Quality of sleep and associated factors among people living with HIV/AIDS on follow up at Ethiopian Zewditu Memorial Hospital, 2018

CURRENT STATUS: Under Review

Sleep Science and Practice • BMC

Nebiyu Mengistu, Telake Azale, Solomon Yimer, Mahilet Fikreyesus, Elsa Melaku, Seid Shumye

Nebiyu Mengistu
Dilla University

Telake Azale
University of Gondar

Solomon Yimer
Dilla University

Mahilet Fikreyesus
Amanuel Mental Specialized Hospital

Elsa Melaku
Amanuel Mental Specialized Hospital

Seid Shumye
Dilla University

Corresponding Author
sopsycha@gmail.com

ORCiD: https://orcid.org/0000-0003-0110-3792

Prescreen

10.21203/rs.3.rs-26745/v1
Subject Areas

*Psychiatry* *Neurology*

Keywords

*quality of sleep, HIV/AIDS, Zewditu Memorial Hospital*
Abstract

Background

Sleep disturbance is a common complaint in people living with HIV/AIDS. Those individuals with it are less likely to adhere to their antiretroviral therapy regimens, have decreased quality of life, have decreased work productivity as well as it may increase the risk for psychiatric disorders, cardiovascular morbidity and disease progression. However, it is not well studied in Ethiopia.

Methods

An institution based cross-sectional study was utilized among 408 participants selected by systematic sampling technique. The Pittsburgh Sleep Quality Index questionnaire was used to measure sleep quality. Binary and multivariable logistic regression models were fitted. Odds ratios (OR) with the corresponding 95% confidence interval (95%CI)) was computed to assess the strength of association. P-value < 0.05 was considered as statistically significant.

Results

The magnitude of poor sleep quality was 55.6%. Being female [AOR = 3.40, 95% CI: (1.80, 6.41)], depression [AOR = 3.52, 95% CI: (1.95, 6.32)], CD4 count ≤ 200 cells/mm3 [AOR = 3.18,95%C: (1.65,6.13)], duration of HIV/AIDS diagnosis [AOR = 3.43,95% CI: (1.61,7.29)], current use of tobacco [AOR = 5.69, 95% CI: (2.04,15.9)] and chat or caffeinated drinks [AOR = 2.65, 95% CI: (1.06,6.64)] and poor sleep hygiene [AOR = 3.55, 95% CI: (1.85, 6.78)] were significantly associated with poor sleep quality.

Conclusions

More than half of the study participants were found to have poor sleep quality. Routine screening of sleep condition among people living with HIV/AIDS and early intervention based on the findings is suggested.

Background

Sleep is a natural process that the brain requires to keep proper functioning and maintain the health of the human body. Sleep occupies one third of human life and its deprivation causes negative consequences that may be physical, cognitive, or emotional. Suffering from inadequate sleep has been associated with chronic medical illness like diabetes, stroke, heart disease and Human immunodeficiency virus or Acquired immune deficiency syndrome (HIV/AIDS) [1, 2].

HIV/AIDS is a chronic, potentially life threatening condition caused by the HIV, which affects mostly the immune system and nervous system. It’s among the most overwhelming health problems throughout the world and especially in developing countries [3]. It is estimated that 36.7 million people are living with HIV/AIDS in the world. In Ethiopia, the national adult HIV/AIDS prevalence has been reported to be 1.14%. It has been estimated that 542,121 adults and 178,500 children require antiretroviral treatment in Ethiopia [4]. Sleep disturbance is one of the most prevalent symptoms in individuals infected with HIV/AIDS where 40% to 70% of individuals infected with HIV/AIDS are reporting significant sleep disturbances, including difficulty falling asleep, awakenings during the night, and reduced sleep time [5-7].

Sleep disturbance among people living with HIV/AIDS occurs throughout the stages of the infection, but more prevalent in the advanced stage. Despite this fact, still it receives little attention[8]. This may be, because it is considered as a normal consequence of the disease and its treatment, or considered to be insignificant in comparison with other complications of HIV infection [9].

But sleep deprivation among people living with HIV/AIDS leads to various effects, such as impaired immune
system, hampered physical performance, affected cell growth and repair, deteriorated neuronal connections and neuronal malfunctions [10]. In addition, it may also increase the risk of cardiovascular morbidity and mortality, and the degree of suffering with psychiatric disorders [11].

According to study results, sleep disturbance is not only prevalent, but also there are more intense and distressful symptoms experienced by the HIV population. As a result, such individuals are less likely to adhere to their antiretroviral therapy regimens probably as a result of depression [6, 12-14].

A cross-sectional surveys conducted in China and France showed that prevalence of sleep disturbances and Poor sleep quality was 43.1% and 47% respectively. Prevalence of sleep disturbances differed significantly between those who suffered anxiety and depression and those who did not. Moreover, being male, a smoker, living single, being unemployed or moderately or seriously depressed were significantly associated with poor sleep quality [15, 16].

According to a survey conducted in Latin America countries Mexico and South East Brazil 58.6% and 46.7% had poor sleep quality respectively. Depressive symptoms, illicit drug use, a CD4 count < 200 cells/μl, and longer duration of HIV/AIDS diagnosis was positively associated with poor sleep quality[17, 18].

Similarly, studies conducted in Nigeria among HIV-positive outpatients reported that 46.2% in University of Calabar Teaching Hospital and 59.3% in Lagos State University Teaching Hospital had sleep disorders and poor sleep quality respectively. Elevated systolic blood pressure, shorter duration of HIV diagnosis and HAART type were associated with sleep disorders and poor sleep quality [19, 20].

Despite this significant health problems and higher prevalence, sleep quality among people with HIV/AIDS remains under-studied with no published study in Ethiopia. Therefore, the aim of this study was to assess the magnitude of sleep quality and it’s among people living with HIV/AIDS in Zewditu Memorial Hospital, Ethiopia.

### Methods

**Study design, period, setting, and population**

An institutional-based cross-sectional study was conducted from April to May 2018 in Zewditu Memorial Hospital which is found in Addis Ababa, Ethiopia. CDC-Ethiopia helped launch an Ethiopia’s first ART program at ZMH in July 2003, and in March 2005 it received technical assistance from Johns Hopkins University’s (JHU) TSEHAI Program. ZMH became the largest HIV clinic in Ethiopia and a leading hospital in the treatment of ART patients. Currently, it treats over 7299 each month. There were 17,857 HIV-positive patients having HIV care follow-up in the hospital in 2018. The study population was patients who were attending at ART clinics during the data collection period. All adults who were seriously ill and unable to communicate were not included in the study.

**Sample size and sampling technique**

Sample size (n) was calculated based on single population proportion formula, by assuming 95% confidence level, the prevalence of poor sleep quality among HIV/AIDS patients which was found to be 59.3% in Nigeria [20] and a precision of 5% between the sample and the parameter was taken. $\alpha =0.05(95\%) =1.96$
By considering a 10% non-response rate the final sample size was 408. We used a systematic sampling technique to select the four hundred eight (408) HIV/AIDS patients who were included in our survey. We determined the sampling interval by dividing the total study population who had to follow up during the average 1-month data collection period (3264) by total sample size (408). Hence, the sample interval is 8. We selected the first study participant by lottery method and the next study participants were chosen at regular intervals (every 8th interval) and interviewed by data collectors.

### Data collection tools and procedures

Data were collected by trained nurses by face-to-face interviewing of the participant (people who are HIV/AIDS positive and attending ART service). The questionnaire was pre-tested by taking 5% of the calculated sample size. The questionnaire contained socio-demographic characteristics (age, income, education, occupation, marital status, and others). Semi-structured questionnaires were used to collect data on clinical factors.

Data on the magnitude of sleep quality was collected by using the Pittsburgh Sleep Quality Index (PSQI), a self-report measure instrument composed of 19 items evaluating seven components of sleep. Each part was scored (range: 0-3; higher scores indicating worse sleep). A total global PSQI was derived by summing the seven components (range: 0 to 21; higher scores indicating poor sleep quality). A global PSQI score >5 yielded a diagnostic sensitivity of 89% and specificity of 86.5 % (κ=0.75, p≤0.001) in distinguishing “good” from “poor” sleepers. “Good sleep” was defined as global PSQI scores of 0-5 and “poor sleep” was global PSQI scores of 6-12[21].

Hospital anxiety and depression scale (HADS) were used to assess anxiety and depression. The HADS has two subscales: the anxiety subscale (HADS-A) and the depression subscale (HADS-D). It has a cutoff point ≥ 8 for each subscale [22]. HIV/AIDS related stigma scale was used to assess stigma. It is a 12-item screening tool developed by Annelies Van Rie, Sohini Sengupta. The tool has 4-point Likert response. Each items were scored with 0 (strongly disagree) and 3 (strongly agree). Participants who scored above the mean score were considered as stigmatized[22, 23].

Sleep hygiene index (SHI), a 13-item self-report measure designed to assess the practice of sleep hygiene behaviors. Each item is rated on a five-point scale ranging from 0 (never) to 4 (always). Total scores range from 0 to 52 with a higher score representing poor sleep hygiene[24]. Social support measured using Oslo 3 items social support scale (OSS-3)[25].

### Data quality control issues

Training was given to the data collectors and supervisors on the data collection tool and sampling techniques by the researcher. Supervision was held regularly during the data collection period both by the researcher, co-investigators and supervisors to check on a daily basis for completeness and consistency.

### Analysis

Data were analyzed using SPSS version 20. Description statistics (frequencies, proportions, means, and standard deviations) were used to present the sociodemographic and the prevalence of domestic violence. Both bivariate and multivariate logistic regression analysis were carried out to see the association of each independent variable
with the outcome variable. A p-value of less than 0.05 was considered statistically significant, and an adjusted odds ratio with 95% CI was calculated to determine the association.

**Ethical clearance**

Ethical clearance was obtained from the joint ethics committee of the University of Gondar and Amanuel Mental Specialized Hospital and Addis Ababa health bureau. The purpose and importance of the study were explained to each participant before they proceed into actual activities. Confidentiality was maintained by anonymous questionnaire and informed consent was obtained from each participant.

### Results

A total of 396 study participants were interviewed, giving a response rate of 97.1%. The mean age of the respondents was 38.57 years with SD (± 10.76). The proportion of male to female participants was almost equal (50.3–49.7%). More than half of the client’s 276 (69.7%) were Orthodox by religion and most of the respondents were married 208 (52.5%) and regarding the education level of the respondents 176(44.4%) had attended secondary school (Table 1)

#### HIV related clinical characteristics of the participants

Among the study participants, the majority 294(74.2%) was on clinical stage I, 219 (55.3%) had greater than 200 cells/mm$^3$ of $CD_4$ count, 296 (74.7%) on the first line regimen of ART drugs and 272 (68.7%) had duration of HIV/AIDS diagnosis greater than 10 years (Table 2).

#### Psycho-social characteristics of the participants

According to psycho-social characteristics, more than half (51.5%) were depressed, 109 (27.5%) of the participants had general anxiety disorder symptoms, 194(49.0%) of them were stigmatized and 164 (41.4%) had poor social support. Among 197 female participants, 117 (59.4%) and of 199 males 87 (43.7%) had depression.

#### Behavioral characteristics of respondents

The current use of substances among 396 study participants was 206 (52.0%). Among those with substance users, majority 183 (46.2%) use alcohol followed by 109 (27.5%) tobacco (Fig. 1).

#### Poor sleep quality and Factors associated among people with HIV/AIDS

The magnitude of poor sleep quality among people living with HIV/AIDS was found to be 55.6%. Multivariable logistic regression revealed female sex, depression, CD4 less than 200 cells/mm$^3$ count, duration of HIV/AIDS diagnosis, current use of tobacco, current use of chat or caffeinated drinks and poor sleep hygiene were significantly associated with poor sleep quality.

The magnitude of poor sleep quality was found to be more than 3 times higher in females compared to males [AOR = 3.40, 95% CI: (1.80, 6.41)]. The odds of having poor sleep quality among depressed respondents were 3.52 times higher as compared to non-depressed respondents [AOR = 3.52, 95% CI:(1.95, 6.32)]. The odds of experiencing poor sleep quality among Participants with shorter duration of HIV diagnosis were more than three times as compared to those who had longer duration of diagnosis [AOR = 3.43,95% CI : (1.61,7.29)]. Similarly, Individuals whose $CD_4$ count were less than 200cells/mm$^3$ were 3.18 times more likely to develop poor sleep quality than individuals with $CD_4$ counts greater than 200cells/mm$^3$ [AOR = 3.18, 95% CI: (1.65,6.13)]. Regarding substances, those who smoke cigarette currently had 5.69 times more likely to develop poor sleep quality as compared with non-smokers [AOR = 5.69, 95% CI: (2.04, 15.9)]. In addition, those taking chat or caffeinated drinks 2.65 higher to have poor sleep quality as compared to those who didn’t use [AOR = 2.65,95%CI: (1.06,6.64)]. Finally, The odds of were poor sleep quality was 3.55 times higher among participants with poor sleep hygiene as compared to those with good sleep hygiene [(AOR = 3.55, 95%CI: (1.85, 6.78)] (Table 3).
This study was a first attempt to ascertain the magnitude of sleep quality and its possible association with various variables among people living with HIV/AIDS in Ethiopia. The results from the current survey revealed that a remarkable proportion of people living with HIV/AIDS had experienced poor sleep quality. More than half of the people living with HIV/AIDS (55.6%) experienced poor sleep quality. The magnitude of this study is in line with the studies conducted in Nigeria (59.3%), South Africa (55.8%), Indonesia (52%) and Mexico (58.6%) [17, 20–22].

Contrarily, the magnitude of poor sleep quality in this study was higher than study results in Brazil (46.7%) [18], Iran (47.5%) [23], China (43.1%) [15], Romania (42%) [24], Spain (40.9%) [25], France (47%) [16] and USA (26%) [26]. Furthermore the current finding is lower than the study conducted in USA 66.7% [27]. The possible reason the observed variation might be the difference in socio-cultural variations, variation in and hospital setting and caring modality.

In this study, poor sleep quality was significantly associated with female gender among people with HIV/AIDS. This could be due to the fact that females are more prone to stress due to the burden of excessive household responsibilities and changes in hormonal level. This result is supported by a study carried out in Nigeria [20].

The current study also found that depressed respondents were significantly associated with poor sleep quality as compared with non-depressed respondents. This may be due to depressed individuals have decreased serotonin neurotransmitters that results in diminished cognitive performance affects normal sleep pattern. This finding is in agreement with studies done in China [15], Europe and USA [16, 26–29]

CD4 count less than 200 cells/mm³ were a significant factor to develop poor sleep quality among people with HIV/AIDS. Probably, immune system is directly linked to the brain by a complex network of nerves, hormones, and neuropeptides. This network of specific physiological pathways is the primary determinant of neuropathology to have a direct impact on health including sleep. The finding of this study coincides with a study done in Nigeria [19, 20] and Mexico [26].

Similarly, shorter duration of HIV diagnosis were significantly associated with poor sleep quality as compared longer duration of diagnosis. The possible reasoning might be HIV-positive patients feel stigmatized and this may contribute to frequent psychological stress and emotional disturbances. The result supported by research conducted in Nigeria [20].

Furthermore, use of substances within the current three months (i.e. tobacco, chat or caffeinated drinks) were significantly associated with poor sleep quality. The possible reasons behind these is biological effect of the substances on the brain results in disturbance of circadian rhythms which is associated with symptoms of poor sleep quality. This finding agrees with a study conducted in France [16], US geographic areas [30, 31] and studies conducted in Ethiopia at community level [32, 33].

Finally, in the present study there is a strong relationship between poor sleep hygiene and poor sleep quality. Even if, the finding of this study has no corresponding literature among the same population, it’s supported by study undertaken in India to identify the relationship between sleep hygiene practices and sleep quality among cancer patients [34].

In summary, this study revealed that more than half of people living with HIV/AIDS were found to have poor sleep quality. Being female, diagnosis of depression, lower CD4 count, shorter duration of HIV/AIDS diagnosis, current use of tobacco, chat or caffeinated drinks and poor sleep hygiene were factors significantly associated
with poor sleep quality. The findings suggest that routine screening of sleep disturbances among people living with HIV/AIDS is highly recommended. It’s also better to integrate mental health program with HIV/AIDS assessment and ART service delivery programs.

**Abbreviations**

AOR: Adjusted odd ratio; CI: Confidence interval; PSQI: Pittsburgh Sleep Quality Index

**Declarations**

- **Ethics approval and consent to participation**

Ethical approval was obtained from joint Ethical Review Committee of University of Gondar and Amanuel Mental Specialized Hospital (No Committee reference number). Written consent was taken from the participants for their voluntary participation. Confidentiality was maintained throughout the study process.

**Consent to publication:** N/A

- **Availability of data and materials.**

All data generated or analyzed during this study are included in this published article. The data sets of the current study is available from [Nebiyu Mengistu, email: nebiyumen@gmail.com ; Mobile: +251931333504, Dilla university, Dilla] upon reasonable request

- **Competing interests**

We declare that there is no any financial or non-financial conflict of interest

- **Funding**

The sources of funding for the current research is from Amanuel Mental specialized Hospital. The funding organization did not have any role in the design of the study, collection, analysis, interpretation of data and in writing the manuscript.

**Authors’ contributions**

Nebiyu Mengistu (nebiyumen@gmail.com) organized the original investigation; coordinated the collection of data; analysis and writing report. Telake Azale (atelake07@gmail.com), Mahlet Fikreyesus (mahifyf@gmail.com) and Elsa Melaku (elsa_mlk@yahoo.com) equally contributed to the design of the study, performed the statistical analyses, Solomon Yimer (sopsycha@gmail.com) and Seid Shumye (Seidshumye22@gmail.com) contributed to the statistical analyses, drafted the manuscript and revision of the Manuscript.

**Acknowledgements**

We would like to thank Amanuel Mental Specialized Hospital, University of Gondar and Zewditu Memorial Hospital staffs for their support and assistance throughout the study process.

**References**

1. Barlow DH: Clinical handbook of psychological disorders: A step-by-step treatment manual: Guilford publications; 2014.
2. Association AP: Diagnostic and statistical manual of mental disorders (DSM-5®): American
3. Johnston L, O'Malley P, Bachman J, Schulenberg J, Patrick M, Miech R: *HIV/AIDS: Risk & protective behaviors among adults ages 21 to 40 in the US, 2004-2016*. 2017.

4. Azagew AW, Woreta HK, Tilahun AD, Anlay DZ. High prevalence of pain among adult HIV-infected patients at University of Gondar Hospital, Northwest Ethiopia. Journal of pain research. 2017;10:2461.

5. Taibi DM. Sleep disturbances in persons living with HIV. J Assoc Nurses AIDS Care. 2013;24(1):72-85.

6. Reid S, Dwyer J. Insomnia in HIV infection: a systematic review of prevalence, correlates, and management. Psychosom Med. 2005;67(2):260-9.

7. Rubinstein ML, Selwyn PA. High prevalence of insomnia in an outpatient population with HIV infection. Journal of Acquired Immune Deficiency Syndromes Human Retrovirology. 1998;19:260-5.

8. Junqueira P, Bellucci S, Rossini S, Reimão R. Women living with HIV/AIDS: sleep impairment, anxiety and depression symptoms. Arq Neuropsiquiatr. 2008;66(4):817-20.

9. McGrath L, Reid S: *Sleep and Quality of Life in HIV and AIDS*. In: *Sleep and Quality of Life in Clinical Medicine*. edn.: Springer; 2008: 505-514.

10. Qaseem A, Kansagara D, Forcier MA, Cooke M, Denberg TD. Management of chronic insomnia disorder in adults: a clinical practice guideline from the American College of Physicians. Ann Intern Med. 2016;165(2):125-33.

11. Gamalde CE, Gamalde A, Creighton J, Salas RE, Selnes OA, David PM, Mbeo G, Parker BS, Brown A, McArthur JC: Sleep and cognition in an HIV + cohort: a multi-method approach. *Journal of acquired immune deficiency syndromes* (1999) 2013, 63(5).

12. Saberi P, Neilands TB, Johnson MO. Quality of sleep: associations with antiretroviral nonadherence. AIDS Patient Care STDs. 2011;25(9):517-24.

13. Babson KA, Heinz AJ, Bonn-Miller MO. HIV medication adherence and HIV symptom severity: the roles of sleep quality and memory. AIDS Patient Care STDs. 2013;27(10):544-52.

14. Hudson A, Kirksey K, Holzermer W. The influence of symptoms on quality of life among HIV-infected women. West J Nurs Res. 2004;26(1):9-23.

15. Huang X, Li H, Meyers K, Xia W, Meng Z, Li C, Bai J, He S, Cai W, Huang C. Burden of sleep disturbances and associated risk factors: a cross-sectional survey among HIV-infected persons on antiretroviral therapy across China. Sci Rep. 2017;7(1):3657.

16. Allavena C, Guimard T, Billaud E, De la Tullaye S, Reliquet V, Pineau S, Hüm H, Supiot C, Chennebault J-M, Michau C. Prevalence and risk factors of sleep disturbance in a large HIV-infected adult population. AIDS Behav. 2016;20(2):339-44.

17. Ferreira LTK, Ceolim MF. Sleep quality in HIV-positive outpatients. *Revista da Escola de Enfermagem da USP* 2012.

18. Rodríguez-Estrada E, Iglesias-Chiesa MC, Fresán-Orellana A, Reyes-Terán G. Factors associated with poor sleep quality among HIV-positive individuals in Mexico City. Salud mental. 2018;41(3):123-9.

19. Babson KA, Heinz AJ, Bonn-Miller MO. HIV medication adherence and HIV symptom severity: the roles of sleep quality and memory. AIDS Patient Care STDs. 2013;27(10):544-52.

20. Hudson A, Kirksey K, Holzemer W. The influence of symptoms on quality of life among HIV-infected women. West J Nurs Res. 2004;26(1):9-23.

21. Huang X, Li H, Meyers K, Xia W, Meng Z, Li C, Bai J, He S, Cai W, Huang C. Burden of sleep disturbances and associated risk factors: a cross-sectional survey among HIV-infected persons on antiretroviral therapy across China. Sci Rep. 2017;7(1):3657.

22. Allavena C, Guimard T, Billaud E, De la Tullaye S, Reliquet V, Pineau S, Hüe H, Supiot C, Chennebault J-M, Michau C. Prevalence and risk factors of sleep disturbance in a large HIV-infected adult population. AIDS Behav. 2016;20(2):339-44.
sleep quality among HIV-positive individuals in Mexico City. Salud Mental. 2018;41(3):123–9.

27. Redman K. **Sleep quality and immune changes in HIV positive people in the first six months of starting highly active antiretroviral therapy (HAART).**

28. Dabaghzadeh F, Khalili H, Ghaeli P, Alimadadi A. Sleep quality and its correlates in HIV positive patients who are candidates for initiation of antiretroviral therapy. Iranian journal of psychiatry. 2013;8(4):160.

29. Arbune M, Dumitru I-M, Cretu-Stuparu M. Characteristics of sleep disorders in Romanian adults infected with human immunodeficiency virus. ARS Medica Tomitana. 2017;23(3):126–31.

30. Crum-Cianflone NF, Roediger MP, Moore DJ, Hale B, Weintrob A, Ganesan A, Eberly LE, Johnson E, Agan BK, Letendre S. Prevalence and factors associated with sleep disturbances among early-treated HIV-infected persons. Clin Infect Dis. 2012;54(10):1485–94.

31. Ramamoorthy V, Campa A, Rubens M, Martinez SS, Fleetwood C, Stewart T, Liuzzi JP, George F, Khan H, Li Y. Caffeine and Insomnia in People Living With HIV From the Miami Adult Studies on HIV (MASH) Cohort. J Assoc Nurses AIDS Care. 2017;28(6):897–906.

32. Manzar MD, Salahuddin M, Maru TT, Dadi TL, Abiche MG, Abateneh DD, Pandi-Perumal SR, Bahammam AS. Sleep correlates of substance use in community-dwelling Ethiopian adults. Sleep Breathing. 2017;21(4):1005–11.

33. Berhanu H, Mossie A, Tadesse S, Geleta D: **Prevalence and Associated Factors of Sleep Quality among Adults in Jimma Town, Southwest Ethiopia: A Community-Based Cross-Sectional Study.** Sleep disorders 2018, 2018.

34. Roselin V, Rhenius1 JA. **Relationship of Sleep Hygiene Practices and Sleep Quality among Cancer Patients.** IOSR Journal of Nursing and Health Science (IOSR-JNHS) (Jan.- Feb.2018), Volume 7(Issue 1 Ver. II.):2320–1940.

### Tables

Table 1: Socio demographic characteristics of people living with HIV/AIDS on follow at Zewditu Memorial Hospital, Ethiopia, 2018.(n=396)

| Variable       | Category   | Frequency | Percentage |
|----------------|------------|-----------|------------|
| Age(mean or SD)|            | 38.57±10.76                                      |
| Sex            | Male       | 199       | 50.3       |
|                | Female     | 197       | 49.7       |
| Religion       | Orthodox   | 265       | 66.9       |
|                | Muslim     | 24        | 6.1        |
|                | Protestant | 84        | 21.2       |
|                | Others     | 23        | 5.8        |
| Marital status | Single     | 166       | 41.9       |
| Educational status                  | Count | Percentage |
|------------------------------------|-------|------------|
| Can’t write and read               | 20    | 5.1        |
| Primary                            | 88    | 22.2       |
| Secondary                          | 176   | 44.4       |
| Tertiary and above                 | 112   | 28.3       |

| Job of participants                | Count | Percentage |
|------------------------------------|-------|------------|
| Employed                           | 154   | 38.8       |
| Private business                   | 150   | 37.9       |
| Students                           | 66    | 16.7       |
| Others ***                         | 26    | 6.6        |

| Living arrangement                 | Count | Percentage |
|------------------------------------|-------|------------|
| with family                        | 244   | 61.6       |
| alone                              | 133   | 33.6       |
| Others****                         | 19    | 4.8        |

N.B. * Catholic, Wakifeta  ** Separated, Divorced, widowed  *** Daily laborer, House wife, Farmer  **** with relatives, Adopted

Table 2. HIV related clinical characteristics of people living with HIV/AIDS on follow up at Zewditu Memorial Hospital, Addis Ababa, Ethiopia, 2018. (n=396)
| Variable                        | Category          | Frequency(396) | Percentage |
|--------------------------------|-------------------|----------------|------------|
| WHO clinical stage             | stage I           | 294            | 74.2       |
|                                | stage II          | 59             | 14.9       |
|                                | stage III         | 35             | 8.8        |
|                                | stage IV          | 8              | 2.0        |
| CD4 count                      | ≤ 200 cells/mm³   | 177            | 44.7       |
|                                | > 200 cells/mm³   | 219            | 55.3       |
| Duration of HIV/AIDS diagnosis| ≤ 10 years        | 124            | 31.3       |
|                                | > 10 years        | 272            | 68.7       |
| ART type                       | first line regimen| 296            | 74.7       |
|                                | Second line regimen| 100           | 25.3       |
| Co-morbid chronic medical illness | No               | 255            | 64.4       |
|                                | Yes               | 141            | 35.6       |
| Types of chronic medical conditions | Hypertension   | 47             | 33.4       |
|                                | Diabetes mellitus | 41             | 29.0       |
|                                | Tuberculosis      | 35             | 24.8       |
|                                | Others            | 18             | 12.7       |

Table 3. Factors associated with poor sleep quality among people living with HIV/AIDS at Zewditu Memorial
| Variables     | Categories | sleep quality | COR(95%CI) |
|---------------|------------|---------------|------------|
|               |            | Poor | Good            |              |
| Age           |            |      |                 | 0.98(0.96,1.00) |
| Sex           | Male       | 75   | 124             | 1.00         |
|               | Female     | 145  | 52              | 4.61(3.00,7.06) |
| Depression    | No         | 72   | 120             | 1.00         |
|               | Yes        | 148  | 56              | 4.40(2.88,6.73) |
| Anxiety       | No         | 153  | 134             | 1.00         |
|               | Yes        | 67   | 42              | 1.39(0.89,2.19) |
| Perceived stigma | No    | 78   | 124             | 1.00         |
|               | Yes        | 142  | 52              | 4.34(2.83,6.64) |
| Social support| Poor       | 128  | 36              | 7.11(3.51,14.3) |
|               | Moderate   | 76   | 108             | 1.40(0.72,2.74) |
|               | Strong     | 16   | 32              | 1.00         |
| CD4 count     | >200 cells/mm³ | 79   | 140             | 1.00         |
|               | ≤200 cells/mm³ | 141  | 36              | 6.94(4.38,10.9) |
| Duration HIV  | >10 years  | 115  | 157             | 1.00         |
|               | ≤10 years  | 105  | 19              | 7.54(4.37,13.0) |
|               |            |      |                 | 3.43(1.61,7.29) |
| Co-morbid medical illness | No | 111  | 144             | 1.00         |
|               | Yes        | 109  | 32              | 4.41(2.77,7.03) |
|               |            |      |                 | 0.67(0.2i,1.98) |
|                                | No | Yes   |          |
|--------------------------------|----|-------|----------|
| **Current use of tobacco**     | 123| 164   | 1.00     |
| **Current use of alcohol**     | 84 | 129   | 1.00     |
| **Current use of chat or caffeinated drinks** | 140 | 166   | 1.00     |
| **Sleep hygiene**              | 84 | 109   | 1.00     |
| **Poor**                       | 136| 67    | 2.64(1.75,3.96) |

* N.B. 1.00 references
* *p*-value less than 0.05
** *p*-value less than 0.01

**Figures**

![Current use of substances](image-url)
Figure 1
Current use of substances among people living with HIV/AIDS on follow up at Zewditu Memorial, Addis Ababa, Ethiopia, 2018(n=396).