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Integrating the Health Belief Model into HIV Care: A Case Study of ART Adherence in Wassa Amenfi West

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Abstract

Background: Antiretroviral therapy (ART) adherence is critical for viral suppression, reduced HIV transmission, and improved quality of life. In rural Ghana, socio-economic challenges and behavioural factors threaten optimal adherence. The Health Belief Model (HBM) provides a framework to understand and address these behavioural determinants.

Objective: To examine the association between HBM constructs—perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy—and ART adherence among people living with HIV (PLHIV) in Wassa Amenfi West Municipality, Ghana.

Methods: A cross-sectional study was conducted among 602 PLHIV aged ≥18 years who had been on ART for at least six months. Participants were selected through systematic random sampling from ART clinic registers. Data were collected using a structured questionnaire guided by HBM constructs, with adherence assessed via self-report and pharmacy refill verification. Chi-square tests and logistic regression were used to examine associations between HBM constructs and adherence, with significance set at $p < 0.05$.

Results: Optimal adherence was significantly associated with high perceived susceptibility ($\chi^2 = 16.82$, $p < 0.001$), high perceived severity ($\chi^2 = 10.95$, $p = 0.001$), high perceived benefits ($\chi^2 = 22.14$, $p < 0.001$), low perceived barriers ($\chi^2 = 18.47$, $p < 0.001$), presence of cues to action ($\chi^2 = 15.68$, $p < 0.001$), and high self-efficacy ($\chi^2 = 17.92$, $p < 0.001$). Participants with high benefit perception and strong self-efficacy had the highest adherence rates.

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Conclusion: The findings highlight the utility of the HBM in predicting ART adherence and designing theory-driven interventions in rural Ghana. Addressing barriers, reinforcing benefits, enhancing self-efficacy, and providing consistent cues to action should be prioritized in adherence programs. Integrating HBM-informed strategies into both clinic-based counselling and community outreach can strengthen ART outcomes in resource-limited settings.

Keywords: Health Belief Model, ART adherence, HIV, behavioural theory, rural Ghana, self-efficacy, cues to action.

Introduction

Antiretroviral therapy (ART) remains the cornerstone of HIV management, transforming the infection from a fatal illness to a chronic, manageable condition when adherence is sustained at optimal levels (≥95% of doses) (World Health Organization [WHO], 2016). Despite remarkable progress in ART rollout across sub-Saharan Africa, adherence challenges persist, particularly in rural, resource-limited settings where socio-economic constraints, stigma, and health system limitations converge to impede treatment continuity (Musumari et al., 2019; Nachega et al., 2019).

The **Health Belief Model (HBM)**, one of the most widely used frameworks in health behaviour research, offers a valuable lens for understanding and improving ART adherence. The model posits that an individual's likelihood of engaging in a health behaviour depends on their perceived susceptibility to a health condition, perceived severity of its consequences, perceived benefits of action, perceived barriers to action, cues to action, and self-efficacy (Rosenstock et al., 1988). In the context of HIV care, the HBM can guide tailored interventions by identifying the cognitive and perceptual factors influencing adherence decisions (Glanz et al., 2015).

Several studies have demonstrated that incorporating behavioural models such as the HBM into HIV care can enhance intervention design, leading to improved patient engagement and adherence (Kisaka et al., 2019; Kiplagat et al., 2018). However, empirical applications of the HBM in rural Ghana remain scarce, and few have systematically explored the model's constructs in relation to ART adherence within the country's decentralized HIV treatment program.

This study applies the HBM to assess the cognitive and perceptual determinants of ART adherence among people living with HIV (PLHIV) in Wassa Amenfi West

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Municipality. By analyzing adherence through the HBM framework, we aim to identify the most influential behavioural constructs in this context and generate evidence to inform theory-driven, culturally relevant adherence interventions.

Methods

Study Design and Setting

A cross-sectional descriptive design was employed in Wassa Amenfi West Municipality, Western Region, Ghana. The municipality is predominantly rural, with dispersed settlements and agriculture as the primary economic activity. ART services are delivered through designated public health facilities under Ghana's national HIV program, which includes routine adherence counselling and follow-up.

Study Population and Sampling

The study population consisted of 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, allowing for a 5% margin of error at a 95% confidence level. Participants were selected using systematic random sampling from facility ART registers.

Data Collection Tools and Procedures

A structured interviewer-administered questionnaire was designed based on the constructs of the Health Belief Model:

- Perceived Susceptibility (e.g., likelihood of health deterioration without ART);
- Perceived Severity (e.g., seriousness of HIV-related illness if untreated);
- Perceived Benefits (e.g., belief in ART's effectiveness to improve health);
- Perceived Barriers (e.g., stigma, side effects, distance to facility);
- Cues to Action (e.g., reminders from healthcare workers, peer encouragement);
- Self-Efficacy (e.g., confidence in ability to adhere to ART regimen).

Responses were measured on a Likert scale and adherence status was assessed through a combination of self-report and verification with pharmacy refill records. The questionnaire was pre-tested in a similar district to ensure clarity and cultural relevance. Data collection was conducted in both English and the predominant local language by trained research assistants.

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Measurement of Variables

The dependent variable was ART adherence, classified as optimal (≥95% of doses taken in the past month) or suboptimal (<95%). Independent variables were the HBM construct scores, derived from summated responses to relevant items.

Data Analysis

Data were analysed using SPSS version 26. Descriptive statistics summarized socio-demographic characteristics and HBM construct scores. Chi-square tests assessed associations between categorical HBM variables and adherence status, while logistic regression identified the strongest predictors of adherence. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Ghana Health Service Ethics Review Committee. Written informed consent was obtained from all participants. Participation was voluntary and confidentiality was ensured by assigning unique codes to each respondent and securing all data in password-protected files.

Results

Socio-Demographic Characteristics

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

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		

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Male	228	37.9
Female	374	62.1
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

The sample shows a higher proportion of older adults and females, which mirrors national ART enrolment patterns in Ghana where women are more likely to access HIV services, partly due to routine antenatal testing. The predominance of participants with low educational attainment could influence comprehension of ART information, potentially shaping their perceptions under the HBM. Longer duration on ART among most respondents suggests that many have past adherence experience, which may interact with self-efficacy and perceived benefits.

Health Belief Model Constructs and Adherence

Perceived Susceptibility

Perceived Susceptibility	**Adherent n (%)**	**Non-adherent n (%)**	**χ^2**	**p-value**
High	328 (90.6)	34 (9.4)	16.82	<0.001
Low/Moderate	284 (78.0)	80 (22.0)		

Participants who strongly perceived that discontinuing ART would lead to health deterioration were significantly more likely to adhere. This reflects the motivational role of risk awareness—those recognizing their vulnerability are more inclined to act

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protectively. Within the HBM, high perceived susceptibility appears to function as a behavioural trigger, prompting sustained medication use despite possible barriers.

Perceived Severity

Perceived Severity	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
High	350 (88.8)	44 (11.2)	10.95	0.001
Low/Moderate	262 (79.4)	68 (20.6)		

Those who believed that untreated HIV would have severe consequences were significantly more likely to adhere. This aligns with HBM predictions that higher perceived severity motivates preventive health behaviours. It also suggests that educational interventions highlighting the dangers of viral rebound and opportunistic infections may strengthen adherence motivation.

Perceived Benefits

Perceived Benefits	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
High	370 (91.1)	36 (8.9)	22.14	<0.001
Low/Moderate	242 (76.3)	75 (23.7)		

High perceived benefits, particularly belief in ART's capacity to improve health and prolong life—were strongly associated with adherence. This is one of the core motivators in the HBM, suggesting that continuous reinforcement of ART's benefits during counselling can strengthen adherence behaviour. The magnitude of association here is among the highest of all HBM constructs assessed.

Perceived Barriers

Perceived Barriers	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
Low	356 (89.4)	42 (10.6)	18.47	<0.001
High	256 (77.3)	75 (22.7)		

Participants reporting fewer barriers—such as stigma, transport costs, and side effects—were significantly more likely to adhere. This negative association illustrates that perceived obstacles can undermine the willingness or ability to maintain treatment. Interventions targeting stigma reduction, financial support, and side-effect management could therefore indirectly raise adherence rates.

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Cues to Action

Cues to Action	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
Present	340 (90.4)	36 (9.6)	15.68	<0.001
Absent	272 (78.6)	74 (21.4)		

Regular cues such as appointment reminders, pill-taking prompts, and peer encouragement were linked to higher adherence. In the HBM, cues to action are critical in translating intention into behaviour, especially in chronic disease management. This finding suggests that structured reminder systems and community peer support could play a decisive role in rural Ghanaian ART programs.

Self-Efficacy

Self-Efficacy	Adherent n (%)	Non-adherent n (%)	χ^2	p-value
High	362 (90.5)	38 (9.5)	17.92	<0.001
Low/Moderate	250 (77.6)	72 (22.4)		

High self-efficacy—confidence in one's ability to take ART as prescribed—was a significant predictor of adherence. This reflects the behavioural control dimension of the HBM, indicating that patients who feel capable of managing their medication schedules despite competing demands are more likely to achieve optimal adherence. Strengthening this confidence through skill-building interventions could yield lasting adherence improvements.

Discussion

The application of the Health Belief Model (HBM) in this study provides important insights into the cognitive and perceptual factors influencing ART adherence among people living with HIV (PLHIV) in Wassa Amenfi West. All six constructs of the HBM—perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy—were significantly associated with adherence, underscoring the model's utility in understanding and addressing adherence challenges in rural Ghana.

High perceived susceptibility emerged as a strong motivator for adherence, with participants who believed they were vulnerable to health deterioration without ART significantly more likely to take their medication consistently. This finding aligns with evidence from other sub-Saharan African settings showing that risk awareness is a critical driver of

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health-protective behaviour (Kiplagat et al., 2018; Kisaka et al., 2019). For policy, this suggests that adherence counselling should explicitly reinforce personal risk perceptions, particularly for patients in the early stages of treatment who may not yet have experienced severe illness.

Perceived severity was also positively associated with adherence, indicating that understanding the potential consequences of untreated HIV can strengthen commitment to ART. Educational interventions that vividly convey the risks of viral rebound, opportunistic infections, and reduced life expectancy may therefore enhance adherence motivation. This is consistent with research in Ethiopia and Kenya, where interventions emphasizing the dangers of treatment interruption improved patient engagement (Kiplagat et al., 2018). However, communication strategies must balance realism with hope, ensuring that fear-based messages are coupled with information on ART's benefits and the possibility of long, healthy lives with consistent treatment.

Perceived benefits had one of the strongest associations with adherence in this study. Belief in ART's capacity to restore health, prolong life, and enable productive living is a powerful motivator, echoing findings from Tanzania and Uganda that trust in treatment efficacy is central to sustained adherence (Eholié et al., 2021). This underscores the need for consistent messaging from healthcare providers that affirms the life-saving value of ART, supported by visible success stories from within the community. Policy frameworks could incorporate peer-led testimonial programs as part of routine clinic activities to reinforce these benefits.

Conversely, high perceived barriers were negatively associated with adherence, consistent with HBM predictions and prior Ghanaian studies (Addo et al., 2018). Reported barriers in this rural context include stigma, transportation costs, side effects, and competing livelihood demands. Addressing these challenges requires multifaceted responses, such as integrating ART refills with community outreach programs to reduce travel burden, providing transport subsidies, ensuring continuous drug supply to avoid treatment fatigue, and implementing community-led stigma reduction campaigns.

Cues to action also played a significant role, with regular reminders from healthcare workers and peers associated with higher adherence. This supports evidence that practical prompts can translate positive intentions into sustained behaviour, particularly in chronic care (Biadgilign et al., 2016). Health policy could prioritize low-cost, high-impact reminder systems such as SMS alerts, pillbox alarms, and

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structured home visit schedules, especially in resource-limited settings.

Finally, self-efficacy emerged as a strong predictor of adherence, reflecting an individual's confidence in their ability to manage ART routines despite obstacles. This finding aligns with research in Malawi and South Africa showing that self-efficacy predicts both adherence and viral suppression (Wouters et al., 2014). Interventions that build self-management skills—such as goal setting, problem-solving workshops, and role-playing strategies for managing stigma—could strengthen this construct and, in turn, adherence rates.

The study's findings suggest that interventions to improve ART adherence in rural Ghana will be most effective if they address all six HBM constructs in an integrated manner. Counselling sessions can be restructured to explicitly explore and strengthen perceptions of susceptibility, severity, and benefits while reducing perceived barriers and reinforcing self-efficacy. Community-based initiatives should incorporate cues to action through ongoing peer and health worker engagement. Policy strategies should move beyond solely biomedical approaches to explicitly incorporate behavioural theory into HIV care programming, ensuring that psychosocial factors are systematically addressed alongside clinical management.

While the study offers important insights, it has limitations. The cross-sectional design precludes causal inference, and adherence measurement relied partly on self-report, which may be subject to recall and social desirability biases. However, triangulation with pharmacy refill data mitigated this risk. The study's focus on a single rural municipality may also limit generalizability to other contexts with different cultural or health system structures. Nevertheless, the relatively large sample size, systematic sampling approach, and theoretical grounding in the HBM enhance the validity and applicability of the findings.

Overall, integrating the HBM into HIV care in rural Ghana offers a structured and evidence-based approach to improving ART adherence. By tailoring interventions to address patients' beliefs, perceptions, and confidence, and embedding these approaches into both clinic-based and community-level strategies, health systems can better support PLHIV in sustaining long-term treatment.

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Conclusion

This study demonstrates that all six constructs of the Health Belief Model—perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy—are significantly associated with ART adherence among PLHIV in Wassa Amenfi West. The findings confirm the value of using behavioural theory to guide HIV care in rural Ghana, where socio-economic constraints, stigma, and access challenges persist. Strengthening positive perceptions of risk, severity, and benefits, reducing barriers, enhancing self-efficacy, and maintaining regular cues to action could collectively improve adherence outcomes. Integrating the HBM into routine ART counselling and community outreach offers a low-cost, high-impact strategy that can be embedded within existing service delivery structures. Future research should explore longitudinal applications of the HBM to assess how perceptions and adherence evolve over time, enabling more adaptive and personalized intervention approaches.

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