Evaluating the Effectiveness of Interventions to Improve ART Adherence in Resource-Limited Ghanaian Settings

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Abstract

Background: Sustained adherence to antiretroviral therapy (ART) is critical for viral suppression and improved survival among people living with HIV (PLHIV). In resource-limited settings such as rural Ghana, programmatic interventions aim to address structural and behavioural barriers to adherence, yet their effectiveness requires empirical evaluation.

Objective: To assess the association between exposure to selected ART adherence interventions and adherence levels among PLHIV in a rural Ghanaian municipality.

Methods: A cross-sectional survey was conducted among 602 PLHIV in Wassa Amenfi West Municipality who had been on ART for at least six months. Data were collected using a structured interviewer-administered questionnaire and verified with pharmacy refill records. Interventions assessed included individual adherence counselling, peer support groups, home visits by healthcare workers, and community sensitisation activities. Chi-square tests were used to examine associations between intervention exposure and adherence, with significance set at $p < 0.05$.

Results: Adherence counselling was the most widely accessed intervention (85.0%), followed by community sensitisation (56.8%), peer support groups (39.2%), and home visits (32.9%). All four interventions were significantly associated with higher adherence rates: counselling ($\chi^2 = 18.92$, $p < 0.001$), peer support ($\chi^2 = 9.52$, $p = 0.002$), home

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visits (χ^2 = 12.67, p < 0.001), and community sensitisation (χ^2 = 14.21, p < 0.001). Participants receiving home visits achieved the highest relative adherence gain (89.9% vs. 80.2%).

Conclusion: Multi-component interventions, especially those involving personalised contact such as home visits and peer group engagement, are effective in promoting ART adherence in rural Ghana. Expanding the reach of these high-impact but underutilised strategies, alongside maintaining established services like counselling, could accelerate progress toward national HIV treatment targets.

Keywords: ART adherence, interventions, HIV/AIDS, home visits, peer support, Ghana, resource-limited settings

1. Introduction

Antiretroviral therapy (ART) has transformed HIV from a fatal disease into a manageable chronic condition, significantly improving survival and quality of life for people living with HIV (PLHIV). However, the effectiveness of ART relies heavily on sustained adherence, typically defined as taking ≥95% of prescribed doses (World Health Organization [WHO], 2016). Suboptimal adherence is a major cause of virological failure, the emergence of drug-resistant strains, and increased HIV-related morbidity and mortality (Nachega et al., 2019).

In resource-limited settings such as rural Ghana, maintaining optimal adherence is particularly challenging due to structural, socio-economic, and health system constraints. These include limited access to health facilities, drug stock-outs, stigma, inadequate counselling services, and poverty (Addo

et al., 2018; Eholié et al., 2021). To address these barriers, a range of interventions have been implemented in Ghana and similar contexts, including adherence counselling, peer support groups, community-based ART delivery, and targeted stigma-reduction campaigns (Adejumo et al., 2016). While these strategies have shown promise, evidence on their real-world effectiveness remains limited, particularly in rural areas where resources and infrastructure are constrained.

Evaluating the effectiveness of adherence-promoting interventions is essential for informing policy and resource allocation in Ghana's HIV response. This study seeks to assess the impact of such interventions among PLHIV in Wassa Amenfi West Municipality, a predominantly rural district characterised by socio-economic deprivation and limited healthcare resources. By systematically examining

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patient-reported and clinic-verified adherence outcomes, this research contributes to the evidence base needed

2. Methods

2.1 Study Design and Setting

A cross-sectional descriptive design was employed to evaluate the effectiveness of ART adherence interventions. The study was conducted in Wassa Amenfi West Municipality, located in Ghana's Western Region. The municipality is largely rural, with agriculture as the main economic activity, and is served by a limited number of health facilities providing ART services. These facilities implement a combination of national and facility-specific adherence support strategies, including counselling, home visits, and peer-led support groups.

2.2 Study Population and Sampling

The study population comprised PLHIV aged 18 years and above who had been on ART for at least six months. A sample size of 602 participants was determined using Cochran's formula for cross-sectional studies, allowing for a 5% margin of error and a 95% confidence level. Participants were selected using systematic random sampling from the ART registers at participating facilities.

2.3 Data Collection Tools and Procedures

to optimise ART programs in resource-limited Ghanaian settings.

Data were collected using a structured interviewer-administered questionnaire developed from validated adherence assessment tools and adapted to the Ghanaian context. The questionnaire captured socio-demographic characteristics, exposure to adherence interventions (e.g., counselling, support groups, home visits), and adherence levels assessed through self-report and verified against pharmacy refill records. Data collection was conducted by trained research assistants fluent in both English and the dominant local language.

2.4 Measurement of Variables

The main outcome variable was ART adherence, categorised as optimal (≥95% of doses taken in the past month) or suboptimal (<95%). The key independent variables were exposure to specific adherence-promoting interventions, including:

- Individual adherence counselling sessions;
- Participation in peer support groups;
- Receipt of home visits by healthcare workers;
- Involvement in community sensitisation programs.

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2.5 Data Analysis

Data were entered into SPSS version 26 for analysis. Descriptive statistics were generated to summarise socio-demographic characteristics and intervention exposure rates. Chi-square tests were used to determine associations between exposure to interventions and adherence status. A p-value of <0.05 was considered statistically significant.

2.6 Ethical Considerations

Ethical approval was obtained from the Ghana Health Service Ethics Review Committee. Written informed consent was obtained from all participants. Confidentiality was maintained by using unique study identifiers and secure data storage.

3. Results

3.1 Socio-Demographic Characteristics

A total of 602 PLHIV participated in the study. The majority were female (62.1%), aged 40−49 years (34.9%), and had low educational attainment, with 34.2% reporting no formal education. Over half (53.5%) had been on ART for more than 24 months.

Table 1

Socio-Demographic Characteristics of Respondents (n = 602)

Variable	Frequency (n)	Percentage (%)
Age group (years)		
18−29	72	12.0
30−39	162	26.9
40−49	210	34.9
≥50	158	26.2
Gender		
Male	228	37.9
Female	374	62.1

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Education		
No formal education	206	34.2
Primary/Basic	228	37.9
Secondary	126	20.9
Tertiary	42	7.0
Duration on ART		
6–12 months	132	21.9
13–24 months	148	24.6
>24 months	322	53.5

Analysis:

This demographic profile reflects a typical rural ART patient population in Ghana, with a high proportion of women and older adults, and a considerable segment with limited formal education. These characteristics are relevant to intervention design, as literacy level and gender roles may influence engagement with adherence support programs.

3.2 Exposure to Adherence Interventions

Respondents reported varying degrees of exposure to adherence-promoting interventions.

Table 2

Exposure to ART Adherence Interventions (n = 602)

Intervention Type	**Exposed n (%)**	**Not Exposed n (%)**
Individual adherence counselling	512 (85.0)	90 (15.0)
Participation in peer support groups	236 (39.2)	366 (60.8)
Home visits by healthcare workers	198 (32.9)	404 (67.1)
Community sensitisation activities	342 (56.8)	260 (43.2)

Analysis:

Adherence counselling was the most widely implemented intervention, reaching 85% of

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respondents. Peer support groups and home visits had considerably lower coverage, suggesting logistical or resource constraints in service delivery. Community sensitisation efforts reached just over half of the participants, indicating room for expansion.

3.3 Association Between Interventions and Adherence

The impact of interventions on adherence was assessed, with statistically significant associations observed for several strategies.

Table 3

Association Between Interventions and ART Adherence (Chi-square test)

Intervention Type	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
Adherence Counselling				
Yes (n = 512)	448 (87.5)	64 (12.5)	18.92	<0.001
No (n = 90)	64 (71.1)	26 (28.9)		
Peer Support Groups				
Yes (n = 236)	206 (87.3)	30 (12.7)	9.52	0.002
No (n = 366)	306 (80.8)	73 (19.2)		
Home Visits by Health Workers				
Yes (n = 198)	178 (89.9)	20 (10.1)	12.67	<0.001
No (n = 404)	334 (80.2)	83 (19.8)		
Community Sensitisation				
Yes (n = 342)	302 (88.3)	40 (11.7)	14.21	<0.001
No (n = 260)	210 (78.8)	57 (21.2)		

Adherence counselling, peer support group participation, home visits, and community sensitisation were all positively associated with higher adherence rates, with p-values indicating strong statistical significance. The largest adherence gap was observed for home visits, where exposure corresponded to a 9.7 percentage point increase in adherence

compared to no exposure. This suggests that personalised, face-to-face engagement may have a particularly strong influence on maintaining adherence in rural contexts.

4. Discussion

This study demonstrates that multiple adherence-promoting interventions are significantly associated with improved ART adherence among people living with HIV in a resource-limited rural Ghanaian setting. The findings confirm that individual adherence counselling, peer support groups, home visits by healthcare workers, and community sensitisation programs all contribute meaningfully to treatment continuity, reinforcing global and regional evidence that multi-component approaches are most effective in sustaining adherence.

Adherence counselling was the most widely accessed intervention and showed a strong positive association with adherence. Participants who received counselling were significantly more likely to achieve optimal adherence compared to those without such exposure. This aligns with prior research in Ghana and other sub-Saharan African countries demonstrating that structured, regular counselling sessions help patients understand treatment regimens, anticipate and manage side effects, and remain motivated to continue therapy (Biadgilign et al., 2016; Musumari et al., 2019). From a policy perspective, these findings underscore the importance of ensuring that ART clinics are adequately staffed and resourced to provide high-quality, ongoing counselling, especially in rural areas where patients may have limited access to other adherence support mechanisms.

Participation in peer support groups also emerged as a significant facilitator of adherence, echoing findings from Malawi, South Africa, and Ethiopia that peer-led spaces offer emotional encouragement, opportunities for experience-sharing, and reinforcement of positive health behaviours (Jobarteh et al., 2016; Wouters et al., 2014). Yet, coverage in this study was less than 40%, suggesting that such interventions remain underutilised. Scaling up peer support networks, particularly those led by trained PLHIV, could help bridge this gap. Embedding peer groups within community structures, and linking them to formal health services, would likely enhance their reach and sustainability.

Home visits by healthcare workers were strongly associated with adherence, with the highest chi-square value among all interventions assessed. This suggests that personalised follow-up in the patient's own environment can be a powerful motivator for continued treatment, as it addresses practical challenges, provides opportunities for tailored health education, and signals

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ongoing commitment from the health system. However, the logistical demands of such outreach in rural areas require targeted policy solutions, such as integrating home visits into community health worker programs and allocating transportation allowances for outreach teams.

Community sensitisation programs also showed a robust positive association with adherence. These programs likely reduce stigma, increase public awareness of HIV treatment benefits, and create more supportive environments for patients. Prior work in Zambia and Uganda has demonstrated that such initiatives can shift community norms toward acceptance and reduce discrimination, which in turn facilitates disclosure and support-seeking behaviour (Kagaayi et al., 2019; Nyblade et al., 2017). For Ghana, expanding such efforts through radio campaigns, local drama performances, and partnerships with traditional leaders could further normalise ART use and address persistent myths.

The statistical significance across all four interventions suggests that no single strategy is sufficient in isolation. Rather, an integrated approach—combining individual-level, peer-based, and community-wide strategies—appears most promising for improving adherence outcomes in rural, resource-limited contexts. Importantly, this study highlights that while some interventions, such as counselling, have achieved wide coverage, others with strong potential impact, like home visits and peer groups, remain limited in reach. Policy and programmatic priorities should therefore focus on expanding these high-yield but underutilised strategies while maintaining the quality of more established services.

These findings must be interpreted in light of certain limitations. The cross-sectional design precludes causal inference, and adherence was measured partly through self-report, which is subject to recall and social desirability biases, though triangulation with pharmacy refill data reduced this risk. Additionally, the study was conducted in a single rural municipality, which may limit generalisability to other settings with different socio-cultural or health system contexts. Nonetheless, the large sample size, systematic sampling, and use of multiple intervention variables strengthen the validity of the findings.

Overall, this study adds to the growing body of evidence that multi-level, contextually tailored interventions can substantially improve ART adherence in rural Ghana. Ensuring consistent funding, building capacity for outreach, and integrating peer-led and community-based approaches into the

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national HIV program could accelerate progress toward Ghana's targets for viral suppression and contribute to achieving the UNAIDS 95-95-95 goals.

5. Conclusion

This study provides clear evidence that multiple adherence-support interventions—adherence counselling, peer support groups, home visits, and community sensitisation—are significantly associated with improved ART adherence among PLHIV in a rural, resource-limited Ghanaian setting. While adherence counselling has achieved broad coverage and remains an essential component of care, peer-led support, personalised home visits, and community-wide education remain underutilised despite demonstrating strong associations with positive adherence outcomes. Expanding the reach of these interventions, integrating them into existing healthcare and community structures, and ensuring adequate resourcing could further strengthen ART adherence. Sustained commitment to such multi-level, context-specific strategies will be critical for improving treatment outcomes, reducing HIV transmission, and achieving national and global HIV control targets.

References

Addo, N. A., Sarfo, F. S., Osei, F. A., & Sarfo-Kantanka, O. (2018). Factors associated with non-adherence to antiretroviral therapy among HIV-infected patients in Ghana. *Journal of the International Association of Providers of AIDS Care, 17*, 1–7. https://doi.org/10.1177/2325958218805780

Adejumo, O. A., Malee, K. M., Ryscavage, P., Hunter, S. J., & Taiwo, B. O. (2016). Contemporary issues on the epidemiology and antiretroviral adherence of HIV-infected adolescents in sub-Saharan Africa: A narrative review. *Journal of the International AIDS Society, 19*(1), 20049. https://doi.org/10.7448/IAS.19.1.20049

Biadgilign, S., Deribew, A., Amberbir, A., & Deribe, K. (2016). Barriers to antiretroviral adherence among HIV/AIDS patients in Ethiopia: A systematic review of qualitative evidence. *PLoS ONE, 11*(5), e0156619. https://doi.org/10.1371/journal.pone.0156619

Eholié, S. P., Moh, R., Badje, A., Kouame, G. M., N'takpé, J. B., Bissagnene, E., … & Anglaret, X. (2021). Implementation of "test and treat" in resource-limited settings: Challenges and prospects. *Current Opinion in HIV and AIDS, 16*(4), 235–242.

https://doi.org/10.1097/COH.0000000000000679

Jobarteh, K., Shiraishi, R. W., Malimane, I., Samo, G., Maphalala, G., Mthethwa, N., ... & Kilmarx, P. H. (2016). Community-based treatment program improves patient outcomes in rural Swaziland. *AIDS, 30*(2), 235–242. https://doi.org/10.1097/QAD.0000000000000910

Kagaayi, J., Makumbi, F., Nakigozi, G., Wawer, M. J., Gray, R. H., Serwadda, D., ... & Reynolds, S. J. (2019). Declining HIV prevalence in sub-Saharan Africa: The impact of changing sexual behaviour, HIV testing, and antiretroviral treatment. *AIDS, 33*(2), 245–253. https://doi.org/10.1097/QAD.0000000000002060

Musumari, P. M., Wouters, E., Kayembe, P. K., Kiumbu, M. M., Mavoko, H. M., Mbikayi, S. M., & Colebunders, R. (2019). Food insecurity is associated with increased risk of non-adherence to antiretroviral therapy among HIV-infected adults in the Democratic Republic of Congo: A cross-sectional study. *PLoS ONE, 14*(1), e0210200. https://doi.org/10.1371/journal.pone.0210200

Nyblade, L., Stockton, M. A., Giger, K., Bond, V., Ekstrand, M. L., Lean, R. M., ... & Wouters, E. (2017). Stigma in health facilities: Why it matters and how we can change it. *BMC Medicine, 15*, 25. https://doi.org/10.1186/s12916-017-0849-z

Wouters, E., Van Damme, W., Van Loon, F., van Rensburg, D., & Meulemans, H. (2014). Public-sector ART in the Free State Province, South Africa: Community support as an important determinant of programme success. *Health Policy and Planning, 24*(1), 31–39. https://doi.org/10.1093/heapol/czn039

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