Working Group,[17] cognitive assessments should be interpreted within a broader clinical and psychosocial context. They advise against relying on screening measures alone, particularly in populations with elevated rates of depression or socioeconomic stress, due to the risk of misclassification or overdiagnosis.[17] In our study, the unexpected direction of the association may reflect underreporting of depressive symptoms, overlap between mood and cognitive complaints, or the limitations of brief tools in distinguishing between the two.

Our findings indicated no significant difference in overall quality of life (QoL) between women with normal/mild versus moderate/severe cognitive impairment. However, the psychological domain which assesses emotional well-being, mental clarity, and inner peace, was notably lower in those with greater impairment. This aligns with a study showing that neurocognitive impairment in PLHIV significantly correlates with decreased mental health and psychological well-being, even when physical and social aspects remain unaffected.[9] Further insight comes from this research, where participants living with HIV and cognitive challenges described their experience as “a fog that impacts everything,” emphasizing how cognitive decline profoundly affects their emotional health, sense of control, and overall life satisfaction.[9] These findings support the view that interventions addressing cognitive impairment in WLHIV should incorporate mental health counselling, support for emotional resilience, and stress-reduction strategies.

Further research should include longitudinal follow-up, inclusion of matched HIV-negative controls, local validation of screening cut-offs, and intervention trials combining cardio-metabolic optimization, exercise, and cognitive training with cognition and HRQoL as co-primary outcomes.

This study had notable strengths, including its focused enrolment of women living with HIV aged ≥50 years, which addressed a critical evidence gap in a vulnerable and underrepresented population, and the active linkage of participants to appropriate care and follow-up for conditions newly identified during the study. Key limitations were the cross-sectional design, which restricted causal inference between HIV-related factors and neurocognitive outcomes, and the small number of participants aged ≥70 years, which limited statistical power for subgroup analyses and reduced the precision of estimates in this oldest age group.

Conclusion

This study highlights the substantial burden of cognitive impairment among older women living with HIV in Kenya, with mild impairment being the most prevalent. The findings reinforce age and low educational attainment as key predictors, underscoring the cumulative effects of aging, HIV, and limited cognitive reserve. While overall quality of life was not significantly diminished in those with cognitive impairment, the psychological dimension was clearly affected, suggesting a critical intersection between emotional health and cognitive function.

To address this growing public health challenge, routine cognitive screening should be integrated into HIV care for older women, especially those over 60 and those with limited formal education. However, such screening must be interpreted cautiously and supplemented with functional and psychosocial assessments to reduce the risk of misclassification. Interventions should go beyond cognitive rehabilitation to include psychosocial support,

mental health services, and educational programs that strengthen cognitive reserve and emotional resilience.

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Annex

Table 1: Demographic, socioeconomic, and behavioural characteristics of Women aging with HIV on follow-up at the KNH CCC

	Overall (N = 200)
Age (years) , Median, IQR)	
Mean (SD)	58.5 (6.53)
Median [Min, Max]	58.0 [50.0, 82.0]
Age group (n, %)	
50-59 years	124 (62.0%)
60-69 years	60 (30.0%)
70+ years	16 (8.0%)
Education (n, %)	
Less than primary school	42 (21.0%)
Primary school	57 (28.5%)
Secondary school	56 (28.0%)
High school or higher	45 (22.5%)
Marital status (n, %)	
Never married	36 (18.0%)
Currently married	54 (27.0%)
Separated/Divorced	41 (20.5%)
Widowed	69 (34.5%)
Employment status (n, %)	
Employed	100 (50.0%)
Unemployed	100 (50.0%)

Housing (n, %)	
Rented house	105 (52.5%)
Own house	89 (44.5%)
Home of a relative	5 (2.5%)
Missing	1 (0.5%)
Monthly income (Ksh) (n, %)	
<10,000	139 (69.5%)
10,000+	53 (26.5%)
Unknown/Declined	8 (4.0%)
Current smoking (n, %)	
No	198 (99.0%)
Yes	2 (1.0%)
Current alcohol consumption (n, %)	
No	199 (99.5%)
Yes	1 (0.5%)
Last viral load (n, %)	
LDL (<50 copies/ml)	182 (91.0%)
Low-level viremia (50-200 copies/ml)	10 (5.0%)
Unsuppressed (>200 copies/ml)	4 (2.0%)
Missing	4 (2.0%)
ART duration (years)	
Mean (SD)	11.0 (3.74)
Median [Min, Max]	12.3 [0.0383, 21.5]
PTSD scores (n, %)	

No/minimal	106 (53.0%)
Mild	42 (21.0%)
Moderate	12 (6.0%)
Severe	3 (1.5%)
Missing	37 (18.5%)
PHQ-9 score	
Mean (SD)	2.05 (3.09)
Median [Min, Max]	0 [0, 23.0]
Depression (n, %)	
No or minimal depression (0 - 4)	167 (83.5%)
Mild depression (5 – 9)	27 (13.5%)
Moderate depression (10 – 14)	5 (2.5%)
Moderately severe depression (15 – 19)	0 (0%)
Severe depression (20-27)	1 (0.5%)

Figure 1: Prevalence of cognitive impairment based on Montreal Cognitive Assessment Score (MoCA)

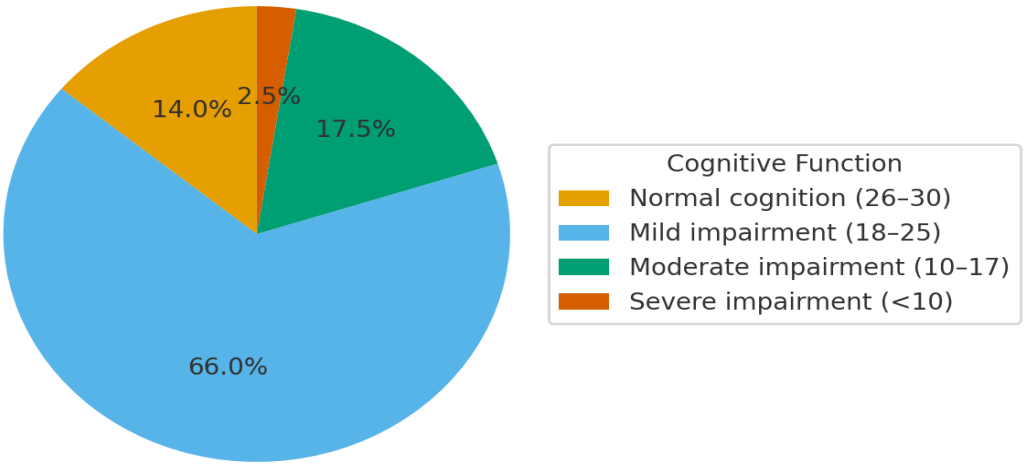

Figure 2: Prevalence of neurocognitive impairment in women aging with HIV by age category

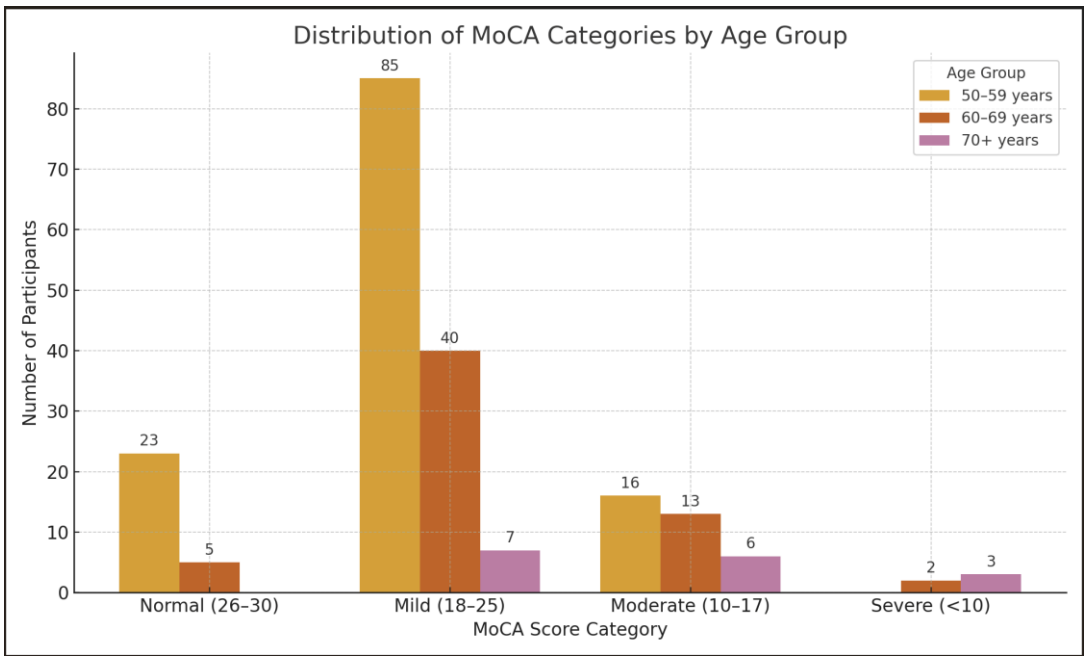

Table 2: Predictors of Moderate to Severe Neurocognitive Impairment Among Women Living with HIV at Kenyatta National Hospital, 2025 (N=200)

Predictor	**OR (95% CI)**	**p-value**	**aOR (95% CI)[a]**	**p-value**
Age				
50–59 years	Reference	–	Reference	-
60–69 years	2.20 (1.14, 4.26)	**0.0175**	2.43 (1.03, 5.90)	**0.045**
≥70 years	6.33 (2.06, 19.45)	**0.0014**	2.21 (0.56, 9.59)	0.267
Education Level				
< Primary School	Reference	–	Reference	-
Primary School	0.35 (0.15, 0.80)	**0.0141**	0.83 (0.29, 2.36)	0.726
Secondary School	0.14 (0.05, 0.33)	**<0.001**	0.19 (0.06, 0.56)	**0.003**
High School or Higher	0.02 (0.003, 0.08)	**<0.001**	0.06 (0.008, 0.27)	**0.001**

Income Category				
<10,000 KSh	Reference	–	Reference	
≥10,000 KSh	0.29 (0.12, 0.61)	**0.0019**	0.50 (0.18, 1.34)	0.179
Unknown/Declined	0.47 (0.07, 2.10)	0.359	0.27 (0.01, 2.51)	0.295
Depression (PHQ-9 score)				
No Depression	Reference	–	Reference	
Depression	0.80 (0.34, 1.74)	0.579	0.31 (0.09, 0.97)	**0.055**
PTSD (PCL-5)				
No PTSD	Reference	–	Reference	
Any PTSD	0.89 (0.45, 1.75)	0.748	0.83 (0.36, 1.89)	0.655
ART Duration				
<12 years	Reference	–	Reference	
≥12 years	0.79 (0.44, 1.45)	0.447	0.69 (0.30, 1.59)	0.381
Viral Load				
<50 copies/mL (Undetectable)	Reference	–	Reference	
>50 copies (Low-level viremia and unsuppressed)	0.81 (0.17, 3.02)	0.765	0.65 (0.14, 2.63)	0.555

[a]Adjustment variables: Age, Viral load, ART duration, Depression, PTSD, Education level, Income. MoCA: Montreal Cognitive assessment; OR: Odds Ratio; CI: Confidence Interval

Table 3: Quality of Life Domain Scores by MoCA Category

Quality of Life Domain	**[b] Mean domain score (SD): (Normal/ Mild Cognitive Impairment)**	**Mean domain score (SD):(Moderate/ Severe Cognitive Impairment)**	**p-value**	**95% CI (Lower)**	**95% CI (Upper)**
Overall QoL	15.21 (2.62)	14.93 (2.89)	***0.4584***	***-0.46***	***1.02***
Physical	17.22 (2.26)	17.07 (2.32)	0.6447	-0.49	0.79
Psychological	16.10 (2.17)	15.54 (2.23)	**0.0476**	**0.01**	**1.13**
Independence	17.12 (2.00)	16.87 (1.97)	0.4624	-0.43	0.94
Social Relationships	17.90 (2.19)	17.67 (2.24)	0.4638	-0.40	0.86
Environment	16.79 (1.86)	16.67 (1.94)	0.6806	-0.44	0.67
Spirituality/Religion	17.85 (2.29)	17.59 (2.45)	0.4308	-0.38	0.89

[b] Independent t-tests comparing domain scores between Normal and Mild Vs Moderate and Severe Cognitive Impairment groups