

Factors Affecting Adherence To Art By People Living With HIV/AIDS In Nigeria: A Systematic Review

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Abstract: Background: Effective antiretroviral therapy (ART) requires 70-90% adherence to achieve sustained viral suppression. However, maintaining high adherence levels is challenging in sub-Saharan Africa, particularly in Nigeria, where low adherence rates are common. This systematic review investigates factors affecting ART adherence among people living with HIV/AIDS (PLWHA) in Nigeria.

Objectives: The review aims to identify factors influencing ART adherence, contribute to the existing body of knowledge, and propose strategies to improve adherence in line with Sustainable Development Goal (SDG) 3, which aims to end the AIDS epidemic by 2030.

Methods: A systematic search was conducted across databases including PubMed, Cochrane, EMBASE, MEDLINE, and PsycINFO. Studies published between 2015 and 2021 were selected based on inclusion criteria focusing on qualitative and quantitative research designs. Data were extracted and analyzed thematically to identify factors influencing ART adherence.

Results: Six studies were selected for review, revealing that forgetfulness, alcohol consumption, and lack of disease knowledge were major barriers to adherence. Conversely, factors enhancing adherence included social support from family and friends, regular clinic appointments, and absence of side effects. Female patients demonstrated higher adherence rates compared to males.

Discussion: The findings highlight critical barriers and facilitators of ART adherence in Nigeria. Consistent clinic visits, minimal travel times, and supportive social networks are pivotal for adherence. However, stigma, clinic staff attitudes, and treatment side effects remain significant challenges. Addressing these issues through targeted interventions and policy changes is crucial for improving adherence rates.

Conclusion: Enhancing ART adherence requires a multifaceted approach, addressing both individual and systemic barriers. Further research is needed to explore the management of treatment side effects and the impact of stigma on adherence. Achieving the SDG 3 goal of ending the AIDS epidemic by 2030 necessitates comprehensive strategies that ensure sustained ART adherence among PLWHA in Nigeria and similar settings.

I. INTRODUCTION

Recent studies reveal that ART regimens require 70-90% adherence to be effective. However, maintaining long-term antiretroviral therapy (ART) necessitates consistent and accurate monitoring, which has been particularly challenging

for countries in sub-Saharan Africa. Low suppression of viral replication by ART is often due to poor adherence to therapy. Adherence is defined as taking medications or interventions in the correct order as prescribed (Reda & Biadgilign, 2012).

From the Millennium Development Goals to the Sustainable Development Goals, global efforts have focused

on improving public health. Enhancing the well-being and health of people is central to the Sustainable Development Goals (SDGs), particularly Goal 3, which targets good health and well-being. SDG Goal 3 aims to ensure health and well-being for all at all stages of life and addresses major health priorities, including HIV/AIDS as a communicable disease (UN, 2022).

One of the health targets of the SDGs is to end the AIDS pandemic by 2030. Significant achievements in the HIV response to date include increased global access to ART. In 2015, the WHO recommended that all people living with HIV/AIDS (PLWHA) be initiated on ART regardless of the disease stage for both clinical and preventive benefits, as continuous viral suppression helps prevent transmission. By 2017, 20.9 million people, constituting 57% of all people living with HIV globally, were receiving ART. In 2016, about 1.6 million deaths were averted worldwide due to ART. UN member states have pledged to end the AIDS epidemic as a public health threat by 2030, aiming to reduce new infections and deaths associated with AIDS by 90%. The core of this strategy is the UNAIDS 90-90-90 approach, which aims for 90% of all people living with HIV to know their HIV status, 90% of people diagnosed with HIV to receive ART, and 90% of those receiving ART to achieve viral suppression by 2020. This approach is based on evidence that ART effectively reduces HIV transmission (Bekker et al., 2018). Adherence to ART is crucial because failure to adhere to medications and attrition from health services result in poorer health outcomes and wasted resources (Charurat et al., 2010).

Nigeria, one of the sub-Saharan African countries with limited resources, has demonstrated high levels of adherence in various studies, indicating that scaling up ART in resource-limited settings is achievable for immunologic and clinical outcomes (Charurat et al., 2010). However, poor ART adherence among people living with HIV remains a significant public health concern, particularly in Nigeria. The country has the world's third-largest burden of disease, with an estimated 1.6 million people living with HIV and AIDS in 2019 (UNAIDS, 2020 in Spreckelsen et al., 2020). Effective disease management requires understanding patient loss along the continuum of care (Kranzer et al., 2012). Adherence to medication is vital for patient health, and non-adherence leads to viral resistance (Spreckelsen et al., 2020).

If ART has been proven to reduce HIV transmission and adherence to treatment is essential, what then hinders adherence to ART? This is the rationale for this systematic review. The research question is: "Are there factors that affect strict adherence to ART by people living with HIV/AIDS?" This question was formulated using the PEO model: P (Population) - People living with HIV/AIDS, E (Exposure) - Factors affecting adherence to ART, O (Outcome) - Adherence to ART. This systematic review focuses on determining the factors that affect adherence to ART by people living with HIV/AIDS in Nigeria.

The objectives of this systematic review are to determine the factors affecting adherence to ART, to contribute to the existing body of knowledge regarding factors affecting HIV treatment management, and to recommend new strategies towards eradicating the HIV/AIDS disease as part of SDG Goal 3 by 2030.

II. METHODOLOGY

To successfully answer the question of which factors most significantly affect adherence to ART among People Living with HIV/AIDS, and to establish evidence useful for Nigeria and other low-income countries implementing HIV/AIDS interventions, a systematic review was conducted. This review was based on a systematic selection of studies that examined various factors influencing adherence to ART.

SEARCH STRATEGY

An electronic search was performed using databases such as PubMed, Cochrane Database, EMBASE, MEDLINE, and PsycINFO. The search strategy involved combining relevant phrases and terms using Boolean operators 'OR' and 'AND'. The specific phrases and combinations used were:

- ✓ Affect* AND adhere*
- ✓ Factors AND cause*
- ✓ ART OR antiretroviral*
- ✓ PLWHA* OR People Living with HIV/AIDS

The results from each search using these combinations were further refined to identify more concise studies related to the topic from the four electronic databases. Initially, a total of 17,666 studies were retrieved from the databases, which were then subjected to eligibility criteria.

Inclusion And Exclusion Criteria

The inclusion criteria were:

- ✓ Studies published from 2015 to 2021 to ensure relevance to current issues and to develop a realistic and achievable strategic plan towards achieving SDG Goal 3 by 2030 in Nigeria and other low-income countries.
- ✓ Research designs such as in-depth interviews (qualitative), cross-sectional, and cohort designs (quantitative).
- ✓ Studies published before this period and those with other study designs were excluded. The combination of qualitative and quantitative methods was set as a criterion to provide insight into the correlation between theory and practice (Dixon-Woods et al., 2005).

APPRAISAL OF REVIEW STUDIES

The selected studies were appraised using the CASP tool. Their individual findings and results were synthesized, and a thematic analysis was performed. Data extraction was also conducted to present the studies' characteristics, detailed in the results/findings section.

PROCESS OF STUDY SELECTION

The studies followed a screening process based on the eligibility criteria, resulting in the selection of 6 studies for the systematic review. A PRISMA model diagrammatically illustrates the step-by-step selection process, as presented in the figure below:

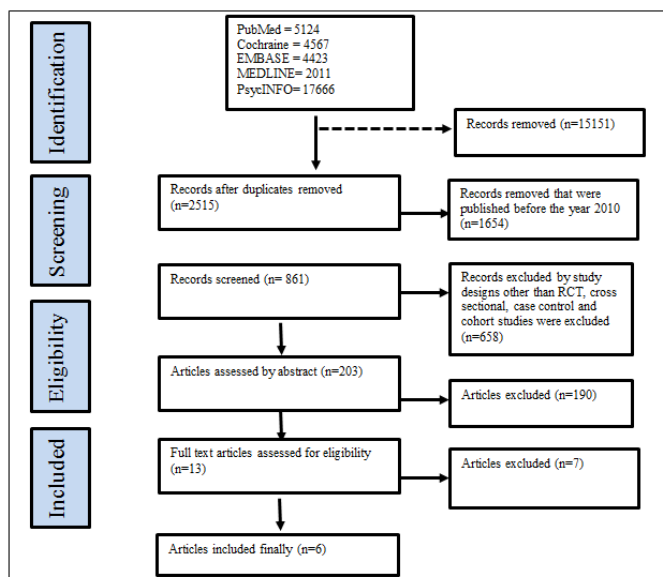


Figure 1: Diagrammatic illustration of studies selected using PRISMA

III. FINDINGS/RESULTS

Six studies were selected following a systematic database search strategy as illustrated in the diagram above. Three of the six studies used a cross-sectional study design, two were cohort studies, and one was an in-depth interview (qualitative). The data, as presented in the table below, was thematically analyzed based on two themes: (1) Factors limiting adherence to ART and (2) Factors enhancing adherence to ART.

FACTORS LIMITING ADHERENCE TO ART

- ✓ **FORGETFULNESS:** Forgetfulness was identified as a significant factor responsible for missing pills, which adversely affects adherence to ART ($P < .05$) (Banagi et al., 2016). Forgetfulness is often associated with age; thus, Dorcelus et al. (2021) found that age and the ability to meet basic needs were significantly related to poor adherence.
- ✓ **ALCOHOL CONSUMPTION:** Alcohol consumption was found to negatively impact adherence to ART compared to non-consumers ($P < .05$) (Banagi et al., 2016; Neupane et al., 2019).
- ✓ **LACK OF KNOWLEDGE:** Inadequate or lack of knowledge about the disease or medication was a major factor contributing to non-adherence (Ahmed et al., 2019).

FACTORS ENHANCING ADHERENCE TO ART

- ✓ **SUPPORT FROM FAMILY AND FRIENDS:** The presence of care from family and friends was found to improve adherence. Banagi et al. (2016) revealed that PLWHA who receive support from their family and friends exhibit better adherence than those who do not. Conversely, Ahmed et al. (2019) suggested that social life

affects adherence as individuals may fear status disclosure.

- ✓ **KEEPING APPOINTMENTS:** Maintaining regular appointments, especially every three months, was a significant predictor for viral suppression ($p = 0.869, > 0.05$) (Tanyi, 2021).
- ✓ **SIDE EFFECTS:** Patients who do not experience side effects from ART are more likely to adhere than those who do (Neupane et al., 2019; Ahmed et al., 2019).
- ✓ **GENDER:** Neupane et al. (2019) found that female patients were more likely to adhere to ART treatment than male patients.

APPRAISAL OF REVIEWED STUDIES

- ✓ **TANYI (2019):** This retrospective cohort study appropriately selected a population of children and adolescents living with HIV, aligning with the research objectives. The study outcomes were measured using cross-tabulation and measures of central tendency, clarifying the use of viral suppression as a tool to measure adherence. However, the study lacked tools such as pill counts and pharmacy refill records to measure adherence.
- ✓ **BANAGI ET AL. (2016):** This cohort study, conducted using a quantitative method, followed an approved protocol and clearly stated its aims and population. However, its generalizability was limited because it focused only on participants from urban South India, making it difficult to apply findings to other settings.
- ✓ **AHMED ET AL. (2019):** This qualitative study used in-depth interviews, which were appropriate for measuring and analyzing participants' subjective experiences. However, the views of the patients may differ from those of defaulted patients who were absent during the research or those not enrolled in care. The research evidence has low internal validity and cannot be generalized (low external validity).
- ✓ **BASTI ET AL. (2017):** This study measured adherence through self-reports, which may not accurately reflect adherence. Nonetheless, it used a proper analytical tool (Epi Info version 7 CDC) along with multiple logistic regression for data analysis.
- ✓ **DORCELUS ET AL. (2021):** This study used bivariate and multivariate analysis to examine the variables associated with adherence. However, adherence was estimated based on self-reports from patients, which may not be entirely accurate.

Overall, the reviewed studies provided valuable insights into the factors influencing ART adherence, although they had varying degrees of limitations concerning internal and external validity, generalizability, and measurement accuracy.

Author and Date	Title of study	Aims	Study Designs	Methods	Study participants	Main findings	Critical appraisal performed	Study Strengths	Study Weaknesses
Tanyi, W.N, 2021	Factors affecting adherence to antiretroviral therapy among children and adolescents living with HIV in the Mbita Sub-County Hospital, Homa Bay- Kenya	To describe the uptake of HIV treatment services among children and adolescents in the Mbita Sub-County Hospital, Homa Bay and determine how schooling, clinic attendance, and type of pill/regimen affect adherence to ART and viral suppression. To describe how schooling, clinic attendance and type of ill/regimen affected adherence to ART and viral Suppression	Retrospective cohort study	Quantitative method	264 Children and adolescents between the ages of 0-19.	At 3 months: The association between clinical appointment at 3 months and viral suppression was found to be significant ($\chi^2(1)=5.760, p = .016$), p-value of <0.05 said to be significant At 6 months: A total of 131(76.6%) of participants kept the 6- month appointment, and 100(76.3%) were virally suppressed while 40(23.4%) missed the 6- months appointment, yet 27(67.5%) of them were virally suppressed. The total 6-months viral suppression rate was 71.3%. 3-month clinic appointment and EAC done were significant predictors of viral suppression $\chi^2(2) = 0.280, p = 0.869 (> 0.05)$ Suppression among Day and boarding reported at 78.6 % (11) and 74.8 % (113) of those out of school, respectively, $p=0.533$. Participants in primary school, 17(85.0%) suppressed better than those in secondary school, 02(73.4%), $p=0.263$ Keeping clinic appointments among eligible patient files reviewed decreased from 83.1% at 3 months, $p=0.016$, to 76.6%, $p=0.526$ at 6 months and to 52.9% at 12 months, $p=0.278$. Only 3- month clinic appointment return rates and Enhanced Adherence Counseling (EAC) were significant predictors of viral suppression $\chi^2(2) = 0.280, p = 0.869 (> 0.05)$	Critical Appraisal Skills Programme (CASP) tool.	The study clearly addressed the population of focus by selecting school children. The relationship of the study to the topic is appropriate. The data analysis was a cross tabulation and measures of central tendency thus suiting the measurement of study outcomes. Viral suppression was used as a tool to measures adherence.	Tools such as pill counts and pharmacy refill records were absent to measure the adherence.
Banagi, A. et al. 2016	Factors Influencing Adherence to Antiretroviral Therapy among People Living with	To assess the level of adherence to ART and factors influencing adherence to	Cross-sectional study – Facility based.	Quantitative method	409 PLWHA aged 18 and above.	Forgetfulness is one of the major factors for missing pills, affecting adherence to ART ($P < .05$) In our study, PLHIV	AXIS appraisal tool was used.	The trial stated clearly the aims of the study and adopted a study design suitable for research findings-	Study adopted self-reported adherence method, this might overestimate

	HIV in Coastal South India	ART among PLHIV in Coastal South India.				<p>who receives good care from their family had shown better adherence to ART compared to those who do not get care from their family members and relatives ($P < .05$).</p> <p>Our study participants those who don't consume alcohol had shown good adherence to ART compared to those who consume alcohol, ($P < .05$).</p> <p>Participants with absence of opportunistic infection had shown good adherence to ART, and PLHIV who had felt better after taking ART had also shown better adherence to ART. Both the factors, absence of opportunistic infection and feeling better after taking ART, have shown significant association with ART adherence ($P < .05$).</p> <p>Females were more adherent to ART than males, possibly because majority of the female participants were widows and staying with their parents.</p>	<p>The study followed an approved protocol.</p> <p>The research was clear about the population – People living with HIV which covers all categories of people from 18 years and above.</p> <p>Factors affecting ART adherence were thematically analyzed as patient-related factors, medication-related factors and Health system-related factors.</p>	<p>the level of adherence.</p> <p>Other ART methods of measurements were not used.</p> <p>Study has limitation on generalizability; participants were focused only from Urban. Findings may not be applicable in other settings.</p>
Ahmed, S.I. et al 2019	Facilitators and Barriers Affecting Adherence Among People Living With HIV/AIDS: A Qualitative Perspective	To examine factors affecting the adherence to HIV/AIDS treatment among patients with HIV/AIDS at a local hospital in Malaysia	In-depth interview: Pretested interview guide. Audio-taped and transcribed verbatim.	Qualitative method	15 patients aged 18 years and above.	<p>Gross negativity turns into the state of hopelessness thereby influencing non-adherence to ART.</p> <p>A few participants stated lack of understanding of disease and drugs as another major cause of non-adherence among PLWHA, which perhaps highlighted a need for patient education and awareness with a continuous support in order to optimize ART adherence among these patients.</p> <p>As expected, both perceived and experienced adverse drug reactions (ADRs) were found to be another possible cause of non-adherence.</p> <p>Few of the patients described that their day-to-day social life affects medication compliance, as at times it is not easy</p>	<p>Critical Appraisal Skills Programme (CASP) tool for Qualitative research.</p> <p>The research adopted a thematic content analysis of the interview data which makes it easy to relate participants' responses to ART adherence.</p> <p>The qualitative method was appropriate because it measures the participants' subjective experience towards addressing the research goals.</p>	<p>The study fails to state the outcomes</p> <p>The study was facility based; and this was likely to influence the patients' views on HIV care and treatment.</p> <p>The views of the participants may vary from the defaulted patients or those not receiving HIV care.</p> <p>The evidence generated from the study has low internal validity and cannot pass for external validity.</p>

						<p>for them to carry along or consume their medications due to fear of status disclosure.</p> <p>According to participants, having positive values inside improve medication adherence.</p> <p>Participants also valued the importance of living a disciplined life among patients with HIV/AIDS; putting priority to medication and abandoning habits like drug use.</p> <p>A few participants also suggested that easing pill burden will help in dealing with issues of noncompliance among PLWHA</p>			
Basti, B.D. et al 2017	Factors affecting antiretroviral treatment adherence among people living with human immunodeficiency virus/acquired immunodeficiency syndrome: A prospective study	To determine adherence rates and factors affecting adherence of ART among PLWHA.	Cohort study: A prospective study.	Quantitative method:	242 PLWHA) 15-19 years.	<p>66.1% of patients had CD4 counts <200 cells/mm³ at initiation of ART. A significant improvement in CD4 counts was noted ($t = 20.181$, at the close of 6 months of treatment. $P < 0.001$); 85% had CD4 counts >200 cells/mm³. Significant weight was improved among subjects on ART ($t = 9.636$ $P < 0.001$).</p> <p>A 100% adherence rate was recorded for the whole 6 month period was seen only in 31.6% patients.</p> <p>Lower 6 month averages of 95–100%, 80–95%, and <80% were noted in 49.8%, 9.1%, and 9.5% patients, thus providing an optimal adherence rate of >95% in 81.4%.</p> <p>The adherence rates in females were higher than in males but were not statistically significant ($\chi^2 = 3.429$ $P = 0.064$).</p> <p>Missed doses resulted to negative correlations with improvements in CD4 counts ($P = 0.038^*$) and weight ($P < 0.001$), i.e., increased missed doses, caused a decrease in CD4 count and weight.</p>	Critical Appraisal Skills Programme (CASP) tool.	The study used a proper analytical tool, i.e. Epi info Version 7 CDC (Centers for Disease Control and Prevention) to analyze the data. Multiple Logistic regression was computed to identify the factors affecting adherence.	The report measured adherence through self-reports, random pill counts, and assessment of medical records. This may not be accurate of about the adherence. The research did not specify which study outcomes it intends to measure.

<p>Neupane, S. et al, 2019</p>	<p>Adherence to antiretroviral treatment and associated factors among people living with HIV and AIDS in CHITWAN, Nepal</p>	<p>To determine the adherence to Anti-Retroviral Therapy (ART) and its associated factors among People Living with HIV and AIDS in ART Center of Chitwan, Nepal.</p>	<p>Cross-sectional study: descriptive</p>	<p>Quantitative method</p>	<p>231 clients aged 18 to 49 years</p>	<p>87.4% of the respondents' attained 95% adherence to prescribed ART regimen.</p> <p>Female were more likely to adhere to HIV medication compared to male (AOR = 10.550 CI: 1.854–60.046).</p> <p>Non-consumption of alcohol are more likely to adhere to the HIV medication than those who do drink (OR = 5.842 CI: 1.294–26.383).</p> <p>respondents without side effects more likely to have optimal adherence compared to those who experience side effects from medication (OR = 8.832, CI: 2.059–37.890).</p> <p>The odds of ART adherence were higher in respondents from family with only parents and their children than those from family with more than parents and children (OR = 4.877, CI: 1.246–19.079).</p> <p>Those who pick ART medicine on their own were found to be more adherent than those who don't pick up ART medication on their own.</p> <p>Those who come to receive ART medicine themselves in the ART center were more adherent compared to those who don't receive ART medicine from the ART Center themselves (OR = 7.861, CI: 1.670–36.998)</p>	<p>AXIS appraisal tool was used.</p>	<p>Multivariable logistic regression was conducted to further authenticate the validity of the results.</p> <p>The analysis was done in such a way that findings were successful in addressing the research question.</p> <p>The result of the study is consistent with other studies conducted previously.</p> <p>The study used strong predictors of ART adherence such as sex, family type, alcohol habit, picking ART medicines on their own, HIV duration and side effects.</p> <p>The process of Sample size determination was clearly illustrated.</p>	<p>Research limitations were not stated in this study in order to provide insights where improvements can be made in further researches.</p>
<p>Dorcelus, L. et al, 2021</p>	<p>Factors associated with antiretroviral therapy adherence among people living with HIV in Haiti: a cross-sectional study</p>	<p>To assess these factors such as socioeconomic, demographic and clinical factors as potential barriers to adherence among patients receiving care in central Haiti.</p>	<p>Cross-sectional study:</p>	<p>Quantitative methods.</p>	<p>411 patients aged 18 years and above participated in the survey.</p>	<p>82%, reported that their adherence to ART was excellent.</p> <p>Age and ability to meet basic needs were two factors with a significant relationship with poor adherence:</p> <p>Patients under 40 years had more likelihood of adherence compared to those 40 years of age and older (OR: 6.32, 95% CI 2.04–10.58, p < 0.01).</p>	<p>AXIS appraisal tool was used</p>	<p>Bivariate and multivariate analysis was conducted to examine the necessary variables associated with adherence as included in the study. And this was appropriate.</p> <p>Result/findings were based on the analysis of variables in association with adherence to ART.</p>	<p>The survey considered adherence estimated by self-reports of patients even with clinically accepted but subjective method.</p> <p>The study did not include pill counts as measures associated with adherence, thus lacking</p>

						Patients unable to meet their basic needs were more likely to have poor adherence (OR: 2.70, 95% CI 1.04–7.00, p = 0.03).			objective measure of adherence. Clinical parameters such as clinical stage, medical history, presence of opportunistic infections, CD4 count and viral load were not assessed.
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Table 1: Data extraction table factors affecting adherence to ART

IV. DISCUSSION

The six studies reveal several factors that limit and enhance adherence to ART. Limiting factors include forgetfulness, alcohol consumption, and lack of knowledge about the disease and drug use. Enhancing factors include care from family and friends, keeping appointments, pill counting, the absence of side effects, and a higher likelihood of adherence among females compared to males.

AGREEMENT WITH NIGERIAN CONTEXT

The study findings align with the situation in Nigeria, as shown by some studies. Consistent clinic visits (Ugwu & Eneh, 2013), minimal travel times (Charurat et al., 2010), patient gender (Agaba et al., 2018; Odafe et al., 2012), and the type of clinic, especially small primary care clinics (Odafe et al., 2012), are identified as strong predictors of ART adherence among adults. Other recent qualitative research from Nigeria highlights stigma, clinic staff attitudes and communication, long waiting times, and stockouts as factors responsible for non-adherence (Dibb & Ohanyido, 2018; Okonkwoh, 2011).

LIMITATIONS OF THE SYSTEMATIC REVIEW

The systematic review has several limitations, which should be noted for future research. The study reviewed only a few studies with limited issues concerning factors that influence adherence to ART. A wide array of factors could inform the potential barriers in Nigeria affecting ART adherence among people living with HIV/AIDS. Additionally, there is a gap in knowledge regarding the management of treatment side effects. Little attention has been given to how HIV patients manage treatment side effects, which may adversely affect adherence to ART. More research is needed to study the consequences of treatment side effects and potential solutions.

IMPLICATIONS OF THE STUDY FINDINGS

The study findings highlight that treatment side effects play a significant role in non-adherence to ART. For instance, a study by Altice et al. (2001) revealed that 92% of the study population failed to adhere to treatment due to ART side

effects. Regarding care from family and friends, the fear of exclusion from family and society leads some patients to miss their medication if they must take it in front of others.

V. RECOMMENDATIONS

- ✓ **GOVERNMENT POLICIES:** There is a need for government policies to protect against stigmatization and create a supportive environment where patients are not afraid to take their medication.
- ✓ **FUNDING AND RESEARCH:** Increased funding should be directed towards researching the side effects of ART and their management. This research should consider the specific needs and conditions of different nations and regions.
- ✓ **GLOBAL HEALTH IMPLICATIONS:** The global health community must recognize that the persistence of the HIV/AIDS epidemic in any country or region affects global health. Therefore, addressing every potential obstacle to achieving SDG Goal 3 by 2030 is essential.

VI. CONCLUSION

Achieving ART adherence is crucial for meeting the SDG Goal 3 by 2030. This systematic review of six studies identifies various factors influencing ART adherence, both limiting and enhancing. Key limiting factors include forgetfulness, alcohol consumption, and a lack of knowledge about the disease and medication. Enhancing factors include support from family and friends, maintaining regular appointments, absence of side effects, and a higher likelihood of adherence among females.

While these factors are being researched, there is a notable gap in documented knowledge regarding the side effects of ART drugs as a limiting factor to adherence. Addressing this gap is essential for improving ART adherence rates. Therefore, it is recommended that more funding be allocated to researching the side effects of ART, as understanding and mitigating these side effects could significantly improve adherence rates and contribute to the broader goal of ending the AIDS epidemic by 2030.

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