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# Evaluation of the factors influencing adherence to ART in HIV/AIDS patients at Kampala International University Teaching Hospital Bushenyi District

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**ABSTRACT**

Globally, there were an estimated 33 million people living with HIV by the end of 2007, and more than 25 million people since 1981 have died from AIDS. In 2007 there were 2.7 million new infections and 2 million HIV-related deaths. All these facts are attributed to the compromise of adherence to ART. Currently, there are an estimated 940,000 people (adults and children) living with HIV in Uganda but the adherence levels are hence posing a great challenge in the fight against the scourge. To assess factors influencing adherence to ART among HIV/AIDS clients at Kampala International University Teaching Hospital, a descriptive cross-sectional study design quantitative in nature was used to recruit 52 respondents for the study out of whom 52 questionnaires thus giving a response rate of 100%. 75% of the respondents strongly agreed that level of income may influence adherence to ART, 57% of the respondents agreed that drug hypersensitivity and side effects affect adherence to ART and 63.5% of the respondents agreed that clinic characteristics can impact adherence. The researcher concluded that client-related factors influencing adherence to ART include the client's age, level of education, level of income, social support, co-morbidities, and patient's belief about the effectiveness of ART. Therapy-related factors affecting adherence to ART include; polypharmacy, hypersensitivity, pill burden, and regimen complexity. Health system-related factors affecting adherence to ART include; clinic characteristics, self-medication, lengthy wait before the next clinic visit, and the patient-provider relationship.

**Keywords:** HIV/AIDS, ART, Adherence, Uganda, Hypersensitivity.

## INTRODUCTION

Adherence to antiretroviral therapy involves the client's ability to follow a treatment plan, that is take medications at the prescribed times, and frequencies, following restrictions regarding food, fluid, and other medications [1-7]. Antiretroviral therapy (ART) has been shown to improve health and prolong the lives of most seropositive clients [8-13]. As compared to other therapies, the efficacy of Antiretroviral therapy depends on strict adherence to the regimen. This poses the greatest challenges ever to many clients who initiated the therapy [14-20]. HIV is a pandemic infection that affects every part of the globe. According to the International AIDS Vaccine Initiative (IAVI) report, there are a total of 40 million HIV-infected persons in the world, and of these 28.5 million are found in Sub-Saharan Africa [21-30]. In Africa, adherence to ART is still low [31-36]. For example, a study in Nigeria showed a high non-adherence rate of 85.2%. The commonest occurring factors of non-adherence were forgetfulness (53.8%), side effects of drugs (31.9%), stigma (31.9%), and busy schedule (38.8%) [12].The prevalence of non-adherence to ART was 28.9% in a cross-sectional study carried out in Mulago Hospital, Uganda [35-40]. Factors associated with non-adherence included side effects, pill burden, and a long time since the last visit to the health worker [13]. A 95% level of adherence to antiretroviral therapy was reported as the minimum level necessary to maintain viral load suppression and improve immune status. Unfortunately taking more than

95% of the prescribed regimen is a difficult goal to achieve and maintain [40-44]. Therefore, the long-term success of treatment programs in resource-limited settings requires establishing the levels and long-term determinants of adherence to antiretroviral therapy among HIV patients [14, 15]. Byrd *et al.* [16] urged that adherence to Antiretroviral therapy (ART) is a powerful predictor of survival for People living with HIV/AIDS (PLWHIV) and that obtaining the full benefit from the therapy is a complex individual behavioral process influenced by many broader factors. Factors significantly associated with high ART adherence levels are adequate knowledge regarding the therapy, accessibility of the ART, and positive attitude towards the therapy [17, 18]. However, stigmatization and discrimination are found to be obstacles to effective ART adherence [19-21].

**Statement of the problem**

Globally there were an estimated 33 million people living with HIV by the end of 2007 and more than 25 million people since 1981 have died from AIDS. In 2007 there were 2.7 million new infections and 2 million HIV-related deaths. All these facts are attributed to the compromise of adherence to ART [22]. Non-adherence issues have been common, especially in sub-Saharan African countries. It is not known why the clients find it hard to reach the recommended near-perfect adherence levels of or above 95 percent, therefore there is a need to establish this and if the clients' issues are not extensively addressed, there might be a possibility of clients in developing viral resistance [23]. Currently, there are an estimated 940,000 people (adults and children) living with HIV in Uganda but the adherence levels are hence posing a great challenge in the fight against the scourge. At Kampala International University Teaching Hospital (KIU-TH) patients do not return for a refill of their drugs at appointed dates only to return for admission in advanced stages of the disease hence a need to assess factors influencing ART adherence at KIU-TH.

**Aim of the study**

To assess factors influencing adherence to ART among HIV/AIDS clients at Kampala International University Teaching Hospital.

**Study objectives**

1. To assess client-related factors influencing adherence to ART among HIV/AIDS clients at KIU-TH.
2. To determine therapy-related factors influencing adherence to ART among HIV/AIDS clients at KIU-TH.
3. To find out health system-related factors influencing adherence to ART among HIV/AIDS clients at KIU-TH.

**Research questions**

- What client-related factors influence adherence to ART among clients at KIU-TH?
- What therapy-related factors influence adherence to ART among clients at KIU-TH?
- Identify the health system-related factors influencing adherence to ART among clients at KIU-TH?

**Justification of Study**

The relationship between adherence and therapeutic success has been demonstrated across a range of Highly Active Antiretroviral Therapy (HAART) regimens. Therefore, the findings of this study may be beneficial to;

## METHODOLOGY

**Study Design and rationale**

This study was conducted through a descriptive cross-sectional study design quantitative in nature. This study design was selected because it aids in rapid data collection and allows a snap short interaction with a small group of respondents at one point in time thus allowing conclusions across a wide population to be drawn. The study design was used to examine HIV/AIDS clients at Kampala International University Teaching Hospital (KIU-TH) about factors influencing adherence to Antiretroviral Therapy (ART).

**Area of Study**

The study was carried out at Kampala International University Teaching Hospital (KIU-TH), a private not-for-profit hospital located within Ishaka municipality in

Bushenyi district, Western Uganda. The hospital is approximately 365 Km southwest of Kampala, Uganda's capital city. The hospital was established in 2005 to aid the training of nursing and medical students studying at Kampala International University. The hospital offers general as well as specialized medical services. It has a bed capacity of over 700 beds. The hospital specifically serves Bushenyi, Rubizirizi, Sheema, and Mitooma districts.

**Study Population**

The study population consisted of adult HIV-positive patients on ART at KIU-TH.

**Sample size determination.**

The sample size for the respondents at Kampala International University Teaching Hospital was calculated using Sloven's (1962) formula with precisions of +/- 5% at a confidence level of 95%. It is given by the expression;

$$n = \frac{N}{1+N(e)^2}$$

Where N=Target population, N=60

e=Fixed error, e=0.05

$$n = \frac{60}{1+60\ (0.05)^2}$$

n=52 respondents

Therefore 52 respondents were recruited for the study.

**Sampling procedure**

A simple random sampling method was used to recruit participants for the study. The simple random sampling method is a probability sampling method where respondents are selected by chance. It is a cheap and time-saving method. To minimize bias the number of Clients present in the clinic on scheduled days was elicited, an equal number of papers coded "yes or no" were folded into a box and each client was given a chance to select one. A client who selected "Yes" was an eligible participant while the one who picked "No" was not included in the study. In case the sample size was not realized, another round of picking assigned "Yes or No" was conducted among those not picked in the first round. The process of randomly picking papers assigned "Yes or No" continued until the sample size was realized.

**Selection criteria**

**Inclusion criteria**

The study included all HIV/AIDS clients present in the ART clinic and willing to consent for the study.

**Exclusion criteria**

HIV/AIDS clients who were very sick at the time of the interview were excluded from the study.

**Study variables**

**Dependent variable**

Factors influencing adherence to ART among HIV/AIDS clients.

**Independent variable.**

- ✓ Client-related factors influencing adherence to ART among HIV/AIDS clients at KIU teaching hospital.
- ✓ Therapy-related factors influencing adherence to ART among HIV/AIDS clients at KIU teaching hospital.
- ✓ Health system-related factors influencing adherence to ART among HIV/AIDS clients at KIU teaching hospital.

**Research Instruments**

A structured questionnaire was used as a tool for gathering information. The structured questionnaire was divided into four sections; The first section was used to collect data about socio-demographic profile, the second section was used to assess patient centered factors influencing adherence to ART, the third section was used to assess therapy related factors influencing adherence to ART and the fourth section was used to assess health care related factors influencing adherence to ART.

**Data collection procedure**

The researcher introduced herself to the prospective participants and read to the individual participants the consent form that detailed the title and purpose of the study as well as the rights of the participant. Whenever a participant agreed to be interviewed, he/she was asked to provide written consent by signing or fingerprinting. If they refused to participate the interview would not proceed. After obtaining the written consent, the researcher entered the

questionnaire serial number and date of interview and proceeded from the first up to the last question using a language understood by the participant. The researcher entered responses given by the participants by ticking the appropriate response and entering the same number in to the coding box. This was done to ensure data quality as the response number ticked was supposed to be the same as the one entered in the coding box. If the numbers were different, it would not be a valid response. The researcher reviewed the questionnaires on a daily basis to ensure they were being completed correctly and any errors were corrected to avoid being repeated. The process of data collection continued until every effort to contact every study participant in the sample had been exhausted. All completed questionnaires were kept safe by the researcher until the time of analysis.

**Data management**

Completed questionnaires were checked for accuracy and completeness on a daily basis after data collection at the end of the day. This was followed by coding and entry of the data using Epi info 3.4.1 software for Windows and double entry into Statistical Package for Social Scientists (SPSS) version 20 software for analysis.

**Data analysis and presentation**

Data were analyzed by descriptive statistics using SPSS version 20 software and presented in frequency tables, pie charts and bar graphs.

**Quality control techniques**

For reliability and validity, questionnaires were pretested with a tenth of the sample size outside the study area. The questionnaires were then revised and content adjustments were made accordingly. After data collection, questionnaires were checked daily, for completeness, clarity, consistency and uniformity by the researcher.

**Ethical consideration**

A letter of introduction was obtained from Kampala International University Western Campus School of Nursing Sciences to permit the researcher to carry out the research. Permission was obtained from the Executive Director of Kampala International University Teaching Hospital. All participating respondents were selected on the basis of informed consent**.**

The study was on a voluntary basis and information was kept private and confidential. Participants' anonymity was kept. The study was conducted while upholding the professional code of conduct in a manner that did not compromise the scientific inclinations of the research.

## RESULTS

### Bio demographic data

**Table 1: Shows bio demographic data of the respondents (n=52)**

| Bio demographic parameter | | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age (Years) | 18-28 | 5 | 9.6 |
| | 29-39 | 25 | 48.1 |
| | 40-49 | 13 | 25 |
| | >50 | 9 | 17.3 |
| | **Total** | **52** | **100** |
| Sex | Male | 36 | 69.2 |
| | Female | 16 | 30.8 |
| | **Total** | **52** | **100** |
| Tribe | Munyankole | 52 | 52 |
| | Muganda | - | - |
| | Others | - | - |
| | **Total** | **100** | **100** |
| Religion | Christian | 41 | 78.8 |
| | Moslem | 11 | 21.2 |
| | Others | - | - |
| | **Total** | **52** | **100** |
| Marital status | Married | 39 | 75 |
| | Single | 10 | 19.2 |
| | Divorced | - | - |
| | Widowed | 3 | 5.8 |
| | **Total** | **52** | **100** |
| Employment status | Employed | 9 | 17.3 |
| | Un employed | 40 | 76.9 |
| | Self employed | 3 | 5.8 |
| | **Total** | **52** | **100** |
| Education level | None | - | - |
| | Primary | 25 | 48.1 |
| | Secondary | 18 | 34.6 |
| | Tertiary | 9 | 17.3 |
| | **Total** | **52** | **100** |

Less than half of the respondents (48.1%) were in the age range between 29-39 years of age while only (9.6%) were in the age range of 18-28 years. Most of the respondents (69.2%) were male while only 30.8% were female. All the respondents (100%) were Banyankole. Most of the respondents (78.8%) were Christian while only 21.2% were Moslem. The majority of the respondents (75%) were married while

only 5.8% were single. The majority of the respondents (76.9%) were unemployed while only 5.8% were employed. Less than half of the respondents 48.1% attained a primary level of education while only 17.3% attained a tertiary level of education.

**Client-related factors influencing adherence to ART**

**Table 2: shows a response about whether it is acceptable to skip treatment doses as long as one is not elderly (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 31 | 59.6 |
| Strongly agree | - | - |
| Neither agree nor disagree | 12 | 23.1 |
| Disagree | 9 | 17.3 |
| Strongly disagree | - | - |
| **Total** | **52** | **100** |

More than half of the respondents (59.6%) agreed that it is acceptable to skip treatment dose as long as one is not elderly while only 17.3% disagreed.

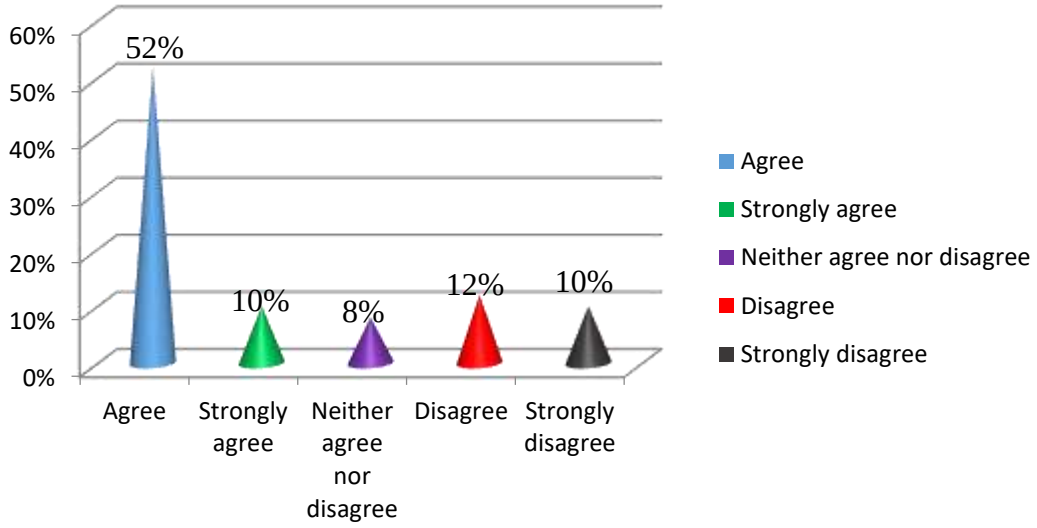


**Figure 1: Shows response about whether the level of education may influence adherence to ART (n=52).**

More than half of the respondents (52%) agreed that level of education may influence adherence to ART while only 8% neither agreed nor disagreed.

**Table 3: Shows response about whether level of income may influence adherence to ART (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 10 | 19.2 |
| Strongly agree | 39 | 75 |
| Neither agree nor disagree | - | - |
| Disagree | 3 | 5.8 |
| Strongly disagree | - | - |
| **Total** | **52** | **100** |

The majority of the respondents (75%) strongly agreed that level of income may influence adherence to ART while only 5.8% disagreed.

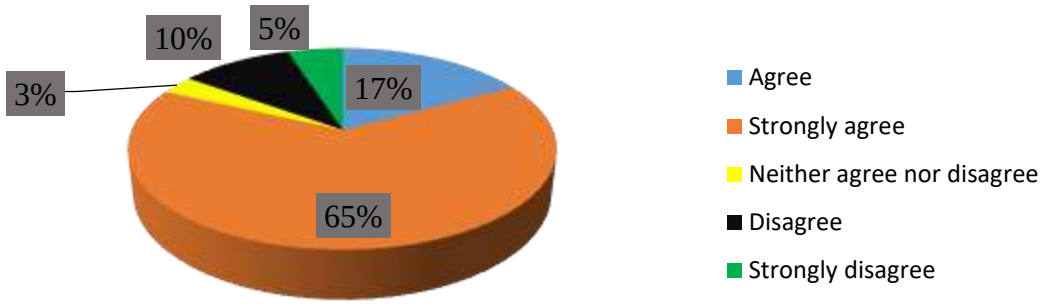


**Figure 3: Shows response about whether social support is important for adherence to ART (n=52).**

Most of the respondents (65%) strongly agreed that social support is important for adherence to ART while only 3% neither agreed nor disagreed.

**Table 4: Shows response about whether co morbidities can affect ART adherence (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 35 | 67.3 |
| Strongly agree | 13 | 25 |
| Neither agree nor disagree | - | - |
| Disagree | - | - |
| Strongly disagree | 4 | 7.7 |
| **Total** | **52** | **100** |

Most of the respondents (67.3%) agreed that co-morbidities can affect ART adherence while only 7.7% strongly disagreed.

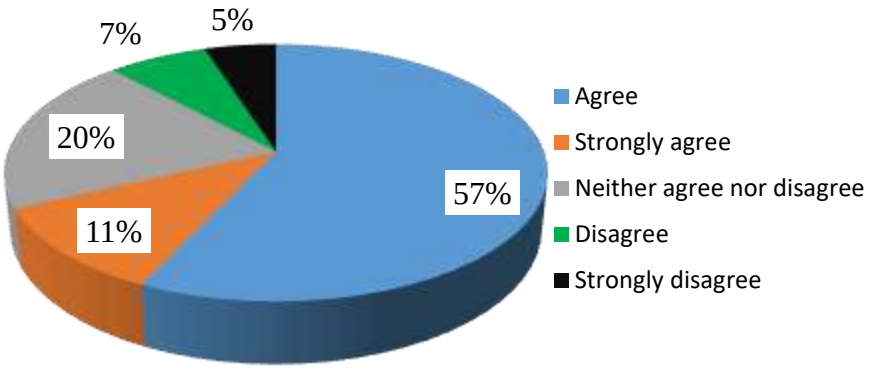


**Figure 4: Shows response about whether patient belief about ART can affect adherence to ART (n=52).**

More than half (57%) of the respondents agreed that patient belief about ART can affect adherence to ART while only 5% strongly disagreed.

**Therapy related factors affecting adherence to ART.**

**Table 5: Shows response about whether polypharmacy can affect adherence to ART (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 36 | 69.2 |
| Strongly agree | 11 | 21.2 |
| Neither agree nor disagree | - | - |
| Disagree | 5 | 9.6 |
| Strongly disagree | - | - |
| **Total** | **52** | **100** |

Most of the respondents (69.2%) agreed that polypharmacy can affect adherence to ART while only 9.6% disagreed.

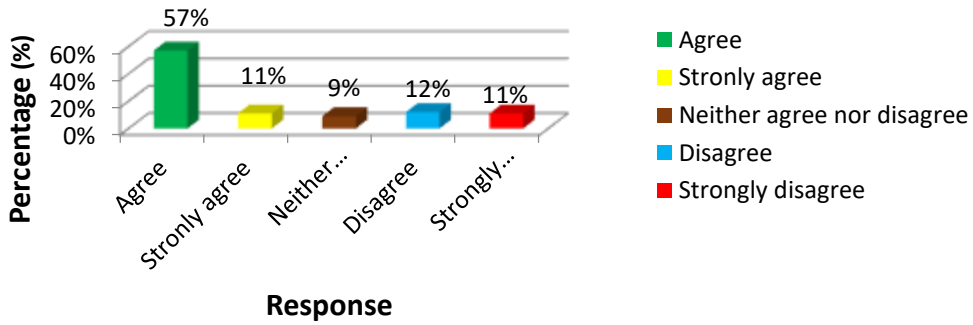


**Figure 5: Shows response about whether drug hypersensitivity and side effects affect adherence to ART (n=52).**

More than half of the respondents (57%) agreed that drug hypersensitivity and side effects affect adherence to ART while only 9% neither agreed nor disagreed.

**Table 6: Shows response about whether increased pill burden can affect adherence to ART (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 19 | 36.5 |
| Strongly agree | 30 | 57.7 |
| Neither agree nor disagree | - | - |
| Disagree | 3 | 5.8 |
| Strongly disagree | - | - |
| **Total** | **52** | **100** |

More than half of the respondents (57.7%) strongly agreed that increased pill burden can affect adherence to ART while only 5.8% disagreed.

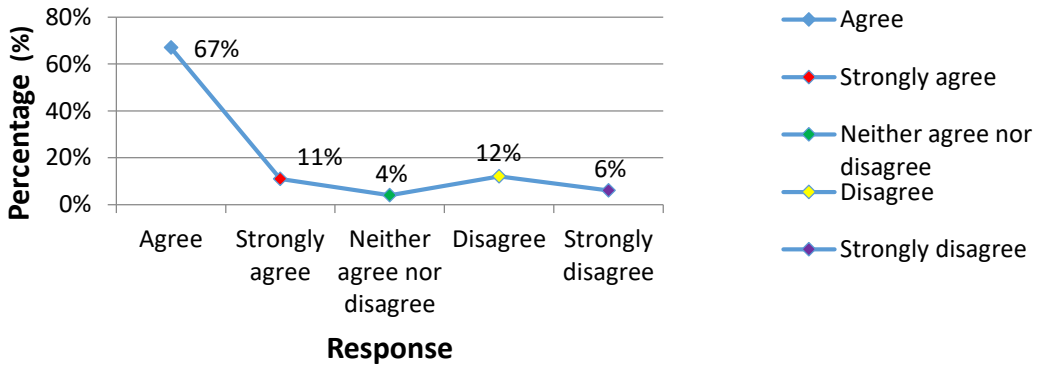


**Figure 6: Shows response on whether regimen complexity may affect adherence to ART (n=52).**

Most of the respondents (67%) agreed that regimen complexity may affect adherence to ART while only 6% strongly disagreed.

**Health system related factors affecting adherence to art.**

**Table 7: Shows response about whether clinic characteristics can impact on adherence (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 33 | 63.5 |
| Strongly agree | 9 | 17.3 |
| Neither agree nor disagree | - | - |
| Disagree | 7 | 13.5 |
| Strongly disagree | 3 | 5.8 |
| **Total** | **52** | **100** |

Most of the respondents (63.5%) agreed that clinic characteristics can impact on adherence while only 5.8% strongly disagreed.

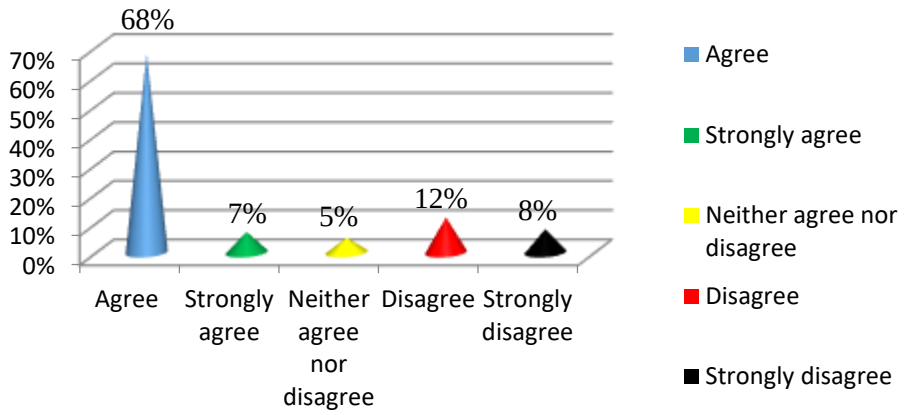


**Figure 7: Shows response about whether self-medication can affect adherence to ART (n=52).**

Most of the respondents (68%) agreed that self-medication can affect adherence to ART while only 5% neither agreed nor disagreed.

**Table 8: Shows response about whether lengthy wait before next clinic visit can affect adherence to ART (n=52).**

| Response | Frequency (n) | Percentage (%) |
|---|---|---|
| Agree | 12 | 23.1 |
| Strongly agree | 34 | 65.4 |
| Neither agree nor disagree | - | - |
| Disagree | 6 | 11.5 |
| Strongly disagree | - | - |
| **Total** | **52** | **100** |

Most of the respondents (65.4%) strongly agreed that lengthy wait before next clinic visit can affect adherence to ART while only 11.5% disagreed.

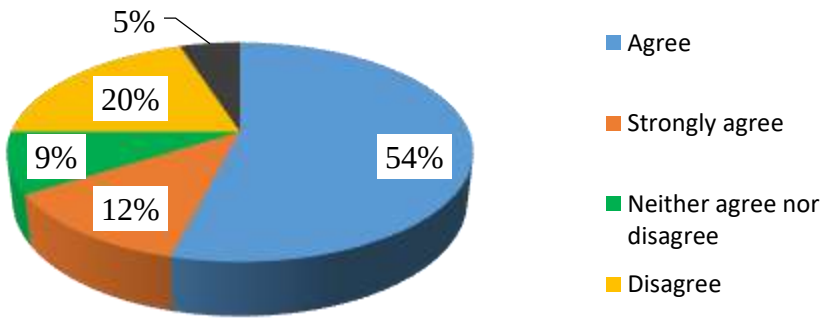


**Figure 8: Shows response about whether provider-patient relationship can influence ART adherence (n=52).**

More than half of the respondents (54%) strongly agreed that provider-patient relationship can influence ART adherence while only 5% strongly disagreed.

## DISCUSSION

### Bio demographic data.

Less than half of the respondents (48.1%) were in the age range between 29-39 years of age while only (9.6%) were of the age range 18-28 years. Certain practices that can affect adherence are common among particular age groups for smoking and the use of illicit drugs is common among young adults while alcohol consumption is common among the elderly. These study findings were in line with the findings of Brown *et al*. [24] who mentioned age as one of the patient-related factors affecting adherence to ART in 50% of HIV/AIDs clients. Most of the respondents (69.2%) were male while only 30.8% were female. Though this study did not correlate between gender and ART adherence, it is worth noting that women are usually more sensitive about their health compared to men and usually report any small change in their health while men also appear in a health facility when the condition is so severe. Therefore, adherence to ART is expected to be better among women compared to men although this is not always the case. All the respondents (100%) were Banyankole. Banyankole were the dominant tribe in the study setting. It is important to note that tribes have cultural practices that may affect adherence to ART for example the practice of trusting traditional healers for most of their health problems is a grave mistake that exacerbates the medical since traditional healers have no machines for example to determine viral load or $CD4^+$ cell count. Most of the respondents (78.8%) were Christian while only 21.2% were Moslem. Religious teachings can help improve ART adherence by discouraging practices such as smoking and alcohol consumption that can affect ART adherence. The majority of the respondents (75%) were married while only 5.8% were single. Married individuals tend to share costs for example transport to the hospital as well as giving each other psychological support which is an important factor in ensuring adherence to treatment. The majority of the respondents (76.9%) were unemployed while only 5.8% were employed. Employment status influences the level of income and therefore the ability to cope with the cost of living due to chronicity of HIV such as the treatment of opportunistic infections as this can affect adherence to ART due to pill burden or drug interactions and side effects. These study findings agreed with the findings of Bond and Hussar [25] who stated that non-adherence to therapeutic ART can worsen the quality of life and add to the cost of medical care in 89% of patients including accelerating the development of new opportunistic infections, and worsening existing ones Less than half of the respondents (48.1%) attained primary level of education while only 17.3% attained a tertiary level of education. Education can influence knowledge, attitudes, and behavior change toward positive adherence. The client's knowledge about the ART regimen and the understanding of the relationship between poor adherence and build-up of resistance predicts better adherence to ART. Therefore, adherence is always expected to be better among educated individuals although some of them usually make no difference with the non-educated class. These findings agree with the findings of Carr *et al*. [19] who stated that factors significantly associated with high ART adherence levels are adequate knowledge regarding the therapy, accessibility of the ART, and positive attitude towards the therapy.

### Client-related factors influencing adherence to ART

More than half of the respondents (59.6%) agreed that it is acceptable to skip treatment doses as long as one is not elderly while only 17.3% disagreed. Skipping treatment doses can be detrimental to treatment progress and patient recovery no matter the age of the patient. These study findings were in line with the findings of Broers *et al*. [26] who found in two studies in India associated with HAART adherence and non-adherence

that there was a positive correlation with younger age. More than half of the respondents (52%) agreed that level of education may influence adherence to ART while only 5.8% neither agreed nor disagreed. Most educated individuals have positive health-seeking behaviors and therefore are more likely to have positive adherence behaviors compared to non-educated ones. These study findings agreed with the findings of Brown *et al.* [24] who urged that a lower level of general education and poorer literacy impacts negatively on some patients' ability to adhere whilst a higher level of education has a positive impact in 70% of patients on ART. The majority of the respondents (75%) strongly agreed that the level of income may influence adherence to ART while only 8% disagreed. The chronic nature of HIV/AIDS increases the cost of living for patients which also impacts negatively on adherence and this is worst if one already had low-income levels. Poor quality of life due to social economic status makes patients abscond clinic visits as they may not be able to afford transport in addition to basic needs of daily living. Medications and clinic visits cost money and may stress an already stretched budget. These study findings concur with the findings of Byrd *et al.* [16] who stated that patients on higher incomes have less difficulty with adherence However, poverty is an increasing feature of the face of HIV especially in the third world where more than 60% of people are living below the poverty line. These study findings also agreed with the findings of Bond and Hussar [25] who found out that in the futures II study which surveyed 924 Australian HIV-positive people, more than half of the respondents (56%) reported experiencing some difficulty in meeting the cost of daily living. Most of the respondents (65%) strongly agreed that social support is important for adherence to ART while only 3% neither agreed nor disagreed. Patients with good social support are more likely to have positive adherence behaviors as they were more likely to access their medicines on time and are also more likely to follow the treatment recommendations as there was someone helping to ensure that they adhere to treatment recommendations. These study findings were in line with the findings of Brown *et al.* [24] who stated that living alone and a lack of support has been associated with an increase in non-adherence in more than 50% of patients on ART as social isolation is predictive of non-adherence and that not living alone (45%), having a partner (62%), social or family support (70%), peer interaction (30%) and better physical interactions (61%) and relationships are characteristics of adherent patients. Most of the respondents (67.3%) agreed that co-morbidities can affect ART adherence while only 7.7% strongly disagreed. Co-morbidities can be psychological or physical illnesses and can lead to increased pill burden and increased risk of drug interactions and side effects which can affect adherence. Co-morbidities also increase the cost of treatment. These study findings agreed with the findings of Ford *et al.* [27] who stated that most people with HIV at some time in the course of their illness, experience a psychiatric disorder for example depression and/or anxiety are reported in up to 70% of patients with symptomatic HIV disease. More than half (57%) of the respondents agreed that patient belief about ART can affect adherence to ART while only 5% strongly disagreed. Patients' beliefs about the seriousness of their condition and treatment effectiveness can influence adherence to ART. These study findings agreed with the findings of Russell *et al.* [28] who stated that a patient's beliefs about their illness and the effectiveness of medication are predictive of adherence and that a belief that HAART is effective, prolongs life while a recognition that poor adherence may result in viral resistance and treatment failure all impact favorably upon a patient's ability to adhere.

**Therapy-related factors affecting adherence to ART**

Most of the respondents (69.2%) agreed that polypharmacy can affect adherence to ART while only 9.6% disagreed. Taking medicines without clear indications or taking many medicines that serve the same purpose can be wasteful and may lead to

serious side effects and drug interactions which may be mistakenly due to ART and this can affect adherence to ART. These study findings concur with the findings of Eldred *et al*. [29] who stated that almost all People Living with HIV/AIDS (PLWHA) who are currently using anti-HIV drugs are on a regimen of 3 or more drugs (HAART) and that the likelihood of a patient's adherence to a given regimen declines with polypharmacy, the frequency of dosing, the frequency and severity of side effects, and the complexity of the regimen. More than half of the respondents (57%) agreed that drug hypersensitivity and side effects affect adherence to ART while only 9% neither agreed nor disagreed. Hypersensitivity reactions to one or more of the drug combinations may bias the clients to thinking that they will always react to any ART regimen and therefore may not adhere to treatment. Anticipation and fear of side effects also impact adherence. Poor adherence has been associated with patients' desire to avoid embarrassing side effects in certain situations, for example, whilst on a date or attending a job interview. These study findings were in line with the findings of Bachiller *et al*. [9] who urged that drug hypersensitivity is far more common in patients with HIV and regimen-associated toxicity is a common predictor of, and reason for, non-adherence across many studies. More than half of the respondents (57.7%) strongly agreed that increased pill burden can affect adherence to ART while only 5.8% disagreed. Additional treatment for opportunistic infections such as Pulmonary tuberculosis may contribute to the pill as well as additional side effects hence affecting adherence. These study findings agreed with the findings of Eraker *et al*. [30], who urged that a typical HAART combination commonly consisting of three agents or drugs (Stavudine, Lamivudine, and Nevirapine or Effavirenz) plus other medication for prophylaxis of opportunistic infections can result into a high pill load, thrice-daily dosing, dietary and dosing idiosyncrasies, large capsules or tablets, and specific storage instructions which impact upon a patient's ability to adhere. Most of the respondents (67%) agreed that regimen complexity may affect adherence to ART while only 6% strongly disagreed. Regimen complexity such as dosing frequency, taste, and size of tablets as well as dietary instructions can impact on adherence. These study findings concur with the findings of Erlon and Mellors [31], who stated that dietary conditions add to the complexity of treatment and often require adjustments in lifestyle and that patients can find their meal schedule compromised by anti-HIV drugs that require dosing on a fasted stomach.

**Health system-related factors affecting adherence to ART**

Most of the respondents (63.5%) agreed that clinic characteristics can impact adherence while only 5.8% strongly disagreed. Clinic characteristics such as opening and closing time, waiting time in the clinic as well as scheduling of appointments for follow-up visits can impact patients' adherence to ART. These study findings agreed with the findings of Furtado *et al*. [22], who found that clinic characteristics that impact adherence include proximity to the patient's home or place of work (70%), the expense of getting there (90%), lengthy delays between appointments (51%), clinic opening and closing times (64%), long waiting times (82%), lack of services such as child care, privacy, confidentiality (95%) and unsympathetic or inconsiderate staff (80%). Most of the respondents (68%) agreed that self-medication can affect adherence to ART while only 5% neither agreed nor disagreed. Self-medication without clear knowledge of medicines and their indications may lead to the use of medicines for conditions they are not indicated for and there may be drug interactions with negative consequences for the patients. This will therefore affect adherence to ART. These study findings were in line with the findings of Grierson *et al.* [32] who urged that for just over half of PLWHA a prescription for HAART lasts for 3 months, however, 40% receive a prescription for one month, and 12% for 2 months hence patients may obtain a prescription before a clinic visit which is reported as an obstacle to adherence. Most

of the respondents (65.4%) strongly agreed that a long wait before the next clinic visit can affect adherence to ART while only 11.5% disagreed. Lengthy wait before the next clinic visit may force the patient to seek alternative medicine for symptomatic relief and since in most cases, the private clinic did not dispense ARVs patients can progress into a worse stage of HIV or may develop resistance to treatment regimes. These study findings were in line with the findings of Hirschhorn *et al.* [33], who stated that not all pharmacies are able to dispense anti-HIV drugs, as a result, some PLWHA attends their local pharmacy for most prescription medicine and a specific pharmacy for their anti-HIV therapy and that in developing countries the story is very worrying as lengthy waits in a few hospitals that do not have extended hours may also impede adherence. More than half of the respondents (54%) strongly agreed that the provider-patient relationship can influence ART adherence while only 5% strongly disagreed. A reassuring relationship between the patient and the provider makes the patient have confidence in the provider and therefore can seek for clarification about his or her doses and any precautions to take if any. These study findings agreed with the findings of Holzemer *et al.* [34], who urged that a meaningful and supportive relationship between a client and a healthcare provider helps a client to overcome significant barriers to antiretroviral therapy adherence. These study findings also agreed with the findings of Russell *et al.* [28], who stated that two recent studies were done in Eastern Uganda on the client-provider relationship to show the effect of the trust of the client on the physician and the impact on the client's ART adherence showed that good relationship improved the adherence ten-fold when compared to those clients who had no trust on the physician.

## CONCLUSION

1. Client-related factors influencing adherence to ART include the client's age, level of education, level of income, social support, co-morbidities, and patient's belief about the effectiveness of ART.
2. Therapy-related factors affecting adherence to ART include; polypharmacy, hypersensitivity, pill burden, and regimen complexity.
3. Health system-related factors affecting adherence to ART include; Clinic characteristics, self-medication, lengthy wait before the next clinic visit, and the patient-provider relationship.

### Recommendations

- To the government of Uganda to promote health education about treatment adherence at all levels of health service delivery.
- Ministry of Health to promote continuous medical education for health workers about ART so that the practice of polypharmacy is minimized.
- Healthcare providers to have better patient-provider relationships and improve healthcare settings as in opening and closing time as well as minimizing waiting time.
- More research should be done about factors influencing ART adherence in other parts of the country so as to come up with more comprehensive findings and conclude appropriately.

### Implications to the nursing practice

The findings of this study will provide a yardstick of reference to the nursing practice to lobby for support to enhance adherence campaigns by addressing common factors impeding ART adherence among HIV/AIDS clients.

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