

Factors Influencing Antiretroviral Therapy (ART) Default among Patients Living with HIV in Kwaebibirem Municipality: A Facility-Based Study

^{1*}Ameyaw Patrick, ²Brainard Ayisi Asare, ³Stephen Quarcoo, ⁴Samuel Bortier Borlabi, ⁵Punguyire Damien, ⁶Moses Barima Djimatey, ⁷Kennedy T.C Brightson

Ghana Health Service

Ethical Approval: Obtained from the Ghana Health Service Ethical Review Committee (reference number GHS-ERC: 027/08/25)

DOI: <https://doi.org/10.5281/zenodo.23233504>

Published Date: 08-October-2026

Abstract: Background and Objectives: Antiretroviral therapy (ART) is the cornerstone of HIV management, yet ART default, defined as missing scheduled doses or clinic visits for 30 days or more, remains a significant public health challenge in resource-limited settings. Despite the expansion of ART services in Ghana, adherence rates remain suboptimal in many communities, including Kwaebibirem Municipality. This study aimed to determine the prevalence and factors influencing ART default among patients living with HIV attending an ART clinic in Kwaebibirem Municipality, Eastern Region, Ghana.

Methods: A facility-based cross-sectional study was conducted at Kade Government Hospital, the primary ART service centre in Kwaebibirem Municipality. A total of 253 patients living with HIV, aged 18 years and above, who had been on ART for a minimum of six months and were actively registered at the facility, were selected using purposive sampling. Data were collected through structured interviewer-administered questionnaires, complemented by 8–10 key informant interviews with healthcare providers. Predictors of ART default were identified using multivariable logistic regression.

Results: The prevalence of ART default was 27.7% (95% CI: 22.5–33.5%). The most commonly reported reasons for missing doses were forgetfulness (57.1%) and perceived clinical improvement (54.3%). In the adjusted analysis, experiencing ART side effects (aOR=3.13; 95% CI: 1.64–5.98; p=0.001) and difficulty taking medication in the presence of others (aOR=2.91; 95% CI: 1.10–7.73; p=0.032) were significantly associated with higher odds of default, while higher monthly income was independently protective against default.

Conclusions: ART default in Kwaebibirem Municipality is a significant concern. Economic hardship, medication side effects, and HIV-related stigma are key drivers of non-adherence. Targeted interventions including side-effect management, stigma-reduction programmes, and economic support for patients are urgently needed to improve ART retention and treatment outcomes.

Keywords: ART default; HIV; antiretroviral therapy adherence; Ghana.

I. INTRODUCTION

Human immunodeficiency virus (HIV) remains one of the most pressing global public health challenges, with an estimated 39 million people living with HIV worldwide as of 2023 [1]. Antiretroviral therapy (ART) has fundamentally transformed the management of HIV, converting a previously fatal condition into a manageable chronic illness by suppressing viral replication, restoring immune function, and significantly reducing HIV-related morbidity and mortality. ART also plays a critical preventive role through the concept of Undetectable = Untransmittable (U=U), whereby individuals with sustained viral suppression cannot sexually transmit the virus [2].

Despite these remarkable advances, adherence to ART remains a formidable challenge globally, particularly in resource-constrained settings. ART default, defined as missing scheduled medication doses or clinic visits for a period of 30 days or more is associated with virologic failure, development of drug-resistant HIV strains, immune system deterioration, and increased mortality [3,1]. The World Health Organization recommends a minimum adherence threshold of 95% of prescribed doses to achieve viral suppression [4]. Failure to sustain this level of adherence risks individual and public health consequences, including enhanced HIV transmission.

Sub-Saharan Africa continues to bear a disproportionate burden of the global HIV epidemic, accounting for approximately 67% of all HIV infections, and faces persistent challenges in achieving optimal ART retention [1]. In Ghana, approximately 354,927 people were living with HIV in 2022, with an estimated 75% receiving ART [5]. The Eastern Region of Ghana, with an HIV prevalence of 2.0% higher than the national average of 1.7% has been a focal point for HIV interventions. Kwaebibirem Municipality, situated within this region, continues to experience ART adherence challenges driven by financial constraints, transportation barriers, stigma, and healthcare system inefficiencies.

Despite the implementation of adherence support strategies including phone call reminders, home visits, peer support groups, free health care services and differentiated service delivery models, the effectiveness of these interventions in Kwaebibirem Municipality remains largely uncharacterised. Limited empirical data exist on the prevalence and determinants of ART default at the district level in this area, hindering the development of evidence-based, context-specific interventions. This study was therefore designed to assess the prevalence and factors influencing ART default among patients living with HIV attending the ART clinic at Kade Government Hospital, and to evaluate the effectiveness of existing patient follow-up mechanisms.

II. MATERIALS AND METHODS

A. Study Design and Setting

A facility-based cross-sectional study design was employed. The study was conducted at Kade Government Hospital (KGH), the primary ART service centre in Kwaebibirem Municipality, Eastern Region of Ghana. KGH is located approximately 25 km east of Koforidua, the regional capital. The hospital, which began operations as a health centre in 1962 and was upgraded to a hospital in 1997, serves a catchment population of approximately 121,698 [6]. It provides a full range of services including outpatient, inpatient, maternity, laboratory, and specialist care, and maintains the largest ART patient registry in the municipality, with an estimated 1,800 patients currently registered on ART.

B. Study Population and Eligibility Criteria

The target population comprised all patients living with HIV registered and actively receiving ART at KGH. Participants were eligible for inclusion if they were: aged 18 years or above; had been on ART for a minimum of six months; were actively registered at the facility; and provided written informed consent. Patients who were severely ill and unable to participate in an interview, those who had transferred to another healthcare facility, and pregnant women enrolled in the Prevention of Mother-to-Child Transmission (PMTCT) programme were excluded, as their adherence patterns and clinical trajectories differ from the general ART population.

C. Sample Size and Sampling

Using the Krejcie and Morgan formula [7] for finite populations at a 95% confidence level, a population proportion of 0.50 (to maximise variability), and a margin of error of 5%, the required sample size from an estimated population of 1,800 ART patients was calculated as 317. After applying exclusion criteria, a final analytical sample of 253 participants was enrolled. Kade Government Hospital was purposively selected as the study site given its status as the primary ART delivery point in the municipality and its capacity to provide a sufficient and representative sample. Participants were consecutively enrolled during routine ART clinic visits.

D. Data Collection

Data were collected through structured interviewer-administered questionnaires conducted in private consultation rooms within the ART clinic to ensure confidentiality. Where private rooms were unavailable, an alternative quiet area with visual and auditory privacy was used. Interviews were scheduled following routine clinic visits to minimise disruption to patient care. The questionnaire captured: sociodemographic characteristics; clinical and treatment history (duration on ART, default history, side effects); reasons for missing doses; psychosocial and behavioural factors (stigma, depression, substance use, social support); and healthcare follow-up mechanisms (reminder systems, counselling, refill frequency). Additionally, 8–

10 key informant interviews (KIIs) were conducted with healthcare providers including physicians, nurses, pharmacists, and adherence counsellors to provide contextual insights into facility-based follow-up practices. The questionnaire was pre-tested on 5–10% of the sample in a non-selected facility, and research assistants underwent one week of training on interview techniques and ethical conduct before data collection commenced.

E. Variables

Dependent variable: ART default (yes/no), defined as self-reported interruption of ART for 30 days or more at any time since treatment initiation.

Independent variables: age, sex, marital status, educational level, employment status, monthly income, duration on ART, CD4 count, comorbidities, ART regimen, experience of side effects, distance to health facility, availability of ART, waiting time, healthcare provider attitudes, follow-up mechanisms, stigma, depression, substance use, and family and social support.

F. Data Analysis

Descriptive statistics (frequencies, proportions, means, and standard deviations) were used to characterise the study population and estimate the prevalence of ART default. Bivariate analyses using chi-square tests (for categorical variables) and independent samples t-tests (for continuous variables) were conducted to examine unadjusted associations between independent variables and ART default. Variables with a p-value <0.25 in bivariate analysis were entered into a multivariable logistic regression model to identify independent predictors of ART default. Adjusted odds ratios (aORs) with 95% confidence intervals (CIs) are reported. A p-value of <0.05 was considered statistically significant. Data were double-entered into EpiData version 3.1 for validation prior to analysis. Qualitative data from KIIs were subjected to thematic analysis to identify recurring patterns related to ART adherence barriers and facility follow-up mechanisms.

III. RESULTS

A. Demographic Characteristics

A total of 253 patients living with HIV were enrolled. Table I presents the demographic characteristics of participants. The majority were aged 35–44 years (43.9%, n=111), followed by those aged 45 years and above (39.5%, n=100). Females constituted a slightly larger proportion of respondents (55.7%, n=141) compared with males (44.3%, n=112). Most respondents were married (61.7%, n=156). Nearly half had attained secondary education (46.6%, n=118), and 34.0% (n=86) had tertiary education. More than half were self-employed (55.7%, n=141). Regarding monthly income, 27.7% (n=70) reported no income, while 30.0% (n=76) earned GHS 1,500–2,999. Christianity was the predominant religion (89.7%, n=227). In terms of access to the health facility, most respondents lived within 1–5 km (47.4%, n=120), and the main modes of transport were public transport (43.9%, n=111) and walking (42.7%, n=108).

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (N=253)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
18–24	4	1.6
25–34	38	15
35–44	111	43.9
≥45	100	39.5
Sex		
Male	112	44.3
Female	141	55.7
Marital Status		
Single	41	16.2
Married	156	61.7
Divorced	45	17.8
Widowed	11	4.4
Educational Level		
No Formal Education	18	7.1
Primary	31	12.3
Secondary	118	46.6
Tertiary	86	34

Occupation		
Unemployed	35	13.8
Formal Employment	68	26.9
Self-Employed	141	55.7
Others	9	3.6
Monthly Income (GHS)		
No Income	70	27.7
<1,500	40	15.8
1,500–2,999	76	30
≥3,000	67	26.5
Religion		
Christianity	227	89.7
Islam	25	9.9
Traditional	1	0.4
Distance from Home to Health Facility		
<1 km	105	41.5
1–5 km	120	47.4
6–10 km	28	11.1
Mode of Transport to Health Facility		
Walking	108	42.7
Public Transport	111	43.9
Private Vehicle	34	13.4

B. Prevalence of ART Default

Of the 253 respondents, 70 (27.7%) reported ever defaulting on their ART medication, yielding an overall prevalence of ART default of 27.7% (95% CI: 22.5%–33.5%). The remaining 183 respondents (72.3%) reported never having defaulted. This indicates that approximately one in four patients living with HIV at this facility had experienced at least one episode of treatment interruption.

C. Clinical and Treatment History

Table II presents the clinical and treatment characteristics of participants. The majority had been on ART for 6 months to 1 year (41.5%, n=105), followed by those on treatment for less than 6 months (26.9%, n=68), 1–3 years (22.1%, n=56), and more than 3 years (9.5%, n=24). Among those who had ever defaulted (n=70), most reported that the last default period lasted less than one month (58.8%, n=40), followed by 1–3 months (26.5%, n=18) and more than 3 months (14.7%, n=10). Overall, 37.9% (n=96) of respondents reported experiencing side effects from ART medications.

TABLE II: CLINICAL AND TREATMENT HISTORY OF RESPONDENTS (N=253)

Characteristics	Frequency (n)	Percentage (%)
Duration on ART		
Less than 6 Months	68	26.9
6 Months–1 Year	105	41.5
1–3 Years	56	22.1
More than 3 Years	24	9.5
Ever Defaulted on ART Medication		
No	183	72.3
Yes	70	27.7
Duration of Last Default Period		
Less than 1 Month	40	58.8
1–3 Months	18	26.5
More than 3 Months	10	14.7
Experienced Side Effects from ART		
No	157	62.1
Yes	96	37.9

D. Reasons for Missing ART Doses

Among the 70 respondents who reported ART default, the most frequently cited reason was forgetfulness (57.1%), followed by perceiving no need for medication due to feeling better (54.3%). Fear of stigma was reported by 32.9% of defaulters, while 25.7% cited side effects as a contributing factor. Structural barriers including long distance to the health facility (7.1%) and financial constraints (7.1%) were reported less frequently. A small proportion (1.4%) cited other unspecified reasons. As this was a multiple-response question, respondents could report more than one reason.

E. Side Effects Experienced by Respondents on ART

Among respondents who reported experiencing side effects (n=96), headache was the most commonly reported symptom (60.8%), followed by dizziness (42.3%) and fatigue (41.2%). Other reported side effects included nausea or vomiting (16.5%), diarrhoea (11.3%), skin rash (9.3%), and insomnia (4.1%).

F. Psychosocial and Behavioural Factors

Table III presents the psychosocial and behavioural characteristics of respondents. The majority reported having a social support system to assist them in remembering to take ART (89.3%, n=226). Despite this, HIV-related stigma was pervasive: 80.2% (n=203) reported fear of stigma or discrimination, and 83.8% (n=203) indicated difficulty taking medication in the presence of others. Alcohol or substance use was reported by 12.6% (n=32) of respondents. Notably, 80.6% (n=204) reported experiencing depression or emotional distress that affected their adherence.

TABLE III: PSYCHOSOCIAL AND BEHAVIOURAL CHARACTERISTICS OF RESPONDENTS (N=253)

Characteristics	Frequency (n)	Percentage (%)
Support system to help remember ART (family/friends)		
No	27	10.7
Yes	226	89.3
Afraid of stigma or discrimination due to HIV status		
No	50	19.8
Yes	203	80.2
Finds it difficult to take medication in presence of others		
No	41	16.2
Yes	203	83.8
Consumes alcohol or substances that may affect ART adherence		
No	221	87.4
Yes	32	12.6
Experiences depression or emotional distress affecting adherence		
No	49	19.4
Yes	204	80.6

G. Healthcare and Follow-Up Mechanisms

Table IV summarises healthcare service utilisation and follow-up mechanisms. The majority visited the ART clinic monthly for refills (56.9%, n=144). Most respondents rated the quality of ART clinic services as good (75.1%, n=190) or excellent (17.8%, n=45). Appointment reminders were reported by 92.5% (n=234) of respondents, with phone calls being the predominant reminder method (74.7%, n=189). ART adherence counselling had been received by 94.5% (n=239) of respondents.

TABLE IV: HEALTHCARE AND FOLLOW-UP MECHANISMS (N=253)

Characteristics	Frequency (n)	Percentage (%)
Frequency of ART Refill Visits		
Monthly	144	56.9
Every Two Months	67	26.5
Every Three Months	42	16.6

Rating of Healthcare Services at ART Clinic		
Excellent	45	17.8
Good	190	75.1
Fair	16	6.3
Poor	2	0.8
Receives Appointment Reminders from Healthcare Providers		
No	19	7.5
Yes	234	92.5
Method of Appointment Reminder		
Phone Call	189	74.7
SMS	33	13.1
Home Visit	12	4.7
None	19	7.5
Received Counselling on ART Adherence		
No	14	5.5
Yes	239	94.5

H. Challenges in Attending Follow-Up Visits

The most commonly reported challenge to attending follow-up clinic visits was work or family commitments (62.5%, n=158). This was followed by other unspecified challenges (26.9%, n=68), long clinic waiting times (20.6%, n=52), and health-related problems (18.6%, n=47). Structural barriers including high transportation costs (7.5%, n=19) and long distances to the clinic (6.7%, n=17) were reported by smaller proportions. Poor healthcare worker attitudes (5.1%, n=13) and fear of stigma or discrimination at the clinic (3.2%, n=8) were also reported.

I. Factors Influencing ART Default

Table V presents the unadjusted (cOR) and adjusted (aOR) logistic regression results for predictors of ART default. In the multivariable analysis, three variables were independently and significantly associated with ART default. Compared with respondents reporting no monthly income, those earning less than GHS 1,500 (aOR=0.28; 95% CI: 0.09–0.83; p=0.021), GHS 1,500–2,999 (aOR=0.27; 95% CI: 0.12–0.64; p=0.003), and GHS 3,000 and above (aOR=0.22; 95% CI: 0.09–0.55; p=0.001) were significantly less likely to default on ART, indicating that higher income was independently protective against default.

Respondents who had experienced side effects from ART had significantly higher odds of defaulting compared with those who had not experienced side effects (aOR=3.13; 95% CI: 1.64–5.98; p=0.001). Similarly, respondents who reported difficulty taking ART medication in the presence of others were nearly three times more likely to default on treatment (aOR=2.91; 95% CI: 1.10–7.73; p=0.032). Other variables including age, sex, distance to the health facility, duration on ART, fear of stigma, depression or emotional distress, refill visit frequency, and receipt of appointment reminders were not significantly associated with ART default in the adjusted analysis.

TABLE V: LOGISTIC REGRESSION ANALYSIS OF FACTORS INFLUENCING ART DEFAULT AMONG PLHIV (N=253)

Characteristics	cOR	95% CI	p-value	aOR	95% CI	p-value
Age (years)						
18–24 (Ref)	—	—	—	—	—	—
25–34	0.8	0.07–8.81	0.855	0.77	0.06–9.51	0.842
35–44	1.44	0.14–14.40	0.756	1.4	0.13–15.29	0.78
≥45	1	0.10–10.10	0.999	0.65	0.06–7.57	0.731
Sex						
Male (Ref)	—	—	—	—	—	—
Female	0.79	0.45–1.37	0.396	0.83	0.44–1.59	0.581
Monthly Income (GHS)						
No Income (Ref)	—	—	—	—	—	—
<1,500	0.39	0.16–0.94	0.035*	0.28	0.09–0.83	0.021*

1,500–2,999	0.38	0.19–0.79	0.009*	0.27	0.12–0.64	0.003*
≥3,000	0.35	0.17–0.75	0.007*	0.22	0.09–0.55	0.001*
Distance from Health Facility						
6–10 km (Ref)	—	—	—	—	—	—
<1 km	0.72	0.30–1.74	0.466	1.03	0.32–3.29	0.962
1–5 km	0.6	0.25–1.44	0.254	1.29	0.41–4.08	0.663
Duration on ART						
<6 Months (Ref)	—	—	—	—	—	—
6 Months–1 Year	0.63	0.31–1.26	0.188	0.68	0.31–1.48	0.328
1–3 Years	0.89	0.41–1.94	0.78	1.3	0.47–3.56	0.61
>3 Years	1.6	0.61–4.19	0.34	2.74	0.85–8.87	0.092
Experienced Side Effects from ART						
No (Ref)	—	—	—	—	—	—
Yes	3.02	1.71–5.34	<0.001*	3.13	1.64–5.98	0.001*
Fear of Stigma or Discrimination						
No (Ref)	—	—	—	—	—	—
Yes	0.77	0.39–1.50	0.446	0.76	0.35–1.65	0.496
Difficulty Taking Medication in Presence of Others						
No (Ref)	—	—	—	—	—	—
Yes	2.25	1.00–6.31	0.048*	2.91	1.10–7.73	0.032*
Depression or Emotional Distress Affecting Adherence						
No (Ref)	—	—	—	—	—	—
Yes	1.07	0.53–2.17	0.843	1.12	0.49–2.52	0.792
Frequency of ART Refill Visits						
Monthly (Ref)	—	—	—	—	—	—
Every Two Months	1.23	0.65–2.31	0.524	1.45	0.68–3.07	0.333
Every Three Months	0.84	0.38–1.87	0.673	0.66	0.24–1.81	0.416
Receives Appointment Reminders						
No (Ref)	—	—	—	—	—	—
Yes	0.63	0.24–1.68	0.357	0.78	0.25–2.44	0.673

cOR = crude odds ratio; aOR = adjusted odds ratio; CI = confidence interval; * = statistically significant ($p < 0.05$);
Ref = reference category

IV. DISCUSSION

This facility-based cross-sectional study examined the prevalence, determinants, and healthcare follow-up mechanisms related to ART default among patients living with HIV in Kwaebibirem Municipality, Eastern Region of Ghana. The findings provide important insights into the clinical, psychosocial, and economic factors influencing ART retention in a district-level setting.

A. Demographic Characteristics

The predominance of middle-aged adults (35–44 years; 43.9%) and older adults (≥45 years; 39.5%) in this study population is consistent with patterns reported across sub-Saharan Africa, where the HIV treatment burden is concentrated among economically productive age groups [1,8]. The higher proportion of female respondents (55.7%) aligns with documented gender differences in healthcare-seeking behaviour; women in Ghana interact more frequently with health services through antenatal care and reproductive health programmes, increasing opportunities for HIV testing and ART enrolment [4].

The finding that most respondents were married (61.7%) corroborates evidence indicating that HIV infection significantly affects married populations through discordant partnerships and limited condom use [9]. Despite relatively high educational attainment, with 46.6% having secondary education and 34.0% tertiary education, ART default still occurred, suggesting that structural, psychosocial, and clinical factors exert greater influence on adherence than education level alone [10]. The predominance of self-employment (55.7%) reflects the informal economic structure common in Ghanaian municipalities, where work-related mobility and competing priorities may affect clinic attendance.

B. Prevalence of ART Default

The overall prevalence of ART default in this study was 27.7% (95% CI: 22.5%–33.5%), indicating that approximately one in four patients enrolled in ART care had experienced at least one episode of treatment interruption. This prevalence is comparable to rates reported in other sub-Saharan African settings, where ART default rates have ranged between 20% and 35% [11,12]. It is consistent with rates documented in other parts of Ghana and the Eastern Region, where default rates between 20% and 30% have been reported [13,14].

This level of default represents a significant public health concern given that UNAIDS advocates sustained adherence above 95% to achieve viral suppression and the 95-95-95 targets [1]. A default rate approaching 28% may compromise HIV treatment outcomes at the population level, increase the risk of drug resistance and treatment failure, and impede efforts to achieve viral suppression goals in the municipality and the broader Eastern Region.

C. Reasons for Missing ART Doses

Forgetfulness (57.1%) and the perception of clinical improvement as a reason to discontinue medication (54.3%) were the leading causes of missed doses. Forgetfulness has been widely identified as a primary driver of medication non-adherence in HIV and other chronic illnesses [15]. These findings highlight a critical gap in patients' understanding of the lifelong nature of ART. Unlike some medications, ART does not cure HIV but rather maintains viral suppression; therefore, treatment must be sustained indefinitely, even in the absence of symptoms [4]. Structured patient education at enrolment and during follow-up visits is essential to address this misconception.

Fear of stigma (32.9%) and ART side effects (25.7%) were also important reasons for missed doses. HIV-related stigma continues to impede consistent ART use in many African communities, manifesting in reluctance to take medication publicly or attend ART clinics [16]. Adverse drug reactions, while often manageable, remain a clinically significant barrier, particularly during the early phases of treatment when patients are adjusting to their regimens [11,17].

D. Psychosocial and Behavioural Factors

Despite 89.3% of respondents reporting the availability of social support systems, stigma-related barriers remained pervasive. The high prevalence of fear of stigma (80.2%) and difficulty taking medication in the presence of others (83.8%) indicates that HIV-related discrimination continues to profoundly influence adherence behaviour even among patients actively receiving care. These findings align with evidence that internalised stigma and fear of unintentional HIV status disclosure are major deterrents to consistent ART use in Ghanaian and broader African communities [18,16].

The high proportion of respondents reporting depression or emotional distress that affected their adherence (80.6%) is particularly noteworthy. Mental health conditions such as depression are prevalent among people living with HIV and have been consistently associated with reduced ART adherence and poorer treatment outcomes [19]. This finding underscores the urgent need to integrate mental health screening and support services into routine HIV care at the facility level.

E. Healthcare and Follow-Up Mechanisms

The majority of respondents reported receiving appointment reminders (92.5%), primarily through phone calls, and 94.5% had received ART adherence counselling. Most rated the quality of healthcare services at the ART clinic as good or excellent (92.9%), suggesting that the patient-healthcare provider relationship at KGH is largely positive. These are encouraging findings, as positive perceptions of healthcare quality have been associated with improved retention in HIV care [20].

Work or family commitments (62.5%) were the most commonly reported barriers to follow-up clinic attendance, reflecting the competing socioeconomic demands that many patients navigate. Long clinic waiting times (20.6%) were also reported, consistent with evidence linking waiting time to patient satisfaction and retention in HIV care [21]. Addressing these structural barriers through differentiated service delivery models, including multi-month dispensing and flexible scheduling, could improve retention rates.

F. Predictors of ART Default

The adjusted logistic regression analysis identified three independent predictors of ART default: monthly income, experience of ART side effects, and difficulty taking medication in the presence of others. Monthly income was inversely associated with ART default, with respondents at all income levels above zero being significantly less likely to default compared with those reporting no income. This finding corroborates evidence from other low- and middle-income country settings demonstrating that financial stability facilitates consistent ART adherence by reducing indirect costs such as

transport and enabling patients to prioritise clinic attendance [22,23]. Patients with no income face compounded vulnerabilities inability to afford transport, food insecurity limiting medication tolerance, and competing household demands all of which cumulatively heighten the risk of treatment interruption.

Experience of ART side effects significantly increased the odds of default (aOR=3.13). Adverse drug reactions remain among the most clinically actionable causes of treatment interruption [11,17]. Effective patient counselling on anticipated side effects at treatment initiation, coupled with timely clinical review and regimen optimisation where necessary, are essential strategies for reducing side-effect-related default.

Difficulty taking ART medication in the presence of others was associated with nearly three times higher odds of default (aOR=2.91), highlighting the central role of HIV-related stigma in driving non-adherence. Patients who conceal their HIV status at home or in the workplace may miss doses rather than risk inadvertent disclosure. This finding is consistent with literature from Ghana and elsewhere in Africa, which emphasises stigma as a key structural barrier to sustained ART engagement [18,24]. Targeted stigma reduction campaigns and community sensitisation programmes are therefore critical components of a comprehensive adherence support strategy.

G. Strengths and Limitations

This study has several strengths. It provides original, facility-based evidence on ART default from a district-level setting in the Eastern Region of Ghana, an area with one of the highest HIV prevalence rates in the country but limited empirical research. The use of a validated logistic regression model to identify independent predictors of default strengthens the causal inference of the findings. The mixed-methods design incorporating key informant interviews further enriches the contextual understanding of adherence barriers.

Several limitations should be acknowledged. First, as a cross-sectional study, causal relationships between identified factors and ART default cannot be definitively established. Second, the study relies on self-reported data on adherence and default, which may be subject to recall bias and social desirability bias patients may under-report non-adherence due to fear of judgment. Third, as the study was conducted at a single facility, findings may not be fully generalisable to all ART patients in the municipality, particularly those who have already dropped out of care and are no longer attending the clinic, potentially leading to an underestimation of the true default prevalence.

V. CONCLUSION

This study demonstrates that ART default among patients living with HIV in Kwaebibirem Municipality is a significant public health concern, with a prevalence of 27.7%. Key independent predictors of ART default include low or no monthly income, experience of ART-related side effects, and difficulty taking medication in the presence of others, the latter reflecting the pervasive influence of HIV-related stigma on treatment adherence. High levels of depression and emotional distress among respondents further underscore the importance of integrating psychosocial support into HIV care.

Based on these findings, the following evidence-based interventions are recommended: implementation of targeted financial support mechanisms (such as transport reimbursement and economic empowerment programmes) for patients with no or low income; proactive management of ART side effects through patient education, timely regimen review, and clinical support; sustained community-level stigma reduction campaigns to create environments in which patients can take their medications without fear of disclosure; integration of routine mental health screening and referral services into ART clinics; expansion of differentiated service delivery models including multi-month dispensing and home-based ART delivery to reduce barriers to clinic attendance; and strengthening of institutional adherence monitoring and audit systems. Addressing these interconnected determinants is essential for improving ART retention, achieving viral suppression targets, and contributing to Ghana's progress toward the UNAIDS 95-95-95 goals.

DECLARATIONS

A. Ethics

This study was reviewed and approved by the Ghana Health Service (GHS) Ethical Review Committee and the Medical Superintendent of Kade Government Hospital (reference number GHS-ERC: 027/08/25). All participants provided written informed consent prior to enrolment. Participants were informed that participation was voluntary and that opting out would not affect the quality of care received at the facility. All data were anonymised and stored securely to protect participant confidentiality. Participants who exhibited signs of psychological distress during interviews were referred to the facility's counselling services.

B. Acknowledgement

The authors would like to thank the management and staff of Kade Government Hospital for their support and cooperation during the conduct of this study. We also appreciate all study participants for their time and valuable contributions. This study received no specific grant from any funding agency.

C. Conflict of Interest

The authors declare no conflicts of interest.

D. Author Contributions Statement

The corresponding author contributed to the conception and design of the study, data collection, data analysis and interpretation, and drafting of the manuscript. All authors contributed to the interpretation of the findings, critically reviewed and revised the manuscript for important intellectual content, and approved the final version for submission and publication. All authors agree to be accountable for all aspects of the work and ensure that questions related to the accuracy or integrity of the study are appropriately investigated and resolved.

E. Data Availability

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

REFERENCES

- [1] UNAIDS (2023) Global AIDS update 2023. Geneva: UNAIDS.
- [2] Rodger AJ, Cambiano V, Bruun T, Vernazza P, Collins S, Degen O, Lundgren JD (2019) Risk of HIV transmission through condomless sex in serodifferent gay couples with the HIV-positive partner taking suppressive antiretroviral therapy (PARTNER). *Lancet* 393: 2428-2438.
- [3] Mills EJ, Lester R, Thorlund K, Lorenzi M, Taj M, Volberding P (2022) Interventions to promote antiretroviral therapy adherence in Africa: a systematic review and meta-analysis. *J Antimicrob Chemother* 67: 1605-1615.
- [4] World Health Organization (2021) Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach (2021 update). Geneva: WHO.
- [5] Ghana Health Service (2022) HIV sentinel survey report 2022. Accra: Ghana Health Service.
- [6] Ghana Statistical Service (2021) 2021 Population and Housing Census: summary report. Accra: Ghana Statistical Service.
- [7] Krejcie RV, Morgan DW (1970) Determining sample size for research activities. *Educ Psychol Meas* 30: 607-610.
- [8] Avert (2023) HIV and AIDS in sub-Saharan Africa. Available: <https://www.avert.org>
- [9] Dzinamarira T, Dzobo M, Chitungo I (2022) COVID-19 and HIV co-infection trends in sub-Saharan Africa. *BMC Public Health* 22: 450.
- [10] Mbuagbaw L, Sivaramalingam B, Navarro T, Hobson N, Lo N, Yeganeh L, Thabane L (2017) Interventions for enhancing adherence to antiretroviral therapy (ART): a systematic review of high quality studies. *AIDS Patient Care STDS* 29: 248-266.
- [11] Bezabhe WM, Chalmers L, Bereznicki LR, Peterson GM, Bimirew MA, Kassie DM (2016) Facilitators and barriers of adherence to antiretroviral drug therapy and retention in care among adult HIV-positive patients. *PLoS ONE* 10: e0125649.
- [12] Bulsara SM, Wainberg ML, Newton-John TRO (2018) Predictors of adult retention in HIV care: a systematic review. *AIDS Behav* 22: 752-764.
- [13] Adjei AA, Quaye E, Nkrumah FK (2021) Antiretroviral therapy default rates and associated factors in Koforidua, Eastern Region, Ghana. *Ghana Med J* 55: 112-119.
- [14] Ghana AIDS Commission (2022) Ghana AIDS Commission annual report 2022. Accra: Ghana AIDS Commission.

- [15] Mills EJ, Nachega JB, Bangsberg DR, Singh S, Rachlis B, Wu P, Cooper C (2006) Adherence to HAART: a systematic review of developed and developing nation patient-reported barriers and facilitators. *PLoS Med* 3: e438.
- [16] Turan B, Budhwani H, Fazeli PL, Browning WR, Raper JL, Mugavero MJ, Turan JM (2017) How does stigma affect people living with HIV? The mediating roles of internalized and anticipated HIV stigma in the effects of received HIV stigma on medication adherence and depression. *AIDS Behav* 21: 283-291.
- [17] Ford N, Shubber Z, Calmy A, Irvine C, Rapparini C, Moqueet N, Hamers RL (2018) Choice of antiretroviral drugs for postexposure prophylaxis for adults and adolescents: a systematic review. *Clin Infect Dis* 60(Suppl 3): S170-S176.
- [18] Dako-Gyeke M, Asampong E, Oduro R (2012) Barriers to and enablers of antiretroviral therapy adherence among people living with HIV in the Birim North district. *J Soc Aspects HIV AIDS* 9: 197-206.
- [19] Uthman OA, Magidson JF, Safren SA, Nachega JB (2014) Depression and adherence to antiretroviral therapy in low-, middle- and high-income countries: a systematic review and meta-analysis. *Curr HIV/AIDS Rep* 11: 291-307.
- [20] Wouters E, Heunis C, van Rensburg D, Meulemans H (2012) Patient satisfaction with antiretroviral services at primary health-care facilities in the Free State, South Africa. *BMC Health Serv Res* 8: 210.
- [21] McLaughlin [initials to be inserted] (2018) [Full reference details not provided in the original manuscript — author to supply title, journal, volume, and pages].
- [22] Ehlers VJ, Zuyderduin A, Oosthuizen MJ (2015) Socioeconomic factors influencing antiretroviral therapy adherence. *Health SA Gesondheid* 20: 33-42.
- [23] Tuller DM, Bangsberg DR, Senkungu J, Ware NC, Emenyonu N, Weiser SD (2010) Transportation costs impede sustained adherence and access to HAART in a clinic population in southwestern Uganda. *AIDS Behav* 14: 778-784.
- [24] Asante A (2013) Social support and the health of people living with HIV and AIDS in Ghana. *Soc Sci Med* 79: 117-125.