Factors Associated With Antiretroviral Therapy Adherence Among People Living With HIV in Haiti: a Cross-sectional Study

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Factors associated with antiretroviral therapy adherence among people living with HIV in Haiti: A cross-sectional study

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BACKGROUND
Suboptimal adherence to antiretroviral therapy (ART) is associated with a higher probability of drug resistance and virological failure¹. Adherence is, therefore, a powerful determinant of the quality of life and survival among people living with HIV (PLH)². WHO

METHODS: A cross-sectional study was conducted among PLH receiving antiretroviral therapy (ART) at the TB/HIV clinic at St. Therese Hospital in Hinche, Haiti. A total of 426 potential participants were approached during their follow-up visits from June to August 2019, of whom 411 participated in the study. After giving informed consent, study participants completed a structured interview that included the Self-Report Item Scale (SRIS), a standard measure, to assess adherence. Socio-demographic, economic and clinical factors were assessed for their association with adherence.

RESULTS: The 411 participating patients represented 39% of the patient population at the TB/HIV clinic during the timeframe of the study. The mean age was 43.7 years (range: 19-80), 65.5% were female and 78.1% had only achieved a primary level of schooling. Nearly 78% had received ART for less than 10 years, 3.41% reported having poor adherence and 28% less than excellent adherence. Factors related to poor adherence in bivariate analysis were age less than 40 years (OR: 6.32, 95% CI: 2.04-10.58, p<0.01) and inability to meet basic needs (OR: 2.70, 95% CI: 1.04-7.0, p=0.03).

CONCLUSIONS: To improve medication adherence, the hospital should strengthen patient counselling of younger recipients of ART and provide financial assistance and other social service interventions. Studies should be implemented in other HIV management centers in Haiti and similar contexts to examine barriers to ART adherence with the goal of improving prognosis and survival in the long-term among PLH in resource-limited setting.

Key-words: Adherence HIV, Haiti, Antiretroviral therapy
defines adherence as the degree to which the patient's behavior (including medication uptake) matches a health worker's recommendations. Adherence factors can be related to four dimensions: the patient, the disease, the patient-physician relationship and treatment management. Factors related to the patient include socioeconomic, demographic, psychological, cognitive and behavioral variables. Hence, employment, income, and education can play an important role in the patient's understanding of his/her illness and ability to participate in his/her management.

According to studies in similar settings, there is a positive relationship between higher levels of education and better living conditions with ART adherence. This may be in part related to greater understanding of what treatment entails as well as having the economic capacity to access treatment. In central Haiti, PLH with low socio-economic status often have to travel extensively to obtain adequate medical care, although ART itself is supplied free of charge. PLH typically receive a regimen with a number of drugs that need to be taken on a daily basis, which can be challenging if he/she has limitations in understanding HIV disease and its management, given that the literacy rate is estimated as 61%.

To our knowledge, there have been no published studies on factors associated with adherence to ART in the central region of Haiti. There have been studies that examined risk factors of delayed viral suppression around the Port-au-Prince area of Haiti. The aim of this study was to examine sociodemographic and economic factors associated with adherence to ART in PLH enrolled in the HIV/TB clinic at St. Therese Hospital in Central Haiti.

**METHODS**

**Aim**

The aim of this study was to determine the factors associated with ART adherence in one hospital in the Central Plateau region of Haiti.

**Study design and setting**
This cross-sectional study was implemented with PLH receiving ART seen in consultation at St. Therese Hospital, a public facility in central Haiti which is also a site affiliated with Partners In Health/ Zanmi Lasante (PIH/ZL), a non-governmental organization. Data were collected through a structured questionnaire with additional treatment information retrieved from the Electronic Medical Record for the HIV program at the hospital.

**Study population**

A total of 426 patients were approached for purposes of recruitment during their scheduled follow-up visit from June 17 to August 14, 2019. Of those, one patient refused to participate; and 425 (99%) agreed to participate. The eligibility criteria included having received ART for one month or longer during this time period, being 18 years of age or older and having received ART administered through the clinic at St. Therese hospital. Patients with speech or memory problems and hence could not answer questions about socio-demographic characteristics and patients who had been on ART for less than a month were excluded from participation. The study sample reduced to 411, as 10 recruits were less than 18 years of age, two people had speech/memory problems, and two had received ART for less than a month prior to the start of the study.

**Data collection and statistical analysis**

Data were collected using a structured questionnaire after the participants’ routine medical consultation. Participants were interviewed by two trained research assistants. The questionnaire was designed for this study, and variables were chosen based on information found in the literature. Descriptive statistics were calculated with frequencies and percentages. A bivariate analysis was conducted to examine the association between ART adherence and the following variables: sex, place of residence, number of years of treatment, time to arrive at the hospital, adherence, level of education, employment, housing, ability to meet basic needs and ART regimen. Adherence was measured with the Self-Report Scale Item which asked the
following question: “Pendant mwa ki sot pase a la a, kijan ou panse ou te pran medikaman yo ?”
which can be translated to “During this past month, how well do you believe you’ve taken your
medication ?” This item was based on a five-point Likert scale: excellent, very good, good,
acceptable, poor, with the variables “acceptable” and “poor” defined as “poor adherence” for
this analysis. Associations were calculated using Mantel-Haenszel chi-square statistics, odds
ratios, and corresponding 95% confidence intervals. Statistical analysis was performed using
the Epi Info 7.2.2.6 software.

Ethics

The protocol of this study was approved by ZL Institutional Review Board and the
medical board of St Therese Hospital and written informed consent was obtained from all study
participants.

RESULTS

The sample (n = 411) represented approximately 40% of the active patients of the
HIV/TB clinic at St Therese hospital. The majority of the population was female (65%) and the
mean age was 43.7 years. Nearly 38% were under the age of 40 years. The majority of
participants were between 40-49 years of age.

Participants came mostly from rural areas (58%). While most had completed primary
school (41%), less than 2% had graduated from high school or attended college. Forty percent
were unemployed and the majority reported owning their own house (45%). Only a few
participants indicated that they were always able to meet their basics needs (9%).

Approximately 36% took less than 1 hour to travel to the clinic.

PLH in our study with under 5 years of ART represented 43% of the sample, while 34%
had between 5-9 years of ART and 22% had 10 years or more. The mean time receiving ART
was 5.84 years. A vast majority (78%) were on the 1st line regimen.
Most patients reported that their adherence to ART was excellent. A subgroup analysis was performed, comparing groups on 1st and 2nd line treatment, defined based on our national guidelines on ART regimens\(^1\). There was no difference in adherence between patients on 1st line versus 2nd line treatment.

Age and ability to meet basic needs were two factors with a significant relationship with poor adherence: the odds of having poor adherence was significantly higher in patients under 40 years compared to those 40 years of age and older (OR: 6.32, 95% CI: 2.04 - 10.58, p< 0.01). Patients who could not meet their basic needs are more likely to have poor adherence (OR: 2.70, 95% CI: 1.04 - 7.00, p=0.03). There was also no difference in the adherence based on gender, area of residence, time taken to get to the hospital, years on ART, education level, employment status and housing status.

Table 1: Sociodemographic characteristics of the study population

| Variables              | N= 411 (%) | 95 CI %     |
|------------------------|------------|-------------|
| **Gender**             |            |             |
| Female                 | 269 (65.4) | 60.6 - 70   |
| Male                   | 142 (34.5) | 30 - 39.40  |
| **Age**                |            |             |
| <30                    | 63 (15.3)  | 12.26 - 19.06 |
| 30 – 39                | 91 (22.1)  | 18.28 - 26.53 |
| 40 – 49                | 113 (27.4) | 23.29 - 32.13 |
| 50 – 59                | 99 (24)    | 20.09 - 28.58 |
| 60 – 69                | 33 (9)     | 5.67 - 11.20 |
| ≥70                    | 12 (2.9)   | 1.59 - 5.18  |
| **Area of residence**  |            |             |
| Rural                  | 242 (58.8) | 53.94 - 63.65 |
| Urban                  | 169 (41.1) | 36.35 - 46.06 |
| **Education level**    |            |             |
| No Education           | 150 (36.5) | 31.87 - 41.38 |
| Primary School         | 171 (41.6) | 36.82 - 46.55 |
| Secondary School       | 85 (20.6)  | 16.93 - 24.99 |
| Graduated              | 3 (0.7)    | 0.19 - 2.30  |
| College                | 2 (0.4)    | 0.08 - 1.94  |
| **Employment status**  |            |             |

Table 2: Clinical characteristics of the patients

| Variables                        | N= 411 (%) | 95 CI % |
|----------------------------------|------------|---------|
| Duration on ART                  |            |         |
| 0 – 4                            | 179 (43.5) | 38.72 - 48.51 |
| 5 – 9                            | 141 (34.3) | 29.76 - 39.15 |
| ≥10                              | 91 (22.1)  | 18.28 - 26.53 |
| Adherence                        |            |         |
| Excellent                        | 337 (82)   | 77.86 - 85.52 |
| Very Good                        | 30 (7.3)   | 5.06 - 10.37 |
| Good                             | 26 (6.3)   | 4.25 - 9.25 |
| Acceptable                       | 4 (0.9)    | 0.31 - 2.65 |
| Poor                             | 14 (3.4)   | 1.95 - 5.79 |
| ART regimen                      |            |         |
| 1<sup>st</sup> line              | 321 (78.1) | 73.73 - 81.94 |
| 2<sup>nd</sup> line              | 90 (21.9)  | 18.06 - 26.27 |

Table 3: Association of demographic, socioeconomic and clinical factors with poor adherence to ART

| Variables                     | Odds ratio (95% CI) | p value |
|-------------------------------|---------------------|---------|
| Gender (Male*) Female         | 1.39 (0.48-3.98)    | 0.53    |
| Age (years) (≥40) <40         | 6.32 (2.04-10.58)   | < 0.01  |
| Area of residence (Urban) Rural | 2.53 (0.81-7.83) | 0.14    |
| **Education level** | (Schooled)  | 1.11 (0.42-2.93) | 0.82 |
|----------------------|-------------|------------------|------|
| *Not Schooled*       |             |                  |      |
| **Employment status**| (Employed)  | 1.80 (0.68-4.74) | 0.22 |
| *Unemployed*         |             |                  |      |
| **Housing status**   | (Non-Owner) | 1.89 (0.72-4.99) | 0.18 |
| *Owner*              |             |                  |      |
| **Ability to meet basic needs** | (Yes) | 2.70 (1.04-7.00) | 0.03 |
| *No*                 |             |                  |      |
| **Time taken to get to hospital** | (<2h) | 2.43 (0.88-6.71) | 0.07 |
| *≥2h*                |             |                  |      |
| **Years on ART**     | (≥5)        | 2.10 (0.79-5.54) | 0.12 |
| *<5*                 |             |                  |      |
| **ART regimen line** | (2nd line)  | 2.30 (0.52-10.23)| 0.38 |
| *1st line*           |             |                  |      |

*Category in parentheses represents the reference group.*

**DISCUSSION**

To our knowledge, this was the first study to assess ART adherence among PLH in the central region of Haiti. Based on their self-descriptions, the majority of the PLH were females, under 50 years of age, living in a rural area within one hour’s travel from the hospital. Most were homeowners, had received at least primary school education, had a job, and were “sometimes” able to meet their basic needs. Most had been receiving ART for 10 years, were on the first line ART regimen based on national guidelines, and estimated that their adherence was “excellent”. Only two factors showed a significant association with poor adherence: age and their ability to meet their basic needs.

Age was found to be an important factor related to poor adherence in our study. Patients under the age of 40 were more likely to have poor adherence than patients over 40 years of age. Our results are consistent with previous studies in similar settings. According to these studies, older patients had better compliance with their medication regimen because they were more used to the routine. The survival instinct was also mentioned in these studies: the elderly patient, in decline, recognized that their life expectancy would be prolonged through good adherence. Adolescents and young adults were at increased risk of treatment failure due to multiple social, psychological and adherence barriers.

The number of years receiving treatment was not associated with poor adherence according to our data. Although we found a trend towards an association between a shorter...
therapy duration and poor adherence, this trend did not reach statistical significance. We did not find any studies that investigated the relationship between the therapeutic regimen and compliance, although some studies found poor compliance in patients experiencing side effects to ART. It is possible who patients who have been on therapy for a longer duration may be more used to taking their medication, are likely to be more stable with respect to their treatment and disease management, and hence may be more likely to demonstrate better adherence. Patients who have been on therapy for a longer period may also be more aware of the risks of non-adherence with respect to prior experience of the emergence of disease symptoms, e.g.: history of opportunistic infections and co-morbidities.

PLH’s self-reported inability to meet their basic needs was the only variable apart from age to show a statistically significant relationship with adherence. This is in spite of the fact that ART is free of charge in Haiti; were treatment not free, it would likely pose an even greater barrier to treatment adherence. Only 9% said they could always meet their basic needs compared with 27.98% who could never meet their needs. Not being able to meet their basic needs was associated almost a three times greater odds of poor adherence.

There was no significant relationship with adherence and several other variables that could have potentially been linked to a patient’s ability to support him/herself. There was no difference in adherence by employment status. However, another study found that the direct effects of workload could interfere with patient adherence due to physical and mental fatigue, work schedule, etc. Being a non-homeowner, according to a study in the United States, was associated with poor adherence. More than half of our sample either rented or lived with family or friends. Living in poor housing conditions could have contributed to poor adherence due to the patient having been concerned about his/her living conditions. The degree of social interaction, however, has also been found to be associated with adherence whereby living alone
has been shown to be associated with poor adherence while interacting with people and social activities have been shown to have a positive effect on adherence.

Education was another area where we did not find a clear association with adherence. Haiti is a country where the literacy rate for adults (15 years and over) is only 61%, and the Central Plateau region of the country has the highest rate of illiteracy. Accordingly, the level of education of the sample was generally very low. Other studies have demonstrated a link between HIV morbidity and mortality with the level of educational attainment, even in a setting of better socio-economic context than ours. Surprisingly, we found no statistically significant difference between adherence among those that had been schooled compared with those who had received no schooling. Other studies have demonstrated a link between HIV morbidity and mortality with the level of educational attainment, even in a setting with a higher average level of overall educational attainment than ours. One study reported a positive association between education level and adherence. It is possible that limited variability of literacy and educational attainment might have resulted in no association with adherence for these factors in the present study; however, given the high rates of illiteracy and the limited ability to meet basic needs it is likely that access to education could potentially improve adherence to ART in this area.

In this study, PLHs’ challenges with “meeting their needs” may have served as a general indicator of the poor socioeconomic conditions of the study participants. Low income has been associated with poor adherence in some studies. Conversely, income level was also not associated with poor adherence in a study in India, where ART was free as it was in this study.

We found a trend towards a travel duration to the hospital of $\geq 2\text{h}$ and poor ART adherence, although this did not reach statistical significance. Lengthy travel time could pose a problem for ART refills and adherence with visits. Most participants lived in rural regions (58.9%). A previous study revealed poorer adherence amongst patients in rural areas compared with those from urban areas. Among the obstacles reported in that study were difficult and
expensive means of transport. The roads in Central Haiti are, overwhelmingly, in poor
c condition. The means of transports are limited to taxi-motorcycles with no bus or taxi-vehicles
travelling between Hinche and neighboring cities. Moreover, in the rainy season, it is even more
difficult to access the city where the hospital is located. A study carried out in a socio-economic
context which was similar to ours also confirmed that distance plays a significant factor in
patient compliance\textsuperscript{20}. In yet another study, not having money for transportation was a
statistically significant factor in poor adherence\textsuperscript{21}.

This study noted no difference in adherence by gender, despite the greater overall burden
of HIV among women in Haiti. According to the Haiti Demographic and Health Survey VI
\textsuperscript{(EMMUS VI)}, 2.3% of women are infected with HIV compared to 1.6% of men. In the Central
Department, 1.5% of women are infected compared to 0.9% in men\textsuperscript{22}. One study reported a
lower number of ART clinic visits among women compared with men. However, assistance
with childcare was associated with a notable increase in clinic attendance\textsuperscript{23}.

There were a number of limitations to our study. First, adherence was estimated by
patients self-reports, using a clinically accepted but subjective method. Thus, there could have
been the risk of compromised patient recall and/or socially desirable responses which, could
have potentially reduced the validity of the measure. Second, the study did not include pill
counts. Therefore, we did not have an objective measure of the adherence of participants. Third,
we did not assess clinical parameters such as clinical stage, medical history, presence of
opportunistic infections, CD4 count and viral load. These factors could have directly impacted,
and have been impacted by patient adherence. Fourth, this study was based only in Central Haiti
and may not be generalizable to the rest of Haiti, nor to other settings. Fifth, the cross-sectional
nature of the study meant that only associations were assessed, and causal inferences could not
be made. Last, the study may have been underpowered to detect significant associations for
some of the variable studied.
In conclusion, this study represents a crucial first step in identifying potentially high risk groups of PLHs who may need help to improve their adherence to ART therapy, based on socio-demographic and economic determinants of adherence to HIV treatment. Among the variables tested, younger age and inability to meet one's basic needs were both factors related to self-reported poor adherence. Particular attention should also be paid to the distance and/or mode of transport of patients to healthcare facilities, especially those in rural areas and also to those that are earlier on in their disease management journey who may need more help with their treatment. Further studies in other HIV patient care centers, using more objective methods of adherence measurement and exploration of other potential predictors of adherence are recommended.

**LIST OF ABBREVIATIONS**

ART Antiretroviral therapy

Confidence Interval CI

HIV Human immunodeficiency virus

OR Odds ratio

PLH People living with HIV

TB Tuberculosis

WHO World Health Organization

**DECLARATIONS**

**Ethics approval and consent to participate**

The protocol for this study was reviewed and approved by the Zanmi Lasante Insitutional Review Board (ZLIRB) and the board of St Therese Hospital. Written informed consent was obtained from all participants in the study.

**Consent for publication**
Availability of data and materials
The datasets used and analyzed during the current study are available from the corresponding authors through reasonable request.

Competing interests
The authors declare that they have no competing interests

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The authors declare that they have not requested or used any source of funding

Author contributions
Dorcélus Ludentz made substantial contributions to this study including study design, data analysis and interpretation and was primarily responsible for drafting the manuscript.

Bernard Joseph Jr was involved with the study design, data analysis, interpretation and contributions to drafting the manuscript.

Constant Georgery was involved with the study design, data interpretation and contributions to drafting the manuscript.

Clerveau Vanessa interviewed the patients, helped with data interpretation and made contributions to drafting the manuscript.

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