

Factors Associated with Non-Adherence to Antiretroviral Therapy: A Health-Facility-Based Cross-Sectional Study in the Amahlathi Sub-District of the Eastern Cape, South Africa

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Introduction: The Joint United Nations Programme on HIV and AIDS (UNAIDS) aims for 95% ART adherence to achieve global viral suppression against HIV/AIDS, which is a major health issue worldwide, especially in southern Africa. This study investigated ART non-adherence among adult HIV-positive clients in the Amahlathi sub-district of the Eastern Cape, South Africa.

Methods: A cross-sectional study of 400 HIV/AIDS-positive persons (PLWHA) was undertaken at multiple facilities. A Survey was used to collect data, while medical records were used to ascertain the viral load. Responses were captured on an ordinal adherence scale and triangulated with viral load records from patient files. Univariate, bivariate, and multiple logistic regression analyses were performed to determine factors associated with ART non-adherence, and 95% CIs reported.

Results: The ART non-adherence rate was 28%. In the bivariate analysis (odds ratio [OR]), living with children (OR = 2.59), living with parents (OR = 4.12), alcohol use (OR = 2.08), HIV non-disclosure to family (OR = 0.31), non-sharing of HIV status to partner (OR = 0.41), staying with partners (OR = 0.41), taking treatment regimen II (OR = 5.74), taking ART doses twice a day (OR = 4.80), use of traditional medicine (OR = 2.83), and missed dosage (OR = 3.98) were associated with non-ART adherence. Multivariate analysis revealed that young age (<30–40 years) (AOR = 0.95; 95% CI: 0.93–0.98), female sex (AOR = 0.41; 95% CI: 0.21–0.77), partner HIV disclosure (AOR = 0.49; 95% CI: 0.26–0.92), and use of traditional medicine (AOR = 2.45; 95% CI: 1.05–5.68) were independent predictors of ART adherence.

Conclusion: ART adherence remains below UNAIDS targets in the study area. Tailored interventions that address traditional medicine use, strengthen partner disclosure support, and provide adherence counseling for young adults and men are urgently needed. Future programs could integrate digital adherence monitoring and reminder systems as practical tools to enhance treatment outcomes.

Keywords: Antiretroviral therapy, adult HIV, factors, non-adherence, South Africa

Introduction

HIV/AIDS remains a global public health issue with high mortality worldwide. As of 2022, 39.0 million [33.1–45.7 million] people were living with HIV/AIDS (PLWHA), with 630 000 [480 000–880 000] HIV-related deaths and 29.8 million on antiretroviral therapy (ART)¹. An estimated 570 000 PLWHA on ART will achieve viral load suppression to meet the 95% target set by the Joint United Nations Programme on HIV and AIDS (UNAIDS).¹ The HIV burden is more severe in developing nations, particularly Sub-Saharan Africa (SSA), where 25.6 million [21.6–30.0 million] PLWHA existed in 2022, with 20.9 million (82%) on ART, 76% achieving viral suppression, and 380 000 [300 000–540 000] HIV deaths, showing a 56% reduction from 2010.¹

South Africa has the greatest number of PLWHA in the world. At the end of 2022, 17.8% of South Africans were living with HIV/AIDS, with 11.9–23.2% on ART.¹ Despite a declining trend, HIV/AIDS mortality in South Africa remains high, with an estimated 85796 deaths in 2022.² The high incidence of HIV/AIDS prompted aggressive and coordinated comprehensive projects or initiatives to ameliorate the escalating HIV epidemic, enhance the quality of life of PLWHA, and minimise its mortality in the country. These efforts include free healthcare for citizens and non-citizens alike, Universal Test and Treat (UTT), extensive rollout and free ART in public health services, and free HIV counselling in health institutions to assist clients with HIV/AIDS-related health issues.

The government launched fixed dose combination (FDC), NGO engagement in HIV/AIDS programmes, and various differentiated ART delivery models, including facility- and community-based adherence clubs, pharmacy pick-up and community-based pick-up;^{3,4} these initiatives aim to improve healthcare for PLWHA. Despite government efforts to enhance ART adherence in South Africa, adherence remains low 5–9. Poor ART adherence leads to financial burden through HIV transmission, morbidity, and mortality.⁵ ART significantly reduces viral loads in PLWHA but is not a cure for HIV/AIDS. To support UNAIDS' 95% viral suppression goal¹⁰, investigating low ART compliance across regions is essential. This will improve quality of life by reducing HIV-related deaths and healthcare costs.

Factors impacting non-adherence to ART are numerous and interactive, creating hurdles to adherence. These factors include socio-demographic, societal, economic, client, individual-level, and health system-related elements. Socio-demographic factors include younger age,^{6–8} low education,^{8–10} unemployment,^{6,11} urban residency,^{6,9,11} and marital status.^{5,7,10} Studies indicate poor adherence is less prevalent among females than males,^{17–20} though some find no gender difference.^{12,13} Internalised stigma^{6,14,15} and fear of disclosure^{5,24–26} are social factors affecting adherence. Economic barriers include food insecurity,^{6,9} lack of finances,^{13,16,17} and inadequate transportation.¹⁸ Client-related factors include alcohol misuse,^{5,8,14} forgetfulness^{5,8,16,17,19,20} and stress.⁵ Individual-level factors comprise lack of support,^{21–23} limited HIV knowledge,²² medication side effects,^{5,16,23,24} opportunistic infection,^{6,7,23} use of traditional medicines,^{18,25,26} belief in herbal medicine,^{20,27} and cultural-religious beliefs.^{5,12,27} Health system barriers include long waiting times,^{20,28} drug shortages,^{18,20} travel distances,^{18,25} and staff discrimination.^{15,18,25,29} PLWHA often experience rejection, hopelessness, anger, and fear due to prejudice.³⁰

Failure to maintain 95% ART adherence leads to poor clinical outcomes, treatment failures, and death; thus, identifying factors impeding adherence is crucial for appropriate interventions. While research exists on non-ART adherence factors in the Eastern Cape province,^{5,10,31,32} these factors operate differently even within the same setting, showing adherence's dynamic nature. The variation in adherence across geographic areas due to socioeconomic differences and service delivery changes requires continuous monitoring in diverse contexts.²⁰

Understanding specific context factors is essential to design appropriate interventions for improving ART uptake, adherence, and health outcomes for PLWHA. Critical factors like gender, knowledge deficits, and stigmatization require investigation to reduce HIV/AIDS infection. Effective ART adherence reduces healthcare burden and costs, highlighting the importance of exploring non-adherence causes across regions. This study aims to investigate factors associated with non-ART adherence among adult clients in the Amahlathi sub-district, Eastern Cape, South Africa, where such research is scarce.

Materials and Methods

Study Setting

The study was carried out in 2019 in four different primary care clinics in the Amahlathi Sub-District of South Africa's Eastern Cape Province. Nompumelelo Gateway, Peddie Extension, Stutterheim Town, and Bhele clinics were among them. The Eastern Cape Province has a population of 6.9 million people (about 15% of the national population) yet contributes just 7.5% of South Africa's GDP.³³ It is mostly rural, with a high rate of poverty and unemployment. Sixty-four percent of the population has an annual income of less than R9600.³⁴ In rural areas, particularly in former homelands Ciskei and Transkei, one-third of households are headed by women over the age of 65.

The Eastern Cape Province experiences a lack of productive economic activity, leaving the majority of the population reliant on social grants and remittances. Twenty-two percent of households receive social subsidies (most commonly child support). The HIV/AIDS pandemic is the greatest development concern for the province; families are more likely to spend their money on HIV/AIDS-related funerals.³⁴ HIV prevalence is estimated to be between 8% and 11% and the province ranks

sixth out of the nine provinces in terms of HIV prevalence, at 15.2%.³⁴ Adherence to antiretroviral medication (ART) is critical for attaining viral suppression in people living with HIV (PLHIV). In the Eastern Cape area of South Africa, studies have highlighted the influence of adherence on viral load levels.³⁵ Over three study waves, 37.1% of adolescents maintained ART adherence, while 62.9% showed inconsistent adherence.³⁶

Design, Population and Sampling

This is a cross-sectional study of 400 HIV/AIDS positive person (PLWHA) was undertaking at a multiple facility. Convenient sampling was used to select clinics including the participants. Inclusion criteria were adult clients, aged 18 and above, who had been on ART for at least six months, and registered in the high active antiretroviral therapy (HAART) programme at the study's selected health centres, comprised the study population. Individuals under the age of 18 were considered minors and excluded from the study because their adherence to ART would normally be dependent on an adult carer; furthermore, individuals on ART for less than six months were also excluded. Every month, 3600 people attend the four conveniently accessible clinics. With a 95% confidence level, a standard deviation of 0.5, and a confidence interval (margin of error) of $\pm 5\%$, a total sample of 385 is required. Participants who were approached while visiting health clinics and those who agreed to participate after being properly informed about the purpose and nature of the study were sampled. To account for attrition or incomplete or missing data, 15 samples were added to the 385 totaling 400 participants. A random sampling method was utilised to determine 100 participants from each clinic. Every second client was chosen from the daily appointment list until 400 were reached.

Measures

ART adherence was defined as $\geq 95\%$ adherence for optimal viral suppression, although newer regimens may still be effective with slightly lower adherence to prescribed antiretroviral therapy dosage and/or with a viral load less than 50 or less than detectable limits (LTDL). Non-adherence, on the other hand, was defined as $\geq 90\%$ as set by the Pharmacy Quality Alliance.³⁷

Covariates and Other Measurements

Participants' socio-demographic data, including age, gender, educational level, marital status, employment status, number of households, and HIV sharing status, were collected using a structured, closed-ended questions. Furthermore, the participants' social habits (health risk behaviour characteristics) such as smoking status, alcohol usage, and sex partner were evaluated. Furthermore, knowledge on HIV and ART was assessed by eliciting information from participants on whether ART can improve their quality of life and the negative effects of ART. In addition, the participants' VL was evaluated using their medical records/files.

Data Collection Procedure

The data were collected between 17 July and 15 November 2019. Appointments were scheduled with the clinic managers of the selected clinics prior to data collection days to secure authorization and data collecting spaces. The participants were approached and briefed with details about the purpose and nature of the study. Participants who agreed to participate in the study received an informed consent form to sign. The surveys were hand-delivered to participants at a secure location at the health facility. The surveys were completed by the participants and collected on the spot. Participants who had difficulty answering the questionnaire due to lack of literacy capacity were assisted accordingly without prompting. In total, 400 participants took part in the study. All participants received standardized training on the study objectives, administration of the structured questionnaire, maintaining confidentiality, and minimizing interviewer bias.

Data Analysis

Descriptive analysis of frequencies, percentages and means/standard deviations were performed for the categorical variables. A two-sample t-tests and χ^2 tests were used for continuous and categorical variables, respectively. Bivariate analyses and multiple logistic regression were performed to calculate crude and adjusted odds ratios at 95% confidence intervals for the factors associated with non-adherence to ART. All analyses were conducted using the Statistical Package for the Social Sciences ((SPSS) 25.0, IBM SPSS, Chicago, Illinois, USA). P values less than 0.05 were considered statistically significant.

Results

The median age was 46 years, with an interquartile range (IQR) of 35–56 years. Of the 400 HIV-positive clients, 28% (n=112) had a viral load above the undetectable limit of 50 copies/uL of blood, indicating that they were unlikely to adhere to ART (Figure 1).

Table 1 shows the participants' socio-demographic characteristics. The majority of the participants were females (75.75%), single (68.75%), had completed secondary school (66.25%), and were unemployed (71.43%). Of the participants (27.75%) had one child and were living with their parents (33.5%). Almost half of the participants (46.25%) lived at least 5 km distant from the clinic and used public transport to attend the clinic (52.25%).

The bivariate analysis revealed that age ($p=0.0001$), female gender ($p=0.001$), marital status (single) ($p=0.048$) and living arrangement (those living with parents) ($p=0.002$) were all significantly associated with ART adherence status. Alcohol consumption was significantly associated with ART adherence status ($p=0.005$); nevertheless, the majority of participants (86.25%) were neither smokers nor drinkers (59.25%) (Table 1).

HIV Disclosure to Family and Sexual History

Table 2 displays the participants' HIV disclosure status and sexual history. The majority of the participants revealed their HIV status to their families (93%) and partners (56.5%). Regarding treatment support, an overwhelming majority of the participants indicated the need for treatment help from their homes (93.8%) and reported having several sexual partners (81.3%); however, a significant proportion of them were not in a committed relationship with their current partners (55.3%). There was a substantial statistical association ($p<0.05$) between HIV disclosure variables and ART adherence.

Table 3 summarises the participants' ART and HIV knowledge. The variables associated with ART adherence level knowledge were treatment regimen ($p<0.0001$), ART treatment medication time ($p=0.005$), use of traditional medication ($p=0.004$), and remedy after missing a dose ($p<0.0001$).

Table 4 shows the results of the univariate and multiple logistic regression analyses. The likelihood of non-adherence to ART reduces with age (Crude Odds Ratio [COR]=0.966; 95% CI: 0.95–0.98), and females were 56% less likely to non-adherent to ART than males (COR=0.44; 95% CI: 0.27–0.72). Furthermore, living with children (COR=2.59; 95% CI: 1.11–6.05) and living with parents (COR=4.12; 95% CI: 1.82–9.33) increased the risks of non-adherence to ART compared to those who lived with their spouses. However, after correcting for confounding factors in the logistic regression model analysis, only individuals who live with their children were more likely not to adhere to their ART. In addition, alcohol use was associated with an increased risk of non-adherence to ART as compared to those who did not

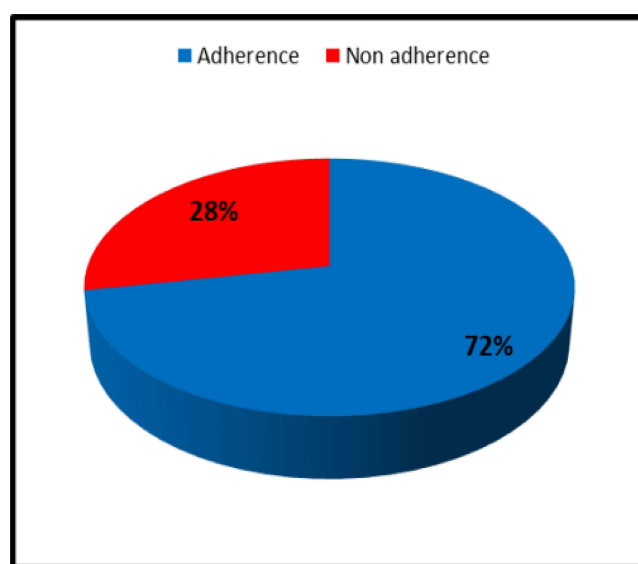


Figure 1 ART adherence defined by undetectable viral load cut off of 50 copies/uL.

Table 1 Participant's Socio-Demographic Characteristics Stratified by ART Status

Variables	Total (n=400) n (%)	Adherent (n=288) n (%)	Non-Adherent (n=112) n (%)	p-value
Age (years)				
<30	71 (17.75)	41 (14.2)	30 (26.8)	0.0001
31 – 40	80 (20.0)	53 (18.4)	27 (24.1)	
41 – 50	98 (24.5)	69 (24.0)	29 (25.9)	
51 – 60	100 (25.0)	83 (28.8)	17 (15.2)	
>60	51 (12.75)	42 (14.6)	9 (8.0)	
Gender				
Male	97 (24.25)	57 (19.79)	40 (35.71)	0.001
Female	303 (75.75)	231 (80.21)	72 (64.29)	
Marital status				
Single	275 (68.75)	188 (65.28)	87 (77.68)	0.048
Married	91 (22.75)	75 (26.04)	16 (14.29)	
Divorced	7 (1.75)	4 (1.39)	3 (2.69)	
Window	27 (6.75)	21 (7.29)	6 (5.36)	
Educational status				
None	11 (2.75)	10 (3.47)	1 (0.89)	0.181
Primary	88 (22.0)	69 (23.96)	19 (16.96)	
Secondary	265 (66.25)	185 (64.24)	80 (71.43)	
Tertiary	36 (9.0)	24 (8.33)	12 (10.71)	
Number of children				
None	59 (14.75)	38 (13.19)	21 (18.75)	0.513
One	111 (27.75)	77 (26.74)	34 (30.36)	
Two	99 (24.75)	73 (25.35)	26 (23.21)	
Three	54 (13.5)	40 (13.89)	14 (12.5)	
Four	43 (10.75)	35 (12.15)	8 (7.14)	
Five and above	34 (8.5)	25 (8.68)	9 (8.04)	
Employment status				
Unemployed	292 (73.0)	212 (73.61)	80 (71.43)	0.826
Employed full time	52 (13.0)	36 (12.5)	16 (14.29)	
Employed part time	36 (9.0)	27 (9.38)	9 (8.04)	
Self-employed	20 (5.0)	13 (4.51)	7 (6.25)	
Living arrangements				
Spouse	69 (17.25)	61 (21.18)	8 (7.14)	0.002
Children	118 (29.5)	88 (30.56)	30 (26.79)	
Parents	134 (33.5)	87 (30.21)	47 (41.96)	
Other	79 (19.75)	52 (18.06)	27 (24.11)	
Smoking status				
Yes	48 (12.0)	29 (10.07)	19 (16.96)	0.161
No	354 (86.25)	254 (88.19)	91 (81.25)	
Stopped	7 (1.75)	5 (1.74)	2 (1.79)	
Alcohol use				
Yes	152 (38.0)	96 (33.33)	56 (50.0)	0.005
No	237 (59.25)	185 (64.24)	52 (46.43)	
Stopped	11 (2.75)	7 (2.43)	4 (3.57)	
Distance to health facility from home				
<1 kilometre	34 (8.5)	24 (8.33)	10 (8.93)	0.145
1-3 kilometres	126 (31.5)	86 (29.86)	40 (35.71)	
4-5 kilometres	55 (13.75)	35 (12.15)	20 (17.86)	
5 or more kilometres	185 (46.25)	143 (49.0)	42 (37.50)	

(Continued)

Table 1 (Continued).

Variables	Total (n=400) n (%)	Adherent (n=288) n (%)	Non-Adherent (n=112) n (%)	p-value
Mode of transport to clinic				
Walking	174 (43.50)	117 (40.63)	57 (50.89)	0.235
Public transport	209 (52.25)	158 (54.86)	51 (45.54)	
Own transport	15 (3.75)	12 (4.17)	3 (2.68)	
Other	2 (0.50)	1 (0.35)	1 (0.89)	

Table 2 HIV Disclosure and Sexual History Stratified by ART Status

Variables	Total (n=400) n (%)	Adherent (n=288) n (%)	Non-Adherent (n=112) n (%)	p-value
HIV disclosure				
Yes	372 (93.0)	275 (95.49)	97 (86.61)	0.002
No	28 (7.0)	13 (4.51)	15 (13.39)	
Treatment support				
Yes	375 (93.75)	275 (95.49)	100 (89.29)	0.021
No	25 (6.25)	13 (4.51)	12 (10.71)	
Sexually active				
Yes	319 (79.75)	222 (77.08)	97 (86.61)	0.033
No	81 (20.25)	66 (22.92)	15 (13.39)	
Number of sexual partners				
None	4 (1.0)	2 (0.69)	2 (1.79)	0.049
One	71 (17.75)	59 (20.49)	12 (10.71)	
Two	25 (81.25)	227 (78.82)	98 (87.50)	
Currently staying with partner				
Yes	103 (25.75)	84 (29.17)	19 (16.96)	0.001
No	221 (55.25)	142 (49.31)	79 (70.54)	
Missing	76 (19.0)	62 (21.53)	14 (12.5)	
Partner type				
One	88 (22.0)	71 (24.65)	17 (15.18)	0.005
Two	234 (58.5)	154 (53.47)	80 (71.43)	
Missing	78 (19.5)	63 (21.88)	15 (13.39)	
Partner HIV status awareness				
Yes	226 (56.5)	171 (59.38)	55 (49.11)	0.001
No	98 (24.5)	55 (19.1)	43 (38.39)	
Do not know	76 (19.0)	62 (21.53)	14 (12.5)	

drink alcohol (COR =2.08; 95% CI: 1.32–3.26). Similarly, HIV disclosure to relatives was 69% less likely to non-adherent to ART than non-disclosure (COR=0.31; 95% CI: 0.14–0.67); shared HIV status with partners was 59% less likely to non-adherent to ART compared to those who failed to disclose (COR=0.41; 95% CI: 0.25–0.68). Additionally, those who current stayed with partners were 59% less likely not to adhere to ART compared to those who were not currently staying with their spouses (COR=0.41; 95% CI: 0.23–0.72).

Participants in regimen II were 5.74 times (95% CI: 2.25–14.62) more likely than those on regimen I not to adhere to ART. While participants on a twice-daily ART regimen were significantly more likely to be non-adherent compared to those on a once-daily regimen, with an adjusted odds ratio of 4.8 (95% CI: 1.25–18.42). This finding underscores the potential influence of dosing frequency on adherence behavior among patients. Participants who missed a dosage and took medication as soon as they realised (often the next day) had a higher risk of non-adherence than those who took

Table 3 Participants' Knowledge About HIV and ART

Variables	Total (n=400) n (%)	Adherent (n=288) n (%)	Non-Adherent (n=112) n (%)	p-value
Treatment regimen				
Regimen I	379 (94.75)	281 (97.57)	98 (87.50)	<0.0001
Regimen II	21 (5.25)	7 (2.43)	14 (12.5)	
ART side effects awareness				
Yes	143 (35.75)	105 (36.46)	38 (33.93)	0.635
No	257 (64.25)	183 (63.54)	74 (66.07)	
How often one takes ART				
Once daily	21 (5.25)	16 (5.56)	5 (4.46)	0.005
Twice daily	20 (5.0)	8 (2.78)	12 (10.71)	
Once at night	359 (89.75)	264 (91.67)	95 (84.82)	
ART dosage knowledge				
Yes	393 (98.25)	283 (98.26)	110 (98.21)	0.973
No	7 (1.75)	5 (1.74)	2 (1.79)	
Use of traditional medicine				
Yes	32 (8.0)	16 (5.56)	16 (14.29)	0.004
No	368 (92.0)	272 (94.44)	96 (85.71)	
HIV cure				
Yes	78 (19.5)	51 (17.71)	27 (24.11)	0.147
No	322 (80.5)	237 (82.29)	85 (75.89)	
Food security				
Yes	380 (95.0)	274 (95.14)	106 (94.64)	0.838
No	20 (5.0)	14 (4.86)	6 (5.36)	
Missed dose remedy				
Take dose soon if on time	292 (73.0)	230 (79.86)	62 (55.36)	<0.0001
Take dose same time	23 (5.75)	17 (5.90)	6 (5.36)	
Wait for next dose	85 (21.25)	41 (14.24)	44 (39.29)	
Knowledge of treatment interruptions				
Yes	249 (62.25)	185 (64.24)	64 (57.14)	0.189
No	151 (37.75)	103 (35.76)	48 (42.86)	
Medical information				
Always	144 (36.0)	106 (36.81)	38 (33.93)	0.296
Seldom	253 (63.25)	181 (62.85)	72 (64.29)	
Never	3 (0.75)	1 (0.35)	2 (1.79)	

Abbreviation: ART, antiretroviral therapy.

Table 4 Univariate and Multiple Logistic Regression Analyses of Factors Associated with ART Non-Adherence

Variables	Non-Adherent n (%)	Univariate	Multivariate
		COR (95% CI)	AOR (95% CI)
Age			
<30-40 years	53 (48.62)	(reference)	0.95 (0.93–0.98)
41-60 years	56 (51.38)	0.96 (0.95–0.98)	
Gender			
Male	40 (35.21)	(reference)	1 (reference)
Female	72 (64.29)	0.44 (0.27–0.72)	0.41 (0.21–0.77)

(Continued)

Table 4 (Continued).

Variables	Non-Adherent n (%)	Univariate	Multivariate
		COR (95% CI)	AOR (95% CI)
Marital status			
Single	87 (77.68)	(reference)	
Married	16 (14.29)	0.46 (0.25–0.83)	
Divorced	3 (2.69)	1.62 (0.36–7.39)	
Widowed	6 (5.36)	0.62 (0.24–1.58)	
Number of children			
None	21 (18.75)	(reference)	1 (reference)
One	34 (30.36)	0.79 (0.41–1.56)	1.76 (0.76–4.06)
Two	26 (23.21)	0.64 (0.32–1.29)	1.78 (0.73–4.32)
Three	14 (12.5)	0.63 (0.32–1.42)	3.40 (1.10–10.45)
Four	8 (7.14)	0.41 (0.16–1.05)	2.44 (0.69–8.66)
Five and above	9 (8.04)	0.65 (0.25–1.65)	4.19 (1.11–15.89)
Living arrangement			
Spouse	8 (7.14)	(reference)	1 (reference)
Children	30 (26.78)	2.59 (1.11–6.05)	3.15 (1.15–8.66)
Parents	47 (41.96)	4.12 (1.82–9.33)	2.71 (0.94–7.71)
Other	27 (24.11)	3.96 (1.66–9.46)	3.47 (1.19–10.17)
Alcohol use			
Yes	56 (50.0)	(reference)	
No	52 (46.43)	2.08 (1.32–3.26)	
Stopped	4 (3.57)	2.03 (0.57–7.21)	
HIV disclosure			
Yes	97 (86.61)	(reference)	1 (reference)
No	15 (13.39)	0.31 (0.14–0.67)	0.39 (0.15–1.06)
Treatment support			
Yes	100 (89.29)	(reference)	
No	12 (10.71)	0.39 (0.17–0.89)	
Staying with a partner			
Yes	19 (16.96)	(reference)	
No	79 (70.54)	0.41 (0.25–0.68)	
Partner aware of HIV status			
Yes	55 (49.11)	(reference)	1 (reference)
No	43 (38.39)	0.41 (0.25–0.68)	0.49 (0.26–0.92)
Do not know	14 (12.5)	0.29 (0.14–0.58)	0.31 (0.14–0.72)
Treatment regimen			
Regimen I	98 (87.50)	(reference)	
Regimen II	14 (12.5)	5.74 (2.25–18.42)	
Frequency of ART intake			
Once daily	5 (4.46)	(reference)	
Twice daily	12 (10.71)	4.80 (1.25–18.42)	
Once at night	95 (84.29)	1.15 (0.41–3.23)	
Use of traditional medicine			
Yes	16 (14.29)	(reference)	1 (reference)
No	96 (85.71)	2.83 (1.36–5.89)	2.45 (1.05–5.68)
Missed dose remedy			
Take dose soon if on time	62 (55.36)	(reference)	1 (reference)
Take dose when remember	6 (5.36)	1.31 (0.49–3.46)	5.06 (1.71–14.97)
Wait for next dose	44 (39.29)	3.98 (2.39–6.63)	2.78 (0.42–18.45)

Abbreviations: COR, Crude odds ratio; CI, confidence interval; AOR, adjusted odds ratio; ART, antiretroviral therapy.

their dose as soon as they remembered, if not on time (COR=3.98; 95% CI: 2.39–6.63). Furthermore, those who used traditional medicine were 2.83 times (95% CI: 1.36–5.89) more likely to not adhere to ART than those who did not.

In the multiple regression analysis, a one-year increase in age reduced the chance of non-adherence on ART by 5% (Adjusted Odds Ratio [AOR] = 0.95; 95% CI: 0.93–0.98). Females were 59% less likely to non-adherent to ART than males (AOR = 0.41; 95% CI: 0.21–0.77). Participants who had three children (AOR=3.40; 95% CI: 1.10–10.45) and four children (AOR = 4.19; 95% CI: 1.11–15.89) had higher odds of non-adherence to ART than those who did not have children. Moreover, individuals who lived with children had a greater risk of non-adherence to ART than those who lived with their spouses (AOR = 3.15; 95% CI: 1.15–8.66). Similarly, those who disclosed their HIV status to their partners were 51% less likely not to adhere than those who did not (AOR=0.49; 95% CI: 0.26–0.92). Individuals who used traditional medicine were 2.45 times (95% CI: 1.05–5.68) more likely to fail to adhere to ART than those who did not.

Discussion

In designated primary care facilities in the Amahlathi Subdistrict of the Eastern Cape, the current study examined the variables that are correlated with non-adherence to ART among adult HIV/AIDS clients. The low ART adherence (112/27%) observed in our sample demonstrates the need to strengthen efforts in our primary health care settings to improve ART adherence among PLHWA in this region. Additionally, the results indicate that among the 249 participants (62%) who were cognizant of the repercussions of treatment interruption, 64 (57%) did not adhere to ART, despite having become aware of the consequences of noncompliance. The low adherence rate noted in our study may have resulted from participants' inability to access healthcare services since most of them resided more than five kilometres distant from the clinic (46.25%) and travelled there by public transportation (52.25%). Thus, long travel distances and transportation constraints may have a negative impact on their ART refills, while shorter travel time to the clinic is associated with good ART adherence.³¹ In a previous study in Ethiopia, those who lived a great distance from a health centre had a higher risk of not adhering to ART (AOR = 2.42; 95% CI: 1.22–25.86).³⁸ Furthermore, studies have established a statistically significant link between a lack of transportation and poor adherence.^{16,17} The adherence rate that we found in our study is lower to that of Kaswa et al³⁵ at 20.2%; however, higher ART adherence rates of 69.0%,⁵ 51%,²⁸ 66% (baseline)/65% (follow-up),³¹ and 57.3%¹⁴ have been reported in other South African settings, along with Ethiopia (39.7%),⁶ 48.2% [11], Cameroon (37.78%),⁸ Nigeria (60.1%),³² 92.6%,¹⁶ and Malawi.³⁹ In addition, outside of SSA, much higher ART adherence has been reported in Nepal (87.4%)⁴⁰ and Indonesia (84.16%).²³

Overall, the ART adherence rates observed in our study and other studies, with exception of McBride et al³⁹ are below the 95% UNAIDS-recommended rate, implying that viral load suppression is not achievable. A randomised control study in South Africa reported 16.4% non-viral suppression,⁴¹ implying that the virus and its effects are continuously transmitted. Besides, the disparities of the prevalence rates of ART adherence noticeable in our study and others in the literature as highlighted above could be attributed to the differences in the geographical contexts of these studies based on the interactions of different factors, access to ART, sample size and ART non-adherence diagnostic criteria used. Notably, our study used self-reported (no missed dose 3 days) of clients attending primary health clinics for medication refill as a defining criteria of ART non-adherence, as have several previous studies.^{5,8,21,24,28} Others combined self-report and pill count,⁷ visual analogue scale,⁶ and self-report with visual analogue.³⁵ Notably, the context of our study is rural, with substantial poverty; thus, the low adherence is alarming and reflects the significantly greater ART non-adherence prevalence in South Africa. Prioritising ART adherence efforts could help to lower the health economy burden of HIV/AIDS and mortality in PLHWA. Advocating for health education about the necessity of ART adherence is critical to increasing the uptake of ART in this setting. In addition, clients in good health can benefit from the Centralised Chronic Medicines Dispensing and Distribution (CCMDD) programme, which allows them to pick up their ARV medication near their home or place of employment, reducing the waiting times at the health facility and increasing the likelihood that clients will take their medication as prescribed.

The findings highlight critical public health implications for HIV response strategies. The bivariate analysis demonstrated that female gender, living with children and parents, alcohol usage, HIV disclosure to family, sharing HIV status to partner, staying with partners, using treatment regimen II, and taking ART pills twice a day were all associated with ART adherence. Other studies noted similar findings in South Africa^{5,35} and other countries in different contexts.^{7,8,21,22,42,43} These findings

highlight the importance of strengthening interventions aimed at these features to prevent increased ART disengagement, new transmissions, hospitalisation, morbidity, and mortality⁴³ in PLWHA in these contexts.

After controlling for other variables, a one-year increase in age reduced the chance of ART non-adherence by 5% (AOR=0.95; 95% CI: 0.93–0.98). The findings showed that an increase in age lowered the likelihood of non-adherence to ART by 3.4%, showing that as a person gets older, he or she becomes more accountable for their adherence to ART. This finding is consistent with prior research from South Africa.^{11,32,44,45} Comparatively, similar trend have been observed in Cameroon,⁸ Haiti,¹³ and Ghana.⁴³ Unlike young people, the elderly are more disciplined and aware of their health conditions, and hence more inclined to adhere to medication to maintain/prolong their life. Adolescents and young adults, on the other hand, are prone to treatment discontinuity due to a variety of social, psychological, and adherence impediments.^{46,47} Adolescents may be resistant to disclosing their HIV status,⁴⁸ perceive medication attendance at health facilities as stigmatising,⁴⁹ and experience prejudice in healthcare settings.⁴⁷ These concerns may have a negative impact on their adherence to treatment regimens. As a result, interventions targeted at increasing optimal ART adherence should target adolescents and young adults in the study settings.

The likelihood of inadequate adherence to ART was found to be lower among females than among males. Prior research has documented comparable results in South Africa⁴⁰ and various other settings.^{24,42,50} Conversely, some studies have indicated that males are more compliant;¹⁷ however, others have found no discernible distinction between the sexes.^{12,13} In general, women are more likely than males to seek medical treatment. Another factor could be the fact that women are unemployed, and often overwhelmed by long hours performing housework. Nonetheless, educating men to continue using ART is critical to ensuring “health for all” subpopulation groups.

Disclosure of HIV status to a partner did not appear to be a major predictor of non-adherence to ART in this study. Other studies in South Africa,^{32,35} SSA,^{21,22,51} and other countries⁴⁹ have shown similar results. In this study, living with children also had 3.15 times the likelihood of not adhering to ART than those living with partners; which is similar to the finding in Nepal.²⁴ Individuals who live in a spousal relationship could likely be more adherent than those in non-spousal relationships. An honest interpersonal relationship would encourage healthy life. Partners who are open and honest with each other about their health conditions, including HIV status, have a greater chance of controlling and treating their HIV condition by encouraging one other to maintain optimal adherence to ART. Therefore, to promote the behaviour of HIV-positive individuals disclosing their status to their family, companions, or relatives, it is imperative to enhance health education regarding the significance of this matter. On the other hand, rejection or reluctance of both partners to discuss their HIV status with each other due to stigmatisation may impair adherence to ART.^{29,49,52}

In this study, individuals who utilised traditional medicine were 2.45 times more likely to be non-adherent with ART than those who did not use traditional medicine. The poor non-adherence to ART owing to the use of traditional medicine has been reported in Sierra-Leone,¹⁸ Ghana,²⁷ and Malawi.²⁵ Furthermore, a study carried out in Ghana revealed an association between clients’ belief in herbal medicine and inadequate compliance with ART.²⁰ Prior research conducted in South Africa has documented the co-utilization of traditional medicine and ART by patients;^{26,53,54} in one study, the odds of using traditional medicine were almost two times higher among HIV infected patients on ART and other comorbidities.²⁶ In South Africa, some people employed traditional or herbal medicines, believing in its efficacy to cure various health disorders, including patients suffering from chronic diseases such as HIV/AIDS;²⁶ this is especially true in resource-constrained contexts. It is advisable that healthcare providers counsel patients regarding the potential hazards linked to exclusively depending on traditional remedies, even if there is a discernible improvement of symptoms related to their condition. Possible motivations for individuals to turn to alternative treatments include their affordability, accessibility, and effectiveness.^{27,55} Furthermore, patients on ART may feel that herbal medications have less side effects than ARVs; consequently, there is a need to educate and debunk such unfavourable beliefs of patients on ART regarding the use of traditional medicine, as the practise affects optimal ART adherence.

Waiting for the next dose increased the likelihood of non-adherence by 2.78 times, whereas taking a missed dose when remembered increased the likelihood of non-adherence by 5.06 times. Other studies have found similar results.^{19,21,24} Patients on ART failed to take their prescribed medications due to forgetfulness^{5,8,17,19,20} and stress.^{5,56} Health care practitioners should encourage patients to take their ARVs on a regular basis; the usage of mobile phone text

messaging and reminder devices might help in this regard. For example, a prior study found that using reminder devices increased the likelihood of positive adherence with ART by 9.1 times.⁵⁷

Limitations of the Study

The authors acknowledge the study's shortcomings. First, the findings cannot be applied to the entire Amathole region (Amahlathi sub-district) or Eastern Cape Province because the sample was drawn from solely primary health clinics and was geographically confined. Second, clients receiving ART in private health care facilities were excluded. Nonetheless, triangulation of information from medical files for several variables to reduce bias were used. Third, information on health system-related aspects from the viewpoints of health providers was not investigated. Fourth, despite the inherent drawbacks of this indirect method, a recent review highlights that this low-cost measure appears to be as effective as other higher cost indicators such as electronic monitoring, and all other measures present the same outcome (detectable viral non-suppression).⁵⁸

Conclusion

The study results indicated low adherence to ART, implying a failure to fulfil the UNAIDS-recommended 95% adherence threshold. Younger age, female gender, living with spouses, partner HIV disclosure, and use of traditional medicine were all predictors of low ART adherence in this setting. Interventions addressing the modifiable variables would assist in improving and promote adherence in order to reach the 95% adherence recommendation and 95–95- “targets” by UNAIDS.

Ethics Approval and Informed Consent

The study received ethical approval from the University of Fort Hare Health Research Ethics Committee (HREC) (FER0301SMAY01). The management of the selected clinics granted permission to access the adult clients on the HAART initiative. The study followed the procedure and principles outlined in the Helsinki Declaration. All participants in the study provided written informed consent. Participants' confidentiality, privacy, and anonymity were maintained. Each participant received an identification code, with no identifying personal information collected. Participants were free to withdraw at any point during the research process.

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Disclosure

The authors report no conflicts of interest in this work.

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