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Assessing healthcare satisfaction and prevalence of diabetes and hypertension among older adults living with HIV in Eastern Uganda: a cross-sectional study

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ABSTRACT

Background: The use of antiretroviral therapy (ART) in the management of HIV/AIDS has greatly increased the life expectancy of people living with HIV. However, longer life spans have been accompanied by a growing burden of non-communicable diseases (NCDs). This study assessed healthcare satisfaction and the prevalence of diabetes and hypertension among older adults living with HIV (50 years and above) at Mbale Regional Referral Hospital in Eastern Uganda.

Methods: A cross-sectional study was conducted at Mbale Regional Referral Hospital (MRRH) involving 400 HIV-positive patients aged more than 50 years on ART. The sociodemographic information, ART history, and comorbidities were obtained. Bivariate and multivariable logistic regression analyses were performed to identify predictors of comorbidities.

Results: The prevalence of DM and HTN were 28.3% and 27.1%, respectively. Participants aged ≥64 years had significantly higher odds of HTN (AOR: 2.25; 95% CI: 1.27–3.19; $p = 0.029$). Changing ART regimens three or more times was associated with HTN (AOR: 2.55; 95% CI: 1.08–4.73; $p = 0.015$). Living 6–10 km from a health facility increased the odds of DM (AOR: 5.46; 95% CI: 1.12–26.54; $p = 0.044$). Overall, 91% of the participants reported satisfaction with the healthcare received.

Conclusion: DM and HTN are highly prevalent among older adults living with HIV in Eastern Uganda and are associated with advanced age, ART regimen changes, and healthcare access challenges. The integration of NCD screening and management into HIV care are key for improving long-term outcomes in this population.

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Older adults; HIV/AIDS; health care satisfaction; hypertension and diabetes mellitus; Older adults living with HIV; HIV in low resource settings

Introduction

Human immunodeficiency virus (HIV) epidemic remains one of the most pressing public health challenges of the 21st century, with approximately 39.9 million people living with HIV worldwide [1]. Advances in antiretroviral therapy (ART) have significantly improved life expectancy among people living with HIV. Consequently, the prevalence and incidence of HIV among individuals aged 50 years and above are increasing at a faster rate than those in the general population. According to UNAIDS, the number of people aged 50 years and older living with HIV increased from 5.4 million in 2015 to 8.1 million in 2020 [2]. This demographic shift presents unique challenges, particularly in resource-limited settings such as Eastern Uganda, where healthcare infrastructure is often overstretched. Older adults with HIV face a higher burden of comorbidities, age-related health complications, and persistent social stigma, further complicating their healthcare needs and overall well-being [3].

Among the health care needs that come with increased life expectancy coupled with sustained lifetime ART are non-communicable diseases particularly hypertension, diabetes mellitus, and cancers [4]. The World Health Organisation (WHO) and United Nations AIDs (UNAIDS) report a concerning rise in the

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prevalence of hypertension and diabetes mellitus among older adults living with HIV. Studies indicate that nearly 50% of older adults with HIV experience hypertension, while diabetes prevalence ranges from 5% to 15% [5]. This dual burden of HIV and non-communicable diseases poses significant challenges to healthcare systems, particularly in low-resource settings. Thus, there is an urgent need for integrated health strategies to manage both HIV and associated chronic conditions to improve overall health outcomes for this population.

Furthermore, despite the growing number of HIV-positive adults globally, there is a notable gap in research on healthcare satisfaction among those aged 50 years and above, particularly in low-resource settings such as Eastern Uganda. The existing literature primarily focuses on younger populations or broader age groups, often overlooking the unique needs and experiences of ageing individuals with HIV. Understanding how older adults perceive and experience healthcare in this context is essential for designing responsive policies and interventions.

Studies from high-income countries suggest that older HIV patients tend to report higher healthcare satisfaction, likely because of better health stability and consistent access to ART [6]. However, findings from low- and middle-income countries (LMICs) are mixed. In some African regions, elderly HIV patients report dissatisfaction due to barriers such as long wait times, stigma from healthcare providers, and difficulty accessing specialised services [7]. Conversely, studies in certain urban areas of African countries with high HIV prevalence indicate higher satisfaction when community-based healthcare programs are available [8].

These discrepancies highlight the need for context-specific research in Eastern Uganda, where healthcare infrastructure, provider–patient interactions, and social determinants of health may significantly influence satisfaction with care. Without targeted studies, the factors affecting healthcare satisfaction among older HIV patients in this region remain unclear, making it challenging to develop effective interventions tailored to their needs. This study aimed to assess healthcare satisfaction and the prevalence of diabetes mellitus and hypertension among HIV-positive individuals aged 50 years and above in Eastern Uganda and identify factors influencing their satisfaction with care.

Methods

Study design

This was a hospital-based cross-sectional analytical study conducted between January 2024 and March 2024 to assess healthcare satisfaction and the prevalence of diabetes and hypertension among older adults living with HIV receiving care at Mbale Regional Referral Hospital (MRRH) in Eastern Uganda.

Study setting

The Mbale Regional Referral Hospital, located in Eastern Uganda, serves as a major referral centre for Elgon and Bukedi sub-regions. The HIV clinic provides comprehensive HIV care services, including ART initiation, routine follow-up, monitoring for non-communicable diseases (NCDs), adherence counselling, and laboratory support. The clinic attends to approximately 1200–1500 HIV patients monthly, including a growing proportion of older adults aged 50 years and above.

Study population

The study population comprised people living with HIV aged 50 years and above who had been enroled in antiretroviral therapy (ART) for at least six months and were attending routine HIV clinic visits at MRRH during the study period. At the time of the study, a total of 1986 eligible clients aged ≥50 years were receiving care at the facility, including 777 males and 1209 females.

Inclusion and exclusion criteria

Eligible participants were people living with HIV aged ≥50 years and enroled in ART for ≥6 months; participants were required to have the cognitive capacity to provide informed consent and participate

meaningfully in the interview process. Admitted patients who were clinically stable and able to complete the study procedures were eligible and included.

Participants were excluded if they were currently using antihypertensive medications for conditions other than hypertension, were pregnant, or if patients who were acutely ill or clinically unstable to the extent that they could not participate in the interview or undergo study assessments were excluded.

Sample size determination

A census sampling approach was used whereby all participants who met the eligibility criteria and attended the clinic during the study period were consecutively enroled into the study.

Sampling procedure

A sampling frame of all eligible older adults receiving ART at MRRH was obtained from the ART clinic register. Census sampling was used to select participants. Proportional allocation to daily clinic attendance was applied, and eligible participants presenting on sampled clinic days were enroled consecutively after random selection.

Data sources

Both primary and secondary data sources were used. Primary data were from structured interviewer-administered questionnaires, while secondary data were extracted from clinical history (ART duration, comorbidities) from the ART register.

Data collection

Data were collected using a structured questionnaire adapted from validated patient satisfaction and HIV care assessment tools. The tool was translated into Lumasaba and Luganda, and back-translated to ensure accuracy. Six trained research assistants working in HIV care conducted face-to-face interviews. The information collected included socio-demographic characteristics, healthcare satisfaction indicators, behavioural risk factors, and self-reported comorbidities.

To prevent duplicate enrolment during the extended recruitment period, each participant was assigned a unique identification number derived from their clinic records. These identifiers were cross-checked during data collection to ensure that individuals were enroled only once. This procedure effectively minimised the risk of overlapping visits or repeat inclusion of the same participant.

Measurement of hypertension

Hypertension status was determined based on documented prior diagnosis in the participants' medical records. Only individuals with a pre-existing diagnosis of hypertension recorded in the ART clinic register or patient file and who were already receiving antihypertensive medications were classified as hypertensive. No new hypertension screening or BP-based diagnostic assessments were conducted for the purposes of this study. Current medication types and self-reported adherence were also recorded.

Measurement of diabetes

Diabetes mellitus classification was based on previous diagnoses documented in the participants' clinical records. Participants were considered diabetic if they had a confirmed diagnosis of diabetes in the ART register or patient file and were currently using antidiabetic medications (oral hypoglycaemics or insulin). The study did not perform new blood glucose testing for diagnostic purposes; only pre-existing medical diagnoses and medication status data were used.

Assessment of healthcare satisfaction

Healthcare satisfaction was measured using an adapted satisfaction scale assessing domains such as waiting time, provider communication, confidentiality, availability of medicines, and overall experience with HIV care services. Responses were scored on a 5-point Likert scale.

Data quality assurance

Research assistants received two days of training on study objectives, tools, informed consent, and measurement techniques. The questionnaire was pre-tested on 5% of the sample at a non-study HIV clinic and refined accordingly. Daily supervision and consistency cheques were performed, and double data entry was used to minimise errors.

Data analysis

The data were entered into Google Forms, exported to Excel for cleaning, and analysed using Stata version 19. Descriptive statistics summarising participant characteristics. Bivariate logistic regression identified associations between predictor variables and healthcare satisfaction, hypertension, and diabetes. Variables with $p < 0.20$ were included in the multivariable logistic regression models. Statistical significance was set at $p < 0.05$. Model fit was assessed using the Hosmer–Lemeshow test, and the normality of continuous variables was checked using histograms.

Results

Demographic characteristics of the participants among older people living with HIV in Eastern Uganda

Most of the 205 participants were between 50 and 64 years old (85.9%), female (54.6%), Bamasaba (62%), Anglican (41.5%), lived in the Mbale district (54.6%), and were employed (96.5%). Approximately 56% had at least primary education, and 60% were married. A small number (7.8%) were admitted during the study period, and nearly everyone (99.5%) was on antiretroviral therapy (ART) (Table 1).

Prevalence of diabetes and hypertension among older adults living with HIV in Eastern Uganda

Among the 43 participants with hypertension, 69.8% were aged 50–64 years. The gender distribution was nearly equal, with 48.8% female and 51.2% male. Most belonged to the Bamasaba tribe (55.8%) and lived in the Mbale district (48.8%). Almost all (100%) were on antiretroviral therapy (Table 1).

Among the 43 participants with diabetes, 69.8% were aged 50–64 years. The majority were males (65.1%) compared to females (34.9%). Most belonged to the Bamasaba tribe (58.1%), with smaller proportions from Ateso, Bagwere, Baganda, and others. Approximately 55.8% lived in the Mbale district. Nearly all (97.6%) were employed, 20.9% had no formal education and 18.6% had tertiary education. Most were married (65.1%), and 11.6% were admitted during the study period. All participants with diabetes were on antiretroviral therapy (Table 2). Among the comorbidities, the most common combination was HIV and diabetes mellitus (DM), which was observed in 14.3% of the cases. This was followed closely by individuals with all three conditions (HIV, diabetes, and hypertension (HTN)), accounting for 14% of the sample. HIV co-occurrence with hypertension alone was slightly less prevalent at 13.1% (Figure 1).

Twenty-three (11.2%) of the participants had comorbidities other than 2, including other infectious diseases, anaemia, chronic heart diseases, cancer, arthritis, and stroke. Both conditions were highly prevalent among older participants (≥64 years), with 70.8% of diabetes mellitus cases and 71.2% of hypertension cases occurring in this age group. In contrast, younger participants (50–64 years) accounted for 29.2% of diabetes mellitus cases and 28.8% of hypertension cases. Peasants formed the largest occupational group affected by both conditions, contributing 74.3% of diabetes cases and 65.4% of hypertension cases, while civil servants were less represented (6.2% and 10.6%, respectively). Ethnically, the Bagisu was the predominant group, accounting for 57.5% of diabetes mellitus cases and 57.7% of

Table 1. Socio-demographic characteristics by hypertension among older adults living with HIV in Eastern Uganda.

	Patient with hypertension		
	No *N* = 162	Yes *N* = 43	Total *N* = 205
Age (years)			
50–64	146 (90.1%)	30 (69.8%)	176 (85.9%)
Above 64	16 (9.9%)	13 (30.2%)	29 (14.1%)
Gender			
1. Female	91 (56.2%)	21 (48.8%)	112 (54.6%)
2. Male	71 (43.8%)	22 (51.2%)	93 (45.4%)
Tribe			
Bamasaba	103 (63.6%)	24 (55.8%)	127 (62.0%)
Ateso	11 (6.8%)	6 (14.0%)	17 (8.3%)
Bagwere	14 (8.6%)	3 (7.0%)	17 (8.3%)
Baganda	10 (6.2%)	3 (7.0%)	13 (6.3%)
Others	24 (14.8%)	7 (16.3%)	31 (15.1%)
Religion			
1. Anglican	66 (40.7%)	19 (44.2%)	85 (41.5%)
2. Pentecostal	18 (11.1%)	1 (2.3%)	19 (9.3%)
3. Catholic	46 (28.4%)	14 (32.6%)	60 (29.3%)
4. Moslem	31 (19.1%)	9 (20.9%)	40 (19.5%)
5. Others	1 (0.6%)	0 (0.0%)	1 (0.5%)
District of residence			
1. Mbale	91 (56.2%)	21 (48.8%)	112 (54.6%)
2. Sironko	12 (7.4%)	4 (9.3%)	16 (7.8%)
3. Budaka	9 (5.6%)	4 (9.3%)	13 (6.3%)
6. Others	50 (30.9%)	14 (32.6%)	64 (31.2%)
Employment status			
Unemployed	5 (3.2%)	2 (4.9%)	7 (3.5%)
Employed	152 (96.8%)	39 (95.1%)	191 (96.5%)
Level of education			
1. None	31 (19.5%)	8 (18.6%)	39 (19.3%)
2. Primary	59 (37.1%)	16 (37.2%)	75 (37.1%)
3. Secondary	46 (28.9%)	12 (27.9%)	58 (28.7%)
4. Tertiary	23 (14.5%)	7 (16.3%)	30 (14.9%)
Marital status			
1. Divorced	14 (8.6%)	4 (9.3%)	18 (8.8%)
2. Married	96 (59.3%)	27 (62.8%)	123 (60.0%)
3. Single	12 (7.4%)	0 (0.0%)	12 (5.9%)
4. Widowed	40 (24.7%)	12 (27.9%)	52 (25.4%)
Admission status			
1. Admitted	8 (4.9%)	8 (18.6%)	16 (7.8%)
2. Not admitted	154 (95.1%)	35 (81.4%)	189 (92.2%)
Is the patient on ART			
1. No	1 (0.6%)	0 (0.0%)	1 (0.5%)
2. Yes	160 (99.4%)	43 (100.0%)	203 (99.5%)

hypertension cases. In terms of educational attainment, primary education was the most common level achieved (31% for diabetes and 39.4% for hypertension). The participants with no formal education constituted 23.9% of the diabetes cases and 23.1% of the hypertension cases. Proximity to health facilities revealed that most participants lived within 3–5 km (48.7% for diabetes and 47.1% for hypertension), followed by those within 1–2 km (33.6% and 42.3%). A smaller proportion resided 6–10 km away (17.7% for diabetes and 10.6% for hypertension). Most participants had been living with HIV for 15 or more years (45.5% for both diabetes and hypertension). The overall prevalence of diabetes mellitus (28.3%) and hypertension (27.1%) is highlighted by the demographic, occupational, and educational disparities observed (Figure 2).

Sociodemographic and clinical factors associated with diabetes mellitus and hypertension

In multivariable logistic regression analysis, participants aged above 64 years demonstrated significantly higher odds of having hypertension compared to those aged 50–54 years (AOR: 2.25, 95% CI: 1.27–3.19, $p = 0.029$). Although older age was also associated with increased odds of diabetes mellitus (AOR: 16.61, 95% CI: 0.14–2,006.51), this finding was not statistically significant ($p = 0.251$). Male participants showed higher, though non-significant, odds of diabetes mellitus compared to female (AOR: 7.14, 95% CI: 0.59–87.06, $p = 0.123$). Ethnicity was an important factor; participants from the Basoga tribe had

Table 2. Socio-demographic characteristics by diabetes among older adults living with HIV in Eastern Uganda.

	Patient with diabetes		
	0. No $N = 162$	1. Yes $N = 43$	Total $N = 205$
Age (years)			
50–64	146 (90.1%)	30 (69.8%)	176 (85.9%)
Above 64	16 (9.9%)	13 (30.2%)	29 (14.1%)
Gender			
Female	97 (59.9%)	15 (34.9%)	112 (54.6%)
Male	65 (40.1%)	28 (65.1%)	93 (45.4%)
Tribe			
Bamasaba	102 (63.0%)	25 (58.1%)	127 (62.0%)
Ateso	13 (8.0%)	4 (9.3%)	17 (8.3%)
Bagwere	14 (8.6%)	3 (7.0%)	17 (8.3%)
Baganda	5 (3.1%)	8 (18.6%)	13 (6.3%)
Others	28 (17.3%)	3 (7.0%)	31 (15.1%)
Religion			
Anglican	66 (40.7%)	19 (44.2%)	85 (41.5%)
Pentecostal	17 (10.5%)	2 (4.7%)	19 (9.3%)
Catholic	49 (30.2%)	11 (25.6%)	60 (29.3%)
Moslem	30 (18.5%)	10 (23.3%)	40 (19.5%)
Others	0 (0.0%)	1 (2.3%)	1 (0.5%)
District of residence			
Mbale	88 (54.3%)	24 (55.8%)	112 (54.6%)
Sironko	13 (8.0%)	3 (7.0%)	16 (7.8%)
Budaka	9 (5.6%)	4 (9.3%)	13 (6.3%)
Others	52 (32.1%)	12 (27.9%)	64 (31.2%)
Employment status			
Unemployed	6 (3.8%)	1 (2.4%)	7 (3.5%)
Employed	150 (96.2%)	41 (97.6%)	191 (96.5%)
Level of education			
None	30 (18.9%)	9 (20.9%)	39 (19.3%)
Primary	63 (39.6%)	12 (27.9%)	75 (37.1%)
Secondary	44 (27.7%)	14 (32.6%)	58 (28.7%)
Tertiary	22 (13.8%)	8 (18.6%)	30 (14.9%)
Marital status			
Divorced	14 (8.6%)	4 (9.3%)	18 (8.8%)
Married	95 (58.6%)	28 (65.1%)	123 (60.0%)
Single	11 (6.8%)	1 (2.3%)	12 (5.9%)
Widowed	42 (25.9%)	10 (23.3%)	52 (25.4%)
Admission status			
Admitted	11 (6.8%)	5 (11.6%)	16 (7.8%)
Not admitted	151 (93.2%)	38 (88.4%)	189 (92.2%)
Is the patient on ART			
No	1 (0.6%)	0 (0.0%)	1 (0.5%)
Yes	160 (99.4%)	43 (100.0%)	203 (99.5%)

significantly higher odds of both diabetes mellitus (AOR: 2.10, 95% CI: 1.20–2.37, $p = 0.023$) and hypertension (AOR: 1.34, 95% CI: 1.13–3.00, $p = 0.043$) compared to the Bamasaaba. The participants from the Bagwere tribe had marginally higher odds of hypertension (AOR: 1.79, 95% CI: 0.84–3.82, $p = 0.048$). Changing antiretroviral therapy (ART) regimens three or more times was significantly associated with increased odds of hypertension (AOR: 2.55, 95% CI: 1.08–4.73, $p = 0.015$). Participants residing 6–10 km away from health facilities had significantly higher odds of diabetes mellitus (AOR: 5.46, 95% CI: 1.12–2.54, $p = 0.044$) compared to those residing within 0–2 km. Other factors, including education level, occupation, marital status, religion, and physical limitations were not significantly associated with either diabetes mellitus or hypertension after adjusting for confounders (Table 3).

Patient satisfaction with care

Ninety-one percent of the respondents were satisfied with care, as shown in Figure 3. As shown in Table 4A, satisfaction with care was higher among older participants (aged ≥64 years), who accounted for 57.1%. Peasants formed the majority of both satisfied (64.6%) and dissatisfied (83.3%) participants. However, private sector workers showed a higher satisfaction rate (23.9%) compared to dissatisfaction (11.1%). The Bamasaba tribe was the most represented group among both satisfied (60.7%) and dissatisfied (72.2%) participants. Anglicans constituted the majority of the satisfied participants (43.4%), while

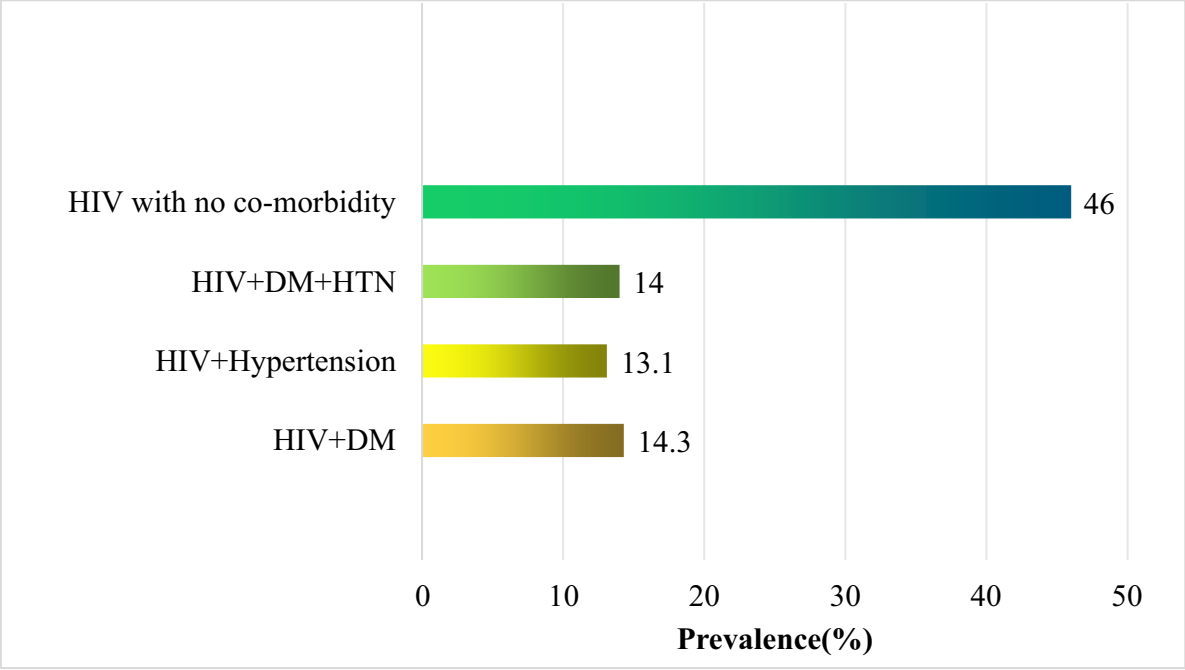

Figure 1. The prevalence of comorbidities (diabetes and hypertension) among older populations living with HIV in Eastern Uganda.

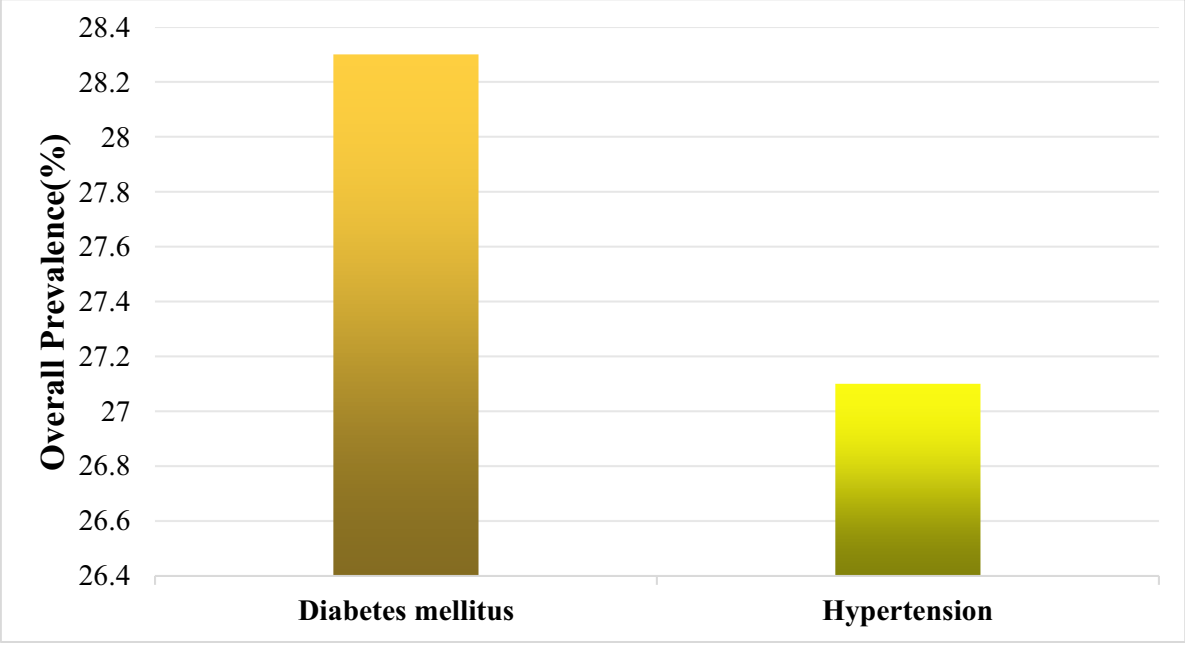

Figure 2. Compares the overall prevalence rates of diabetes at 28.3%, hypertension at 27.1% among older adults living with HIV in Eastern Uganda.

Muslims formed a significant proportion of the dissatisfied participants (38.9%). Satisfaction rates were highest among participants with primary education (36.8%) and secondary education (31%), while dissatisfaction was more evenly distributed across education levels, with primary and secondary education each accounting for 50% and 16.7%, respectively. Married participants were more satisfied with care (63.5%). Non-admitted participants reported higher satisfaction (94%). Participants residing 3–5 km from

Table 3. Sociodemographic and clinical factors associated with diabetes mellitus and hypertension.

		DM		HTN	
Predictor	Subcategory	*p*-values	AOR (95%CI)	*p*-values	AOR (95%CI)
Age	50–54	*Ref*	*Ref*	*Ref*	*Ref*
	2. Above 64	0.251	16.61(0.14–2,006.51)	**0.029**	225.32(1.27–3.19)
Gender	Female	*Ref*	*Ref*	*Ref*	*Ref*
	2. Male	0.123	7.14(0.59–87.06)	0.645	0.55(0.04–7.00)
Tribe	Bamasaaba	*Ref*	*Ref*	*Ref*	*Ref*
	2. Ateso	0.181	0.11(0.00–2.79)	0.126	32.26(0.38–2,763.38)
	3. Bagwere	0.691	0.48(0.01–18.06)	**0.048**	1.79(0.84–3.82)
	4. Baganda	0.49	2.82(0.15–53.33)	0.098	53.90(0.48–6,076.18)
	5. Basoga	**0.023**	2.1(1.2–2.37)	0.043	1.34(1.13–3.0)
	6. Others	0.784	0.65(0.03–13.89)	0.422	15.01(0.02–11,160.21)
Level of education	None	*Ref*	*Ref*	*Ref*	*Ref*
	2. Primary	0.979	1.04(0.07–15.61)	0.146	12.06(0.42–347.35)
	3. Secondary	0.237	5.15(0.34–77.96)	0.052	36.98(0.97–1,408.17)
	4. Tertiary	0.629	2.63(0.05–133.12)	0.114	28.49(0.45–1,811.35)
Religion	Anglican	*Ref*	*Ref*	*Ref*	*Ref*
	2. Pentecostal	0.125	0.06(0.00–2.18)	0.453	4.44(0.09–218.40)
	3. Catholic	0.56	1.94(0.21–18.07)	0.133	42.79(0.32–5,715.90)
	4. Moslem	0.266	3.74(0.37–38.36)	0.307	10.42(0.12–938.39)
Marital status	Divorced	*Ref*	*Ref*	*Ref*	*Ref*
	2. Married	0.836	1.36(0.07–24.79)	0.924	1.17(0.04–30.79)
	3. Single	0.212	0.02(0.00–9.48)		1.00(0.00–0.00)
	4. Widowed	0.956	1.09(0.05–23.57)	0.194	9.49(0.32–282.54)
Years lived with HIV		0.997	1.00(0.65–1.54)	0.529	0.85(0.51–1.41)
Patient on ART	No	*Ref*	*Ref*	*Ref*	*Ref*
	Yes	0.613	0.02(0.00–64,719.68)	0.728	0.08(0.00–140,253.20)
Years spent on ART		0.281	0.79(0.51–1.21)	0.952	0.99(0.62–1.58)
Numbers of times changed ART	Never	*Ref*	*Ref*	*Ref*	*Ref*
	1	0.088	19.57(0.64–599.14)	0.914	1.16(0.08–17.95)
	2	0.078	31.94(0.68–1,496.90)	0.466	2.90(0.17–50.81)
	3 and more	0.185	6.69(0.40–111.09)	**0.015**	2.55(1.08–4.73)
Physical limitation	No	*Ref*	*Ref*	*Ref*	*Ref*
	Yes	0.927	1.12(0.10–13.24)	0.576	0.44(0.03–7.68)
Marginalised population	No	*Ref*	*Ref*	*Ref*	*Ref*
	Yes	0.348	13.21(0.06–2,901.24)		1.00(0.00–0.00)
Distance health facility	0–2 km	*Ref*	*Ref*	*Ref*	*Ref*
	2. 3–5 km	0.249	3.36(0.43–26.38)	0.526	3.79(0.06–234.03)
	3. 6–10 km	**0.044**	5.46(1.12–2.54)	0.258	9.90(0.19–524.78)
	4. >10 km	0.369	0.15(0.00–9.13)	0.12	64.04(0.34–12,103.69)
Management plan	Documented	*Ref*	*Ref*	*Ref*	*Ref*
	3. Not documented	0.912	0.86(0.05–13.77)		1.00(0.00–0.00)
HTN	No	*Ref*	*Ref*		
	2. Yes	0.253	0.28(0.03–2.50)		
DM	No			0.218	0.23(0.02–2.39)
	2. Yes			*Ref*	*Ref*

the health facility were the most satisfied (53.6%). A significant proportion of participants (46.7%) who had lived with HIV for 15 years or more were satisfied with care.

Factors associated with patient satisfaction with care

Table 4B shows that patients aged 50–64 years had significantly higher crude odds of satisfaction with care compared to those aged 65 years and above (OR = 3.54, 95% CI: 1.21–10.36, $p = 0.021$). However, this association was not significant after adjustment ($p = 0.571$). Residence in Mbale had 4.42 times higher odds of being satisfied with healthcare than in Bukedea, but the results were not statistically significant before adjusting for other factors (cOR = 4.42, 95% CI: 0.98–19.97, $p = 0.054$), and there was no association after adjusting for other factors (aOR = 4.28, 95% CI: 0.70–26.36, $p = 0.116$). Gender, tribe, highest level of education, marital status, healthcare provider, religious affiliation, and distance from the healthcare facility were not associated with satisfaction. Patients without physical limitations were significantly more likely to report satisfaction with care compared to those with physical limitations, both in the crude analysis (OR = 6.14, 95% CI: 2.00–18.85, $p = 0.002$) and after adjustment (AOR = 7.45, 95% CI: 1.17–47.28, $p = 0.033$). Patients who were unable to pay for their health needs were significantly less likely to report satisfaction with care after adjustment compared to those who could afford their health needs (AOR = 4.73, 95% CI: 1.06–21.13, $p = 0.042$).

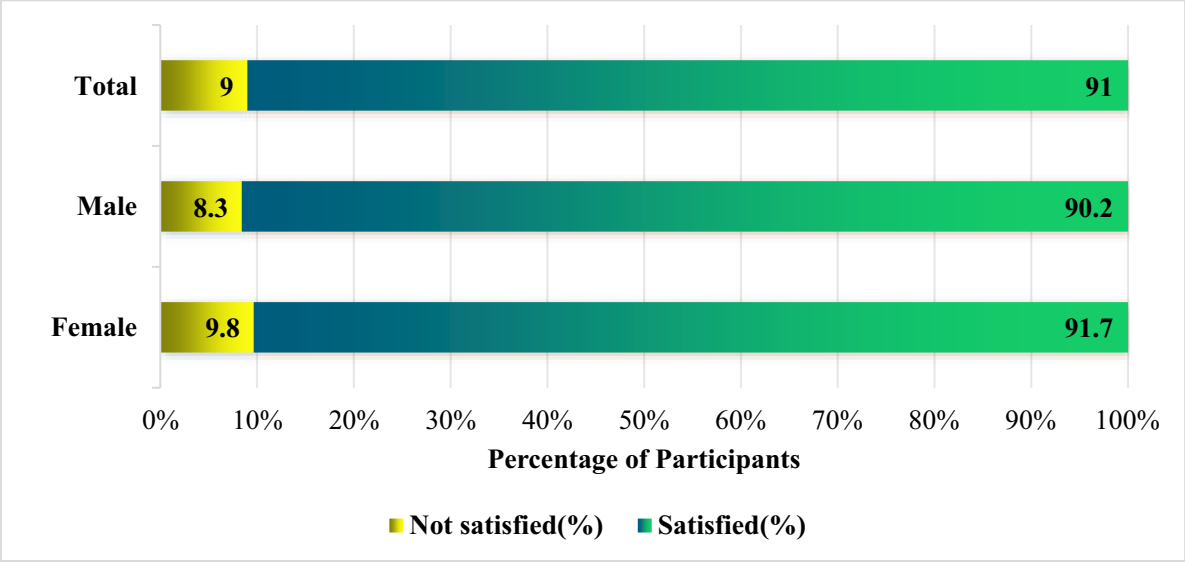

Figure 3. Percentage satisfaction among older HIV people living with HIV.

Discussion

The findings from this study show that DM (28.3%) and HTN (27.1%) are highly prevalent in HIV-positive patients aged 50 years and above at Mbale Regional Referral Hospital. These findings agree with evidence in the literature, especially within African countries with high HIV prevalence, in which, owing to improved HIV care resulting from ART, life expectancy has increased, thus increasing age-related risks for comorbidities [9]. Diabetes was more prevalent among females (61.9%), while hypertension was more common among males (60.6%). Both conditions were significantly more common in participants aged ≥64 years, with 70.8% of diabetes and 71.2% of hypertension cases occurring in this age group. These findings agree with other studies conducted in similar settings, indicating increased metabolic disorders [10] in older HIV patients on long-term ART. Studies in South Africa have reported a diabetes prevalence of 20.4% and a hypertension prevalence of 50.2% among HIV-positive individuals aged ≥50 years [11,12]. Similarly, research in Kenya revealed that 5%–10% of HIV-positive individuals aged ≥50 years had diabetes, and 20% had hypertension [13,14]. These findings may be attributed to the combined effects of ageing, chronic inflammation due to HIV, and the metabolic side effects of ART, which include insulin resistance and dyslipidaemia [15]. These studies align with our findings, reinforcing the increasing burden of non-communicable diseases (NCDs) among ageing populations with HIV.

Our study revealed that diabetes was more prevalent in females, whereas hypertension was more common in males. Similar trends have been reported in studies from Uganda [16] and other African countries with high HIV prevalence [11,13]. The higher prevalence of diabetes among females may be attributed to hormonal differences, higher obesity rates, and metabolic changes linked to prolonged ART use [17]. Meanwhile, the higher prevalence of hypertension among males aligns with findings from Tanzania, where men were found to have a 35% higher risk of hypertension due to factors such as smoking, alcohol consumption, and lower healthcare-seeking behaviours [18]. In addition, age was a significant factor in our study, with older participants (≥64 years) being more likely to have both diabetes and hypertension. This finding is consistent with global research, as ageing has been widely recognised as a major risk factor for these NCDs [19,20]. Studies among older adults with HIV revealed that individuals aged ≥65 years had a 1.5 times higher risk of developing diabetes and a 2.2 times higher risk of hypertension compared to those aged 50–64 years [21,22]. This highlights the need for targeted screening and early intervention strategies in this population.

Our study further revealed that participants who had changed ART regimens three or more times had a significantly higher risk of hypertension (AOR: 55.31, $p = 0.015$). This finding is supported by another previous study in which patients on second-line or multiple ART regimens had an increased likelihood of

Table 4A. Showing patient satisfaction with care among older adults living with HIV in Eastern Uganda.

Patient satisfaction with care	No $n = 36$	Yes $n = 364$	Total $n = 400$
Gender			
Female	17(47.2)	189(51.9)	206(51.5)
Male	19(52.8)	175(48.1)	194(48.5)
Age (years)			
50–64	13(36.1)	156(42.9)	169(42.3)
Above 64	23(63.9)	208(57.1)	231(57.8)
Occupation			
Civil servant	2(5.6)	34(9.3)	36(9)
Private sector worker	4(11.1)	87(23.9)	91(22.8)
Peasant	30(83.3)	235(64.6)	265(66.3)
Unemployed	0	8(2.2)	8(66.3)
Tribe			
Bamasaba	26(72.2)	221(60.7)	247(61.8)
Ateso	4(11.1)	27(7.4)	31(7.8)
Bagwere	0	32(8.8)	32(8)
Baganda	2(5.6)	25(6.9)	27(6.8)
Basoga	2(5.6)	21(5.8)	23(5.8)
Others	2(5.6)	38(10.4)	40(10)
Religion			
Anglican	8(22.2)	158(43.4)	166(41.5)
Pentecostal	4(11.1)	32(8.8)	36(9)
Catholic	10(27.8)	107(29.4)	117(29.3)
Moslem	14(38.9	66(18.1)	80(20)
Others	0	1(0.3)	1(0.3)
District			
Mbale	24(66.7)	190(52.2)	214(53.5)
Sironko	0	30(8.2)	30(7.5)
Budaka	2(5.6)	26(7.1)	28(7)
Pallisa	2(5.6)	8(2.2)	10(2.5)
Bukedea	2(5.6)	26(7.1)	14(3.5)
Others	6(16.7)	98(26.9)	104(26)
Level of education			
None	6(16.7)	71(19.5)	77(19.3)
Primary	18(50)	134(36.8)	152(38)
Secondary	6(16.7)	113(31)	119(29.8)
Tertiary	6(16.7)	46(12.6)	52(13)
Marital status			
Divorced	12(33.3)	24(6.6)	36(9)
Married	12(33.3)	231(63.5)	243(60.8)
Single	2(5.6)	20(5.5)	22(5.5)
Widowed	10(27.8)	89(24.5)	99(24.8)
Admission status			
Admitted	10(27.8)	22(6)	32(8)
Not admitted	26(72.2)	342(94)	368(92)
Distance from health facility			
1–2 km	16(44.4)	127(34.9)	143(35.8)
3–5 km	14(38.9	195(53.6)	209(52.3)
6–10 km	6(16.7)	42(11.5)	48(12)
Years living with HIV			
0–4	2(5.9)	36(9.9)	38(9.5)
5–9	0	42(11.5)	42(10.6)
10–14	10(29.4)	116(31.9)	126(31.7)
>= 15	22(64.7)	170(46.7)	192(48.2)

hypertension due to prolonged exposure to protease inhibitors and integrase inhibitors, which are associated with metabolic changes and insulin resistance [21]. Frequent ART regimen changes may indicate treatment failure, drug resistance, or intolerance, all of which can contribute to systemic inflammation and cardiovascular risks [23,24].

Peasants are the most affected occupational group, aligning with studies in other low-resource settings where limited access to healthcare, poor nutrition, and physically demanding work contribute to high NCD burdens [25]. Additionally, our study revealed that living 6–10 km from a health facility was significantly associated with diabetes risk (AOR: 54.46, $p = 0.044$). Similar studies in Malawi and Ethiopia reported that patients who reside more than 5 km from clinics or hospitals have a higher likelihood to develop uncontrolled diabetes due to irregular follow-up and medication non-adherence [26,27]. The

Table 4B. Bivariate and multivariable logistic regression analysis of the factors associated with patient satisfaction with care.

Patient satisfaction with the healthcare received				
Independent variables	*p*-values	Crude odds ratios (95% CI)	*p*-values	Adjusted odds ratios (95% CI)
Age (years)				
50–64	**0.021**	3.54(1.21–10.36)	0.571	1.53(0.35–6.60)
65 and above	*Ref*	*Ref*	*Ref*	*Ref*
Gender				
Female	0.377	1.55(0.59–4.11)		
Male	*Ref*	*Ref*		
Tribe				
Bamasaba	0.596	1.55(0.31–7.74)		
Ateso	*Ref*	*Ref*		
Baganda	0.714	1.60(0.13–19.84)		
Basoga	0.96	1.07(0.08–13.65)		
Others	0.785	1.33(0.17–10.58)		
District of residence				
Mbale	**0.054**	4.42(0.98–19.97)	0.116	4.28(0.70–26.36)
Budaka	0.751	1.38(0.19–9.83)	0.978	1.04(0.07–16.09)
Pallisa	*Ref*	*Ref*	*Ref*	*Ref*
Bukedea				
Others	0.554	1.57(0.35–7.01)	0.756	0.74(0.11–4.91)
Level of education				
None	0.26	2.77(0.47–16.27)		
Primary	0.417	1.74(0.45–6.68)		
Secondary	0.676	1.33(0.35–5.14)		
Tertiary	*Ref*	*Ref*		
Religion				
Anglican	0.882	1.13(0.22–5.81)		
Catholic	0.964	1.04(0.19–5.64)		
Moslem	0.44	2.24(0.29–17.22)		
Others	*Ref*	*Ref*		
Marital status				
Married	0.258	2.24(0.55–9.07)		
Single	0.518	2.20(0.20–24.09)		
Widowed	0.285	2.40(0.48–11.95)		
Divorced	*Ref*	*Ref*		
Number of times changed ART				
0	*Ref*	*Ref*	*Ref*	*Ref*
1	0.233	2.76(0.52–14.60)	0.675	1.52(0.22–10.69)
2	0.378	1.82(0.48–6.95)	0.256	2.71(0.49–15.13)
3 and more	**0.077**	3.68(0.87–15.55)	0.127	4.10(0.67–25.04)
Physical limitation				
No	**0.002**	6.14(2.00–18.85)	**0.033**	7.45(1.17–47.28)
Yes	*Ref*	*Ref*	*Ref*	*Ref*
Coming from a marginalised area				
No	**0.097**	10.88(0.65–181.84)	0.108	15.31(0.55–427.79)
Yes	*Ref*	*Ref*	*Ref*	*Ref*
Distance from the health facility				
Less than 1 km	*Ref*	*Ref*		
1–2 km	0.435	1.97(0.36–10.85)		
3–5 km	0.222	2.93(0.52–16.53)		
6–10 km	0.812	1.27(0.18–8.87)		
Health provider				
Clinical officer	0.724	1.27(0.34–4.68)		
Nurse	0.31	1.96(0.53–7.18)		
Doctor	*Ref*	*Ref*		
Care transition				
None	**0.002**	5.79(1.88–17.76)	0.875	1.16(0.18–7.39)
Hospital to home	*Ref*	*Ref*	*Ref*	*Ref*
Financial accessibility				
Able to pay for health needs	0.366	0.62(0.22–1.75)	*Ref*	*Ref*
Unable to pay for health needs	*Ref*	*Ref*	**0.042**	4.73(1.06–21.13)

Bagisu ethnic group had the highest proportion of both diabetes and hypertension cases, while the Bagwere had a significantly higher likelihood of hypertension compared to the Bagisu (AOR: 138.93, $p = 0.048$). Ethnic and regional differences in the prevalence of hypertension and diabetes have been reported in several African settings. In Uganda, national STEPS survey data and subsequent analyses demonstrate significant geographic variation in hypertension and diabetes prevalence across regions, including Eastern Uganda [28,29]. Such variations in these studies have been attributed to different lifestyle patterns and dietary practices, socioeconomic status, urbanisation level, and healthcare access. Although ethnicity per se

has not been substantially studied as an independent determinant of NCDs in Uganda, regional clustering of cardiometabolic risk factors would suggest that population-level differences similar to those reported in Nigeria [30] may also exist in the Ugandan context. Our findings of differential odds of diabetes and hypertension across ethnic groups warrant further investigation, which may be reflective of underlying sociocultural, environmental, or genetic influences.

Patient satisfaction with care is crucial in this special population of patients on lifelong medication, as it determines multiple crucial factors, such as adherence [31]. In this study, patient satisfaction was primarily associated with modifiable, structural and socioeconomic factors, including financial accessibility and the absence of physical limitations, rather than inferring direct effects on adherence or long-term clinical outcomes. Our findings highlight tangible health system constraints affecting older adults living with HIV in Eastern Uganda. Financial barriers likely reflect ongoing out-of-pocket expenditures for transport, medications for comorbid NCDs, and other indirect costs of care. Similarly, physical limitations may restrict mobility and clinic attendance, particularly in semi-rural settings where public transport is limited. These findings underscore the need for locally actionable interventions such as strengthened integration of NCD and HIV services, decentralisation of care to lower-level facilities, community-based follow-up for mobility-impaired patients, and targeted financial risk protection mechanisms for older adults. Addressing these structural barriers may improve the patient experience within the existing health system. Our study revealed that participants aged 50–64 years had significantly higher crude odds of satisfaction with care compared to those aged 65 years and above. This pattern is consistent with findings from a study conducted in Ethiopia, where mid aged adults reported higher satisfaction levels due to their better health-seeking behaviour and fewer age-related comorbidities [32]. However, a study in South Africa showed that satisfaction levels increased with age, with those above 65 years reporting higher satisfaction due to their increased reliance on healthcare services [33]. The discrepancy between our findings and those from South Africa may be attributed to differences in healthcare infrastructure and support systems for older HIV patients.

The inability to pay for health needs was a significant predictor of dissatisfaction in our study, with those unable to afford healthcare being 4.73 times less likely to report satisfaction. Similar findings were reported in Kenya, where financial constraints were a major barrier to accessing quality healthcare among older adults living with HIV [34]. Studies in high-income settings such as the United States suggest that financial barriers are less of a determinant due to widespread health insurance coverage, highlighting the importance of economic factors in low-resource settings [35].

Patients without physical limitations had significantly higher satisfaction with care, even after adjustment for other factors (AOR = 7.45, $p = 0.033$). This finding is consistent with a study in Malawi, where physical disability was associated with lower satisfaction due to mobility challenges and difficulty accessing healthcare facilities [36]. Studies have reported that specialised care for physically disabled patients improves their satisfaction levels [36]. This suggests that targeted interventions for patients with mobility challenges could enhance their satisfaction levels.

Our findings indicate that married participants had the highest levels of satisfaction with care (63.5%), whereas divorced individuals were overrepresented among the dissatisfied group (33.3%). Research indicates that marital status significantly influences the level of social support received by people living with HIV. Marital status, along with monthly income and receipt of univariate therapy, were factors influencing the total score for social support among people living with HIV [37]. This suggests that married individuals may experience greater social support, which can positively impact their satisfaction with HIV care.

Participants residing 3–5 km from healthcare facilities had the highest satisfaction levels (53.6%), while those living 1–2 km had the highest dissatisfaction rates (44.4%). This contrasts with other findings, where proximity to healthcare facilities was positively associated with satisfaction due to reduced transportation costs and travel time [38], one possible explanation for our findings is that those living closer to healthcare facilities may have higher expectations and, consequently, greater dissatisfaction when those expectations are unmet.

Limitations of this study include the following: this was a cross-sectional study design, and data were captured at a single point in time, making it difficult to establish causality between patient satisfaction and associated factors. The use of structured questionnaires relies on participants' self-reported experiences, which can introduce recall bias or social desirability bias. Furthermore, the study was conducted at a single hospital (Mbale Regional Referral Hospital), limiting the applicability of the findings to other regions or healthcare facilities in Uganda. Although random selection was employed, only individuals who were

present and willing to participate were included, potentially excluding those with severe illness, mobility challenges, or other barriers to participation.

This study may have underestimated the true prevalence of hypertension (HTN) and diabetes mellitus (DM) among the study population, as confirmatory diagnostic procedures (such as repeated blood pressure measurements, fasting blood glucose testing, or HbA1c assessment) were not performed at the time of study assessment. Reliance on documented diagnoses and/or self-reported history may have resulted in under-detection of undiagnosed or asymptomatic cases. Therefore, the reported prevalence may not fully reflect the actual burden of metabolic non-communicable diseases in this population. Furthermore, a small proportion of participants (7.8%) were enroled while admitted, which may have introduced heterogeneity, as inpatient experiences and illness severity can differ from ambulatory patients. Although admission status was not independently associated with primary outcomes, residual confounding due to differences in the care context cannot be entirely excluded.

Another limitation of this study is the absence of an appropriate control group. The inclusion of a comparable HIV-negative or general outpatient population within the same hospital setting would have strengthened the comparative analysis and allowed for a more robust interpretation of the observed prevalence of hypertension (HTN) and diabetes mellitus (DM). Without a control group, causal inferences and direct comparisons to non-HIV populations cannot be made. Therefore, the findings should be interpreted within the context of this methodological constraint.

Conclusion

Our study confirms that diabetes and hypertension are highly prevalent among older adults living with HIV, with significant associations with age, gender, occupation, ethnicity, ART regimen changes, and distance from healthcare facilities. These findings are consistent with other studies in African countries with high HIV prevalence and globally, underscoring the importance of integrating NCD management into HIV care. Future research should explore the genetic and environmental factors influencing these conditions and evaluate interventions to improve long-term health outcomes for this vulnerable population. Furthermore, the study underscores the multifaceted nature of patient satisfaction with HIV care among older adults in Eastern Uganda. The key determinants of satisfaction include financial stability, physical health status, and marital status. While some findings align with studies conducted in other African settings, variations exist due to differences in healthcare systems, cultural contexts, and socioeconomic conditions. Addressing financial barriers, improving accessibility for physically disabled patients, and enhancing inpatient care experiences could significantly improve satisfaction levels. Future research should explore qualitative insights into patient experiences to provide a more comprehensive understanding of the factors influencing satisfaction.

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Author contributions

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Data availability statement

All the data are available in this article.

Ethics approval statement

The study was approved by the Busitema University Faculty of Health Sciences Research Ethics Committee (BUFHS-REC) under approval number BUFHS-2023-142. Additional administrative clearance was obtained from the the study facilities. Informed consent was obtained from all the study participants, who were informed that their participation was voluntary and that they could withdraw at any time without any consequences. The study strictly adhered to the ethical principles governing human research, as outlined in the Declaration of Helsinki.

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