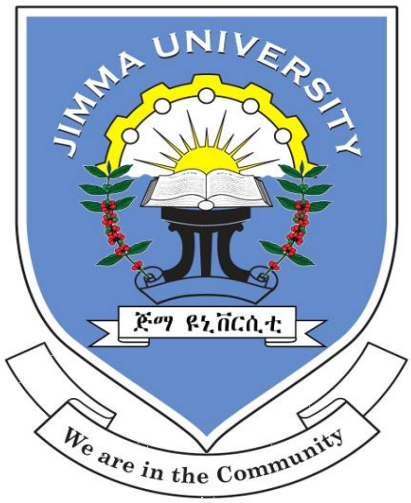

NEUROCOGNITIVE IMPAIRMENT AND ASSOCIATED FACTORS AMONG PEOPLE LIVING WITH HYPERTENSION AND HIV/AIDS ATTENDING FOLLOW-UP TREATMENT AT GOVERNMENT HOSPITALS IN GAMBELLA REGION SOUTHWEST ETHIOPIA; COMPARATIVE CROSS-SECTIONAL STUDY

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A RESEARCH RESULT IS TO BE SUBMITTED TO JIMMA UNIVERSITY, FACULTY OF MEDICAL SCIENCES, DEPARTMENT OF PSYCHIATRY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR A MASTER OF SCIENCE IN INTEGRATED CLINICAL AND COMMUNITY MENTAL HEALTH.

FEBRUARY, 2022

JIMMA, ETHIOPIA

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Abstract

Background: Neurocognitive impairment is a clinical deficit in cognitive function that represents a decline from a previously achieved level of functioning. Neurocognitive impairment is commonly reported in people with HIV and hypertension is likely to become an increasingly important issue necessity of a local profile. Cognitive decline can affect the quality of a patient's life, increases the burden of care on health services. Particularly in environments with limited resources, one requires evidence-based planning and intervention. However, there was few studies have been conducted in the locality to determine and compare the magnitude and associated factors of neurocognitive impairment among people living with HIV/AIDS and hypertension.

Objective: To determine and compare the prevalence of neurocognitive impairment and associated factors among people living with hypertension and HIV/AIDS attending follow-up treatment at government hospitals in the Gambella region, southwest Ethiopia.

Methods: A hospital-based comparative cross-sectional study design was employed from October 10, 2022, to December 9, 2022. The sample size was determined using a double population proportion and a total of 354 People living with HIV/AIDS and 357 individuals with hypertension was enrolled. Proportional allocation was made and systematic random sampling was employed. Data were collected using an interviewer-administered questionnaire and a review of medical records. The Rowland Universal Dementia Assessment Scale was used to screen for neurocognitive impairment. Bivariate and multivariate analysis was carried out and interpreted using odds ratio and 95% confidence interval at p-value < 0.05.

Result: In this study, the prevalence of neurocognitive impairment among people living with HIV/AIDS was 39.8%, which was higher than in patients with hypertension (27.7%). Being female (AOR=2.242, 95% CI= 1.340-3.753), moderate depression (AOR=2.198, 95% CI= 1.211-3.990), moderately severe depression (AOR=4.018,95% CI= 1.266-12.750), anxiety (AOR=2.682, 95% CI=1.225-5.870), obstructive sleep apnea (AOR=4.039, 95% CI= 1.317-12.390), Gaya use (AOR=3.010, 95% CI=1.416-6.394), cigarette use (AOR= 2.183, 95% CI= 1.023-4.655) were significantly associated with neurocognitive impairment among HIV/AIDS patients, similarly, it was also identified among patients with hypertension. However, unlike

hypertension patients, CD4 nadir (AOR= 2.235, 95% CI= 1.248-4.005) and being underweight (AOR=3.043, 95% CI= 1.618-5.724) were found to be predictors of neurocognitive impairment among people living with HIV/AIDS.

Conclusion: In this study, more than one-third and more than one-fourth of people living with HIV/AIDS and hypertension were found to have neurocognitive impairment and different factors were implicated, in areas of the Ethiopian population with limited resources, this emphasizes early screening for the identification of neurocognitive impairment and appropriate treatments, focusing on risk factors.

Keywords: Neurocognitive impairment, HIV infection, and hypertension, Gambella; Ethiopia

Acknowledgment

First, I would like to express my deepest gratitude and appreciation to my advisors Mr.Liyew Agenagnew and Mr.Shimelis Girma Mr. Badiru Dawud for their guidance, support, and encouragement, unreserved precious comment, and frank criticism from the beginning of the proposal writing. Next, I would like to extend my deep thanks to Jimma University, the department of psychiatry for their discussion, and approval of this interesting topic, and for arranging this opportunity to carry out this research. In addition, I would like to pass my gratitude to the Federal Ministry of Health system for strengthening the special support Gambella case team for them providing me with data to accomplish my proposal, and to Majang zoon health office, all hospital staff, for providing necessary support, continuous motivation, and encouragement making this study possible, also Gambella regional health office for offering the opportunity to study and for their financial support. I am grateful to all of my study participants for being voluntary to give me information on my title of work. Finally, my deepest gratitude also goes to all data collectors and supervisors for their cooperation and commitment during data collection.

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List Abbreviation and Acronyms

AIDS; - Acquired Immune Deficiency Syndrome

ANI; - Asymptomatic neurocognitive impairment

ART; - Antiretroviral therapy

CART; - Combination of antiretroviral therapy

DSM; - Diagnostic and Statistical Manual

HAART; - Having active antiretroviral therapy

HAD; - HIV-associated dementia

HAND; - HIV-associated neurocognitive disorder

HIE; - HIV encephalopathy

IHDS; - International HIV Dementia Scale

HIV; - Human Immunodeficiency Virus

MMSE; - Mini-Mental State Examination

MND; - Mild neurocognitive impairment

NCD; - Non-communicable disease

NCI; - Neurocognitive impairment

PLWHIV; - People living with Human Immunodeficiency Virus

1: INTRODUCTION

1.1 Background

Neurocognitive impairment is a clinical deficit in memory, cognition, behavior, and motor function that represents a decline from a previously achieved level of functioning (1). DSM-V preferred the term "neurocognitive impairment" for conditions affecting younger people, such as impairment caused by traumatic brain injury or HIV infection. Individuals with a significant decline in a single domain (complex attention, executive function, learning, and memory, language, perceptual-motor, or social cognition) can receive the diagnosis (2). Hypertension is linked to increased progression and worsening of cognition in adults with, poor cognitive performance, incident mild neurocognitive impairment, and dementia (3). Even Hypertension affects neurocognitive functioning before clinical manifestations of cerebrovascular disease are seen (4). Given the link between elevated BP. Cerebral, microcirculation can be harmed in a variety of ways because of hypertension, including complete physical damage from conditions such as thrombosis. Furthermore, inflammation can weaken the vessel wall resulting in decreased microvasculature functionality, which can cause ischemia in the cells it nourishes and, if left untreated, irreversible neuronal damage brings a cognitive disorder called executive dysfunction (5). In HIV, patients' neurocognitive deterioration has long been acknowledged. Since the late 1980s, the terms HIV dementia complex, HIV-associated dementia (HAD), and HIV encephalopathy (HIE) have been interchangeably used to describe the spectrum of cognitive disorders in HIV-positive patients (6). However, the National Institute of Mental Health (NIMH) and the National Institute of Neurological Diseases and Stroke (NINDS) introduced a revised classification of the full spectrum of neurological disease (HAD) beginning with asymptomatic neurocognitive impairment and progressing to a severe form of HIV-associated dementia (6).

HIV has an indirect effect on fundamental brain cells known as neurons (1). once the virus is in the brain it infects productively macrophages and microglia (7). HIV activates macrophages and microglia, which protect the brain. These cells then release toxins, which can set off a cascade of events that leads to neurons self-destructing (1). Although white matter damage and changes in subcortical volume can occur as a result of the neuropathlogical process of opportunistic infection and chronic immune activation following severe immunosuppression (i.e., nadir CD4 levels, <200) correlated with neurocognitive impairments (8).

In turn, uncontrolled blood pressure appears to increase the risk of global cognitive functions in hypertensive patients (9) Sub-cortical white matter lesions due to vascular injury may disrupt the prefrontal cortex-basal ganglia circuits, which, in turn, brings about a cognitive disorder (10).

Moreover, Chronic Diseases and Cognitive Decline are one of the most common public health issues in this population age (11). When hypertensive and HIV patients' cognitive changes worsen, they frequently progress to dementia (8,12) Furthermore, infectious and communicable diseases account for 60–80% of Gambella health problems (13). The HIV/AIDS situation in the Gambella region differs from the national data in that it is a small and sparsely populated region with the highest regional prevalence in Ethiopia (14,15). In addition to infectious diseases, the people of Gambella have faced an increase in the prevalence of non-communicable diseases (NCDs) in recent years. The proportion of deaths in Gambella attributable to NCD risk factors such as cancer, hypertension, and diabetes has increased over the last decade (13).

1.2 Statement of the problem

About 37.9 million people were living with HIV globally. Sub-Saharan Africa remains among the hardest-hit regions by the pandemic (15). Ethiopia is one of the Sub-Saharan African countries most affected by HIV/AIDS; with an estimated prevalence of 1.1 percent among people of all ages (15). In addition, Hypertension is becoming a major public health problem in Ethiopia nearly two out of ten individuals who are older than 18 years living with hypertension (16). furthermore, According to a recent report on the Mortality Surveillance Program (AAMSP), the trends and causes of mortality among adults in Addis Ababa Ethiopia show HIV/AIDS (first), and hypertension (second) (17). The coexistence of NCDs and mental disorders has significant implications for overall well-being and life expectancy (18).

Studies across the world have shown an association between hypertension and cognitive impairment. Globally the prevalence of cognitive impairment among persons with hypertension ranges from 16.5–to 63.9% (12), In addition, according to the recent (2021) systematic meta-analysis report, the pooled prevalence of mild neurocognitive impairment (MCI) in patients with hypertension was 30%, with significant heterogeneity of 26% in Asia and 40% in Europe (19). In India, China, Tanzania, was reported form (35.5% - 44.76%) (12,18,20). Despite its importance, rarely studied in Sub-Saharan African countries, Only one study in Ethiopia revealed the prevalence of cognitive impairment in hypertensive patients was 30.8 percent (21). However, the available literature shows that the prevalence of neurocognitive impairment in HTN patients is low compared to PLHIV.

Globally, the prevalence of HAND is estimated to range from 20% to 90% (22).Glory to the introduction of combination antiretroviral therapy has led to a significant reduction in severe forms of HAND. Yet, mild to moderate forms of HAND is still highly prevalent and may even have increased (23). The persistence of milder forms of neurocognitive impairment in the cART era stile raises debate among scholars about whether HAART is a protective factor or risk factor for neurocognitive impairment (24) others postulated that HAART does not completely suppress viral infection in the CNS so that patients with HIV are still at risk of developing neurocognitive impairment (7).

However, According to the European multicenter study report, the prevalence of mild NCI at five HIV clinics was found at 35% (25). Also in another similar multicenter international study,

the prevalence of cognitive impairment among HIV-positive people ranged from 13% in Brazil to 18.4% in Thailand and from 34% in China to 56% in India (26). In the Central African Republic was 25% (27). In Sub-Saharan Africa, the prevalence of neurocognitive impairment among PLHIV ranges from 20% to 37% (28). In Ethiopia, the combined prevalence of HAND in eight studies was 39.15 percent (29). The degree of heterogeneity ranged from 67.1 percent in Gamo Gofa zone public hospitals to 24.8 percent in Debre Markos Hospital in Northwest Ethiopia (30,31).

Besides, the critical estimates of frequency and risk factors. epidemiological study varied largely across the country depending on the target population such as age, gender, education level, disease-related factors, geographic region, and clinical settings (22). Moreover, neurocognitive impairment is likely multifactorial, With TBI. Psychoactive drugs, mental illness, chronic stress, or some pathologies, such as diabetes mellitus, and cardiovascular disease (32,33). The existence of co-morbid infections as well as other potentially predisposing lifestyle factors worsens the conditions and increases their apparent prevalence in the targeted population.

Some risk factors for cognitive impairment grow with age and may be more prevalent in HIV-positive patients as well as in hypertensive populations (32–34). Similarly, high rates of neurocognitive impairment have been observed in HIV-infected adolescents who acquired HIV infection through maternal transmission (35). While modifiable lifestyle factors such as poor eating habits, obesity, inadequate exercise uncontrolled blood pressure appear to increase the risk of global cognitive functions of hypertensive patients (9). Moreover, Sleep disorders, especially obstructive sleep apnea, are implicated in neurocognitive dysfunction in adults (36).

Neurocognitive impairment has an impact on the quality of life, and in the worst-case scenario, it can lead to disability and death, At the very least, it may lead to poor medication adherence and the development of antiretroviral resistance, which can precipitate the progression of AIDS (31,37). Increase a significant burden of care for other family members and the community(5). Cognitive impairment not only impairs individual therapy but also harms community-wide HIV control efforts because cognitively impaired patients are more likely to engage in HIV-related risk behavior. This may be exacerbated if the transmitted strains are also HAART-resistant (31,37). Now, days back the Federal Ministry of Health (FMOH) made a substantial effort to eliminate HIV/AIDS epidemics (38), and adopted 90–90-90 HIV prevention strategies including

behavior change initiatives programs and male circumcisions, particularly in Gambella (39). However, still not paying enough attention to these issues, which hurt HIV control efforts. although the fact is that Gambella is the smallest and most sparsely populated region (40,41), with the highest HIV/AIDS burden in Ethiopia. Regional frequency (4.5 percent unfavorable) is significantly higher than the universal cut-off measures for worldwide plague announcements (15) no historical research has wiped out this outlying area.

Moreover, neurocognitive impairment is likely multifactorial (32,33) demonstrating the need for an area-specific profile to enhance the quality of life and well-being of people with HIV and hypertension. However, in order to take the proper action, particularly in environments with limited resources, one requires evidence-based planning and intervention. It may also be necessary to prioritize the intervention area while addressing all health-related issues, which is challenging. however, there is a few studies are found on this aspect locally to determine and compare the magnitude and associated factors of neurocognitive impairment among people living with HIV/AIDS and hypertension. Therefore, this comparative cross-sectional study was conducted to determine and compare the prevalence of neurocognitive impairment and associated factors among people living with hypertension and HIV/AIDS attending follow-up treatment at governmental hospitals in the Gambella region, southwest Ethiopia.

1.3 Significance of the study

The finding of this study may help to take the appropriate measurement for the problem of the targeted population and may provide useful information to policymakers and concerned governmental and non-governmental organizations. The finding of the study can also be used as a base for recommendations supremely for the Ministry of Health and Gambella Regional Health Bureau to give attention to those hot spot areas to have good progress towards achieving HIV/AIDS prevention programs, especially in the area. So that they can use this finding as a resource in the management plan and can set prevention programs and update treatment protocols for proper management, follow-up, and care of hypertension and HIV/AIDS patients. Evidence-based planning for the diagnosis and management of neurocognitive impairment in this population group is an added significance for hospital management. So early screening for NCD and early intervention improve patients' quality of life and prevent further complications. In addition, this study also provide or estimate the likely proportion of neurocognitive impairment between the targeted populations so that regions like Gambella can set evidence-based prioritization if it is necessary. Furthermore, undoubtedly it can contribute to or strengthen knowledge about the subject revealed by previously conducted studies.

2: LITERATURE REVIEW

2.1Over view of neurocognitive impairment

Several studies were conducted in various parts of the world to determine the prevalence and potential predictors of neurocognitive impairment, with each study focusing on HIV and hypertension patients separately. There were also differences in the methods used to screen for cognitive impairments; this wide range has resulted in uncertainty about the actual prevalence of neurocognitive impairment among HIV and hypertension patients.

2.2 Magnitude of neurocognitive impairment among people living with hypertension and HIV/AIDS

A prospective cohort study conducted in the Netherlands recruited 388 HIV patients for a period of one year from December 2012 to December 2013. The aim was to address clinical predictors for HAND and to investigate the use of the IHDS screening tool in a well-treated HIV population, and the study indicated a prevalence of cognitive impairment of 127 (33%) (8). Similarly, in 2017, a multicenter cross-sectional quantitative study was conducted in five outpatient clinics in European (London, UK; and Denmark, Italy), among 448 adult HIV-positive patients, 156 (35%) met the definition of NCI. Cogstate computerized NP testing was used to assess impairment in multiple cognitive domains (25). On the other hand, in 2013, an Argentine cross-sectional study was conducted among HTN people to determine the prevalence of cognitive disorders and structural abnormalities in the brain; the study included nineteen patients who had a history of hypertension for at least ten years, MRI revealed that thirteen patients (69%) had detectable lesions, the Mini-Mental Test revealed that eight patients (42 percent) had cognitive disorders (42), this finding shows a slight difference in the prevalence of NCI among PLHIV compared with studies in the Netherlands and European, the difference might be due to variation in sample size and study design.

However, in the year 2020, a cross-sectional observational study was conducted in a metropolis ART center in India. Over two years, 384 adult HIV-positive patients were recruited, the MMSE and Montreal Cognitive Assessment Score (MoCA) were used as screening tools to assess the development of NCI, of which 185 (48 percent) had asymptomatic neurocognitive impairment (ANI) (43). Looking for HTN in India, in 2018 a cross-sectional study was conducted to assess the prevalence of cognitive impairment and psychiatric comorbidity among the patients attending

the rural non-communicable disease clinic, of one hundred twenty-four participants, the prevalence of cognitive impairment among patients with hypertension was 35.5% is slightly consistent with the study done among HIV-positive patients in India, cognitive functions were assessed using the Hindi mental status examination (HMSE) (18).

Furthermore, a cross-sectional study conducted in 2015 in China on 400 veterans to investigate the presence of cognitive impairment of elders with hypertension, indicates that out of the 400 participants 117 (29.25%) were cognitively impaired, cognitive impairment was assessed by using both MMSE and Montreal Cognitive Assessment (MoCA) (44).

Although in 2017 A cross-sectional study conducted in Nigeria's tertiary health facility among HIV-positive patients reported the prevalence of HAND was 21.5% and neurocognitive impairments were assessed using the International HIV Dementia Scale (45), This is comparable with a cross-sectional study conducted in 2015 in Bangui the Central African Republic, among 224 adult PLHIV who had been on ART for at least one month, the study found that the prevalence of neurocognitive disorders was 25%, the test used for screening NCD was the International HIV Dementia Scale (IHDS) (27). However, this study is lower than another hospital-based cross-sectional study conducted in 2013 in Uganda among 618 adult HIV-positive people found that the overall prevalence of NCI was 64.4 percent, and the International HIV Dementia Scale was used to screen for HIV-related neurocognitive impairments (46).

In addition, a similar cross-sectional study was carried out in Tanzania in 2015-reported that the overall prevalence of NCI among PLHIV was 19.3 percent (47). Which is low, compared with the study conducted in Uganda. However, In Tanzania, the study participant was patients who had been on ART for at least 1 year and without confounding comorbidities. Moreover, the method used to assess NCI was the neuropsychological tests Frascati criteria leading to remarkable differences.

On the other hand, looking for an HTN patent, a cross-sectional study was conducted in Tanzania in 2021 to assess cognitive impairment among hypertensive patients attending a tertiary cardiovascular hospital, a total of 1201 hypertensive patients participated and the overall prevalence of NCI was 524 (43.6%), the General Practitioner Assessment of Cognition (Gpcog) screening tool was employed to assess a cognitive impairment (12).

Furthermore, in Ethiopia, a hospital-based cross-sectional study was conducted from 2019 to 2021. To determine HIV-associated neurocognitive disorders (HAND) among people on HAART treatment, screening was done using the International HIV Dementia Scale. It was discovered the prevalence of neurocognitive impairments in Gamo Gofa zone public hospitals was 67.1 percent (31). 35.7 percent In Jimma University Medical Center (28). 36.4 percent Dessie Referral Hospital (48). 35.6 percent in Addis Ababa (49). 33.3 percent at Tigray's Ayder Comprehensive Specialized Hospital (50). 39.3% in Mizan-Aman HIV/ART clinic (51). Despite this, a study at Debre-Markos Referral Hospital reported the prevalence of HIV dementia was 24.8 percent(30). Furthermore, The prevalence of HIV-associated neurocognitive impairment in North Shoa Zone, Amhara was 41%, and the Mini-Mental State Examination tool (MMSE), was employed (52).

Moreover, in Ethiopia, an institution-based cross-sectional study conducted in 2018 among 279 hypertensive patients on follow-up at Jimma University Medical Centre chronic clinic, Jimma, reported the prevalence of cognitive impairment in the study was 86 (30.8%), and the Mental State Examination was used to assess cognitive function (21).

2.3 Factors Associated with Neurocognitive impairment among peoples living with hypertension and HIV/AIDS

Several factors influence neurocognitive function in people living with HIV and hypertension, divided into three categories: socio-demographic factors, psychosocial factors, and clinical or biological factors of the patient.

2.3.1 Socio-demographic predictor of neurocognitive impairment among people living with hypertension and HIV/AIDS

In 2017, a multicenter cross-sectional quantitative study was conducted among adult HIV-positive patients in five European outpatient clinics (London, UK; and Denmark, Italy). showed a significant association between NCI and sociodemographic variables such as being male (PR 2.03, 95% CI 1.53–2.69) or female (PR 1.44, 95% CI 1.04–2.00), and not having a university education (PR 1.75, 95% CI 1.35–2.27) (25). This variable also determines NCI in HTN people, a study conducted in Argentina in 2013 indicates the risk of sustaining CI was slightly higher in over 65-year-old patients (OR = 1.02, p = 0.032), and twice as high for females (OR = 2.15, p < 0.001), Also the risk decreases as the educational level increases (OR = 0.89, p < 0.001) (10). Similarly, a cross-sectional observational study performed in a metropolis ART center in 2020 in India discovered a significant association of socio-demographic factors with female sex, with an odds ratio (OR) of 1.89 (95% CI: 1.21–2.79, p 0.01), and education less than 10 years, with an OR of 2.43 (95% CI: 1.56–3.80, p 0.01) (43). However, a cross-sectional study conducted in 2015 in a rural ART center in Tanzania shows only age was significantly associated with NCI (AOR = 1.6 for a 10-year increase; 95 percent CI: 1.1–2.3) (47). In turn to the HTN patent, a study result in the year 2021 among hypertensive patients in Tanzania demonstrated primary education (OR 3.5, 95% CI 2.4–5.2, p 0.001), unemployment (OR 1.7, 95% CI 1.2–2.6, p 0.01), and rural habitation (OR 1.8, 95% CI 1.1–2.9, p = 0.01) was found to have an independent association with cognitive impairment (12). Moreover, a study conducted among PLHIV in Debre Berhan, Ethiopia, reported individuals who earned less than 500 Ethiopian Birr (ETB) per month had nearly five times higher odds of suffering neurocognitive impairment as compared with those who earned above 1500 ETB per month, 4.22 (95% CI = 2.02, 8.81) (52). Although a study conducted in 2017 in the Gamo Gofa zone ART clinic indicated the key predictor of HAND was unemployment status (AOR 3.181 (1.752–5.777) (31)

2.3.2 Psychosocial predictor of neurocognitive impairment among people living with hypertension and HIV/AIDS

A study conducted in 2013 in Uganda among 618 adult HIV-positive adults revealed a significant association between probable HIV dementia and an increasing number of negative life events. 6–10 events (AOR = 2.14; 95% CI = 1.45–3.15); 11+ events (AOR = 2.25; 95% CI = 1.33–4.13) versus 1–5 negative life events. Furthermore, individual stress levels show a significant association with medium stress levels (AOR = 2.55; 95% CI = 1.73–37.77) and high-stress levels (AOR = 3.29; 95% CI = 1.99–5.45) (46). Furthermore, According to a study conducted among HAART patients in the North Shoa Zone of Amhara, Ethiopia, Individuals with low social support were at nearly four times higher odds compared with those with high social support to develop neurocognitive deficits, 3.65 (95 percent CI = 1.86-7.17) (52).

2.3.3 Clinical predictor of neurocognitive impairment among people living with HIV/AIDS

According to the findings of the CHARTER group, one of the largest cohort studies on HAND to date in the USA, indicated that those study participants who reported either a nadir date or CD4 nadir were significantly associated with rates of neuropsychological impairment (OR = 0.96, 95% confidence interval (CI) 0.91–1.01; p=0.09) (53). These results are also comparable with a prospective cohort study conducted in the Netherlands between December 2012 and December 2013, the study demonstrated participants with a CD4 nadir count of 50 cells/m3 had a statistically significant association with poor neurocognitive outcomes compared to patients with a CD4 nadir count of > 50 cells/m3 (0.18 vs. 0.55; p = 0.01) (8). Furthermore, a study conducted in 2020 in Indian revealed that the presence of at least one vascular risk factor was linked to poorer cognitive performance with an OR of 2.52 (95% CI: 1.67–3.80, p 0.01) (43)

Moreover a cross-sectional study carried out at the HIV clinic of Kenyatta National Hospital in Nairobi revealed that patients on Zidovudine (AZT) + Lamivudine (3TC) + Efavirenz (EFV) had a higher risk of NCI (OR = 3.7, p = 0.03) compared to other HAART regimens (54). Furthermore, a study conducted in Ethiopia at Mizan-Tepi University Teaching Hospital ART clinic reveals that a history of recreational drug use (AOR = 13.67 (95% CI; 6.42–29.13)) and not taking prescribed medications (AOR = 2.99 (95% CI; 1.01–8.87)) were independently associated with the prevalence of NCI (51). Similarly, in Addis Ababa, clinical variables such as lifetime tobacco use were associated with HAND (AOR: 2.640; 95 percent CI: 1.44–4.01) (49).

In addition, a study conducted in selected public hospitals in the North Shoa Zone indicates that individuals with comorbid depression and anxiety had nearly six times the risk of NCI as those without comorbidity: 5.51 (95% CI = 1.81-16.79). A person's longer duration of HIV illness in a year was associated with a 1% increase in HAND, 1.01 (95 percent CI =1.001-1.02) (52).

2.3.4 Clinical predictor of neurocognitive impairment among people live with hypertensive

In 2018, a study conducted at NCDs clinic in Chandigarh India suggests that the prevalence of CI is higher among patients of NCD with psychiatric morbidity. One-fourth of patients had both depressive and anxiety disorders (18). Furthermore, a study conducted in 2015 in China among elder veterans investigate the risk factors such as Age (OR 2.679, 95% CI 1.663–6.875), sleep impairment (OR 1.117, 95% CI 1.754–7.422), uncontrolled hypertension (OR 1.522, 95% CI 1.968–4.454), type 2 diabetes (OR 2.464, 95% CI 1.232–4.931), hyperlipidemia (OR 1.411, 95% CI 1.221–8.988) were associated cognitive deterioration. While the protective factors are a high level of education (OR 0.032, 95%CI 0.007–0.149), and regular exercise (OR 0.307, 95% CI 0.115–0.818) (44). Moreover, according to the study conducted in 2018 among hypertensive patients at Jimma University Medical Centre chronic clinic, Khat chewing, cigarette smoking, and alcohol were significantly associated with NCI (COR = 1.449, 95% CI = 0.854-0.866, COR = 1.466, 95% CI = 0.548-3.921, COR = 0.447, 95% CI = 0.206-0.969, respectively) (21).

2.4 Summary

NCI has been reported in a variety of areas with varying degrees of heterogeneity. Besides this, risk factors differ in subpopulations of hypertension as well as HIV patients. Various risk factors have been identified in studies around the world that appear to increase the risk of developing NCI. Age, gender, educational level, and occupation status have all been discovered to have a significant relationship. In addition to metabolic risk factors, depression, anxiety, substance use, sleep disorders, and psychosocial factors such as trauma and poor social support have been investigated in both HIV and HTN patients. Furthermore, the HAART regimen and virology status, specifically the nadir CD4 count, was discovered to be independent predictors of HAND. Similarly, in HTN people, uncontrolled blood pressure and medical comorbidity have shown significant associations with NCI.

2.5 Conceptual framework

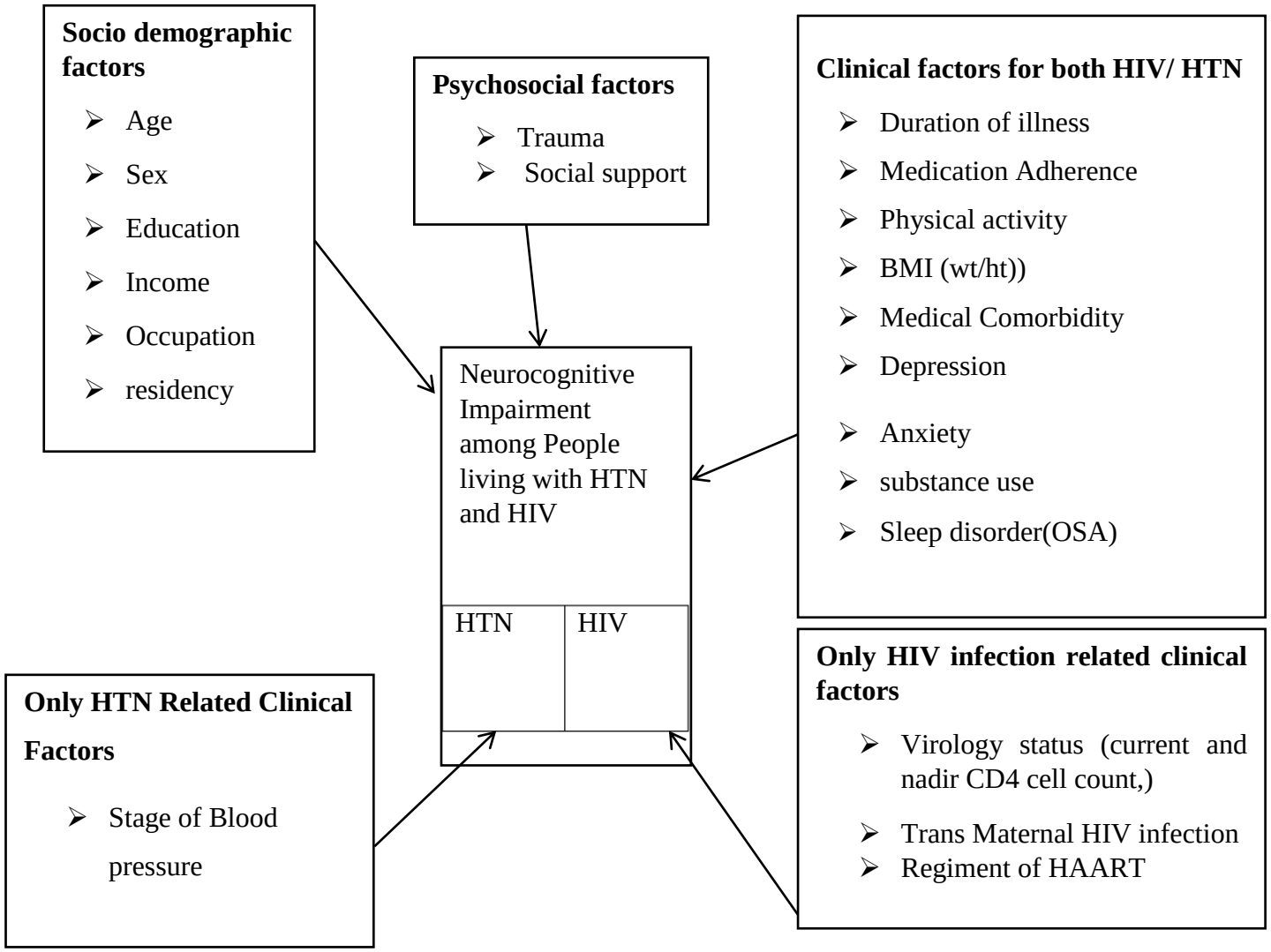

Figure 1; conceptual framework reviewed from different literature to compare Neurocognitive impairment-associated factors among people living with hypertension and HIV/AIDS attending follow-up treatment at government hospitals in the Gambella region, southwest Ethiopia; 2022

3: OBJECTIVE

3.1 General Objective

- To determine and compare the prevalence of neurocognitive impairment and associated factors among people living with hypertension and HIV/AIDS who has follow-up treatment at government hospitals in the Gambella region in southwest Ethiopia; 2022

3.2 Specific Objectives

- To compare the prevalence of neurocognitive impairment between people living with hypertension and HIV/AIDS attending follow-up treatment at government hospitals in the Gambella region in southwest Ethiopia; 2022
- To identify factors associated with neurocognitive impairment among people living with hypertension attending follow-up treatment at government hospitals in the Gambella region in southwest Ethiopia; 2022
- To identify factors associated with neurocognitive impairment among people living with HIV/AIDS attending follow-up treatment at government hospitals in the Gambella region in southwest Ethiopia; 2022

4: METHODS AND MATERIALS

4.1 Study Area and Period

The study was conducted in the Gambella region, located in the western part of Ethiopia about 770km away from Addis Ababa. Its size is 25,802.01 square kilometers. According to the Central Statistical Agency (CSA) of Ethiopia, the Gambella Region has an estimated population of over 483,097, consisting of 186,526 males and 171,985 females. The region is divided into three administrative zones (Anuak, Nuer, and Majang), 12 woredas (districts), and one special woreda (Itang). The region has 5 hospitals, 29 health centers, and 142 health posts. All hospitals and 26 health centers provide ART services. According to the current regional monthly EDHIS report, there are 7435 PLHIV registered and have had follow-up visits from every ART service provider institution. Additionally, 2987 hypertension patients have had follow-up visits in all five hospitals, and an institutionally based comparative cross-sectional study was conducted from October 10, 2022, to December 9, 2022, at all governmental health hospitals in Gambella regional state of Ethiopia.

4.2 Study design

A Hospital-based comparative cross-sectional study design was conducted

4.3. Population

4.3.1 Source population

All people living with hypertension and HIV/AIDS in Gambella Region southwest Ethiopia

4.3.2 Study population

Adult hypertension and HIV/AIDS patients attending follow up clinics in the Gambella Region hospital during the study period that fulfilled the inclusion criteria

4.4 Inclusion and Exclusion Criteria

4.4.1 Inclusion criteria

The inclusion criteria were participants, who had complete medical record, aged 18 years and above,

4.4.2 Exclusion criteria

During the enrollment process, those clients whose medical status interfere with the study evaluations, such as clients who had visual difficulties were excluded from the current study.

Participants with known HIV infection and hypertension comorbidities were also excluded from the study, which aimed to compare the prevalence of the two diseases.

4.5 Sample size and Sampling technique /Sampling procedures

4.5.1 Sample size determination

The sample size was determined by using a double population proportion formula. By considering the following statistical assumptions of 95% CI, taking the prevalence of neurocognitive impairment, P1 = 41 % among HIV- positive patients, and P2 = 30.8 % in hypertension patients from the previous study, which was conducted in public hospitals in the North Shoa Zone, Amhara, and at Jimma University Medical Center hypertension follow-up clinic (21,52) for the sample size

$$\mathbf{n = (Z_{\alpha/2}+Z_{\beta})^{2} * (p_1 (1-p_1) + p_2 (1-p_2)) / (p_1-p_2)^2,}$$

Where $Z_{\alpha/2}$ is the critical value of the Normal distribution at α/2 (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96),

$\mathbf{Z_{\beta}}$ is the critical value of the Normal distribution at β (e.g., for a power of 80%, β is 0.2 and the critical value is 0.84) Moreover, p_1 and p_2 are the expected sample proportions of the two groups. In addition, a 5% non-response rate is added, the calculated sample size is equal to 359 for each, and the total sample size is 718.

4.5.2 Sampling technique /Sampling procedures

The study included all five Gambella region hospitals that provide routine services to HIV and hypertension patients. Proportional allocation was made to each of the five health facilities Furthermore, systematic random sampling was used to select and approach each study subject from each institution. Although the monthly follow-up visits to the ART and hypertension clinic were used to determine the sampling fraction (Kth) for each healthcare facility. Based on the (Kth) of all selected health institutions, ART/HTN patients were included until the allocated number of study subjects for each institution is reached. Those subjects who come again for

follow-up were not included in the study, and the next immediately coming person was interviewed to avoid the redundancy of the interview.

Table 1; Monthly follow-up, sample size, and sampling fraction (Kth) of all health institutions

Study area	Monthly follow-up in the ART clinic	Monthly follow-up in the hypertension clinic	Sample size		Kth	
			ART	HTN	ART	HTN
Gambella referral hospital	1,124	1105	210	282	5	4
Gambella town primary hospital	323	156	60	40	5	4
Pinyudo primary hospital	222	98	43	13	5	7
Kumi primary Hospital	216	111	40	14	5	8
Nyinenyang primary hospital	56	76	6	10	10	8

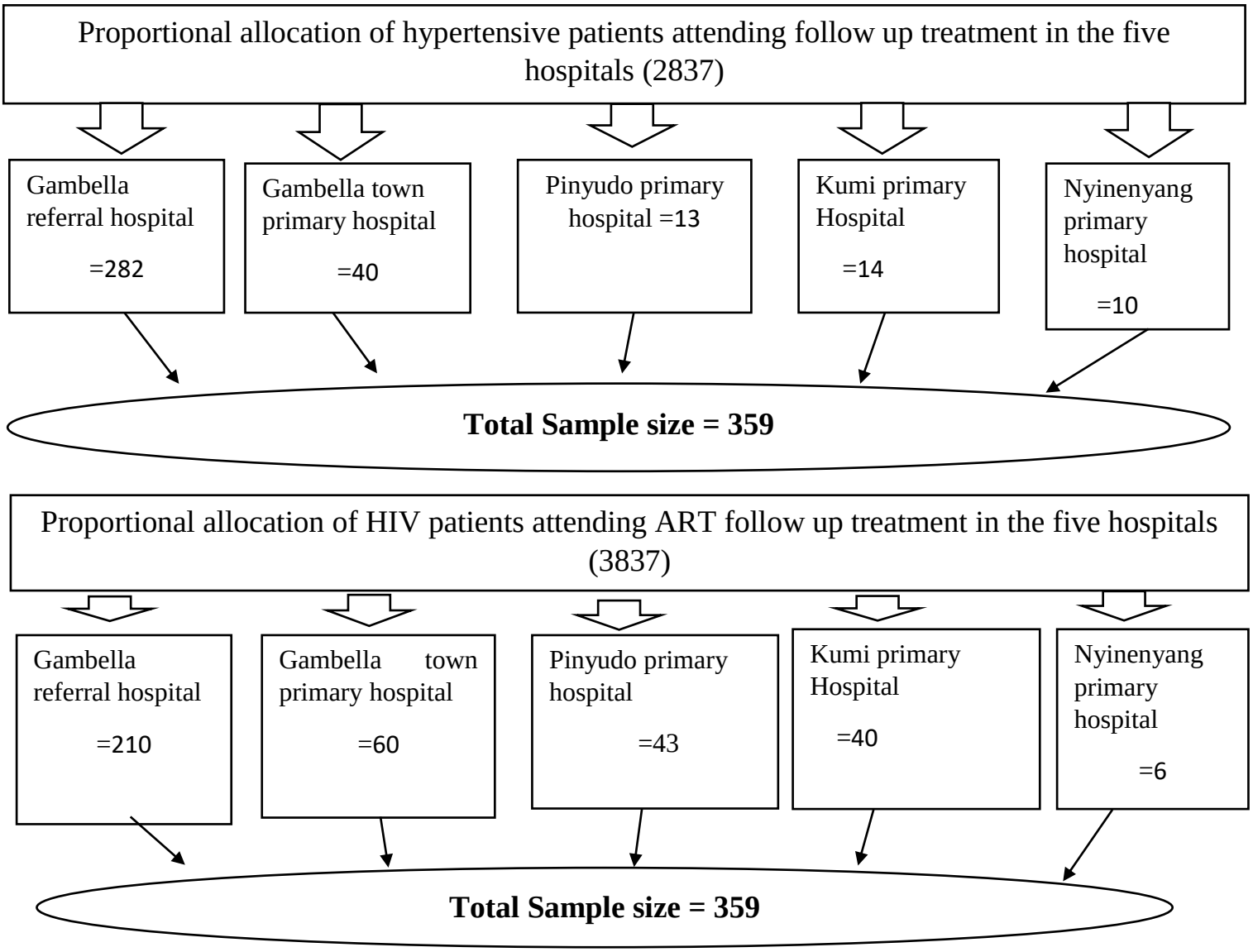

Figure 2; Proportional allocation of a sample size to determine and compare the prevalence of Neurocognitive impairment and associated factors among people living with hypertension and HIV/AIDS attending follow-up treatment at government hospitals in the Gambella region southwest Ethiopia; 2022

4.6 Data collection procedures (Instrument, personnel, data collection technique)

4.6.1 Data collection instrument

A semi-structured questionnaire was used in a face-to-face interview to gather information on socio-demographic characteristics, and medical records were also reviewed to look for clinical variables connected to HTN and HIV, comorbid medial illnesses, HAART regiments, and CD4 status. Neurocognitive impairment and other predicted variables were assessed by using the following tools as operationalized:

The Rowland Universal Dementia Assessment Scale (RUDAS):- The RUDAS was used to assess cognitive impairment, and is a brief cognitive screening tool designed to reduce the effects of cultural learning and language diversity when evaluating neurocognitive disorders in vulnerable populations. It is unaffected by educational attainment and assesses a wide range of cognitive domains, making it promising for detecting various types of dementia in socio-demographically diverse populations. The RUDAS is a simple tool that takes only 10 minutes to administer and is made up of six components that investigate memory, body orientation, visuospatial praxis, motor praxis, judgment, and language. It has a maximum score of 30. This tool has been validated in both high-income and low-income countries, including Ethiopia, and has demonstrated good validity and reliability. RUDAS has demonstrated an excellent ability to detect major neurocognitive disorders at an optimal cut point of less than or equal to 22, with sensitivity and specificity values of 92% and 75%, respectively (55).

Patients' Health Questioners 9 (PHQ-9) was used to assess depression. It is a screening and diagnostic questionnaire for MDD based on DSM-IV criteria. PHQ-9 appears to be a reliable and valid instrument used to diagnose major depressive disorders among Ethiopian adults. Participants rate depression according to the particular problem that has bothered them for the last two weeks. Scores ranged from 0 to 4 representing no depression, 5-9 representing mild depression, 10-14 representing moderate depression, 15-19 representing moderately severe depression, and 20-27 representing severe depression (56)

The Medication Adherence Report Scale-10 (MARS-10) was utilized to detect medication-taking behavior. MARS is a 10-item self-report adherence scale that assesses both intentional ("I avoid using it if I can") and non-intentional non-adherence ("I forget to use it"). It is designed to address some of the limitations of self-report measures by minimizing social desirability bias and

setting a tone where non-adherence is considered normal. The questionnaire is reliable in predicting non-adherence across several conditions. A score of less than five on the MARS total scale, which ranges from 0 to 10, indicates non-adherence (57).

The Oslo Social Support Scale (OSSS-3) was used to assess the level of social support. The total score was operationalized into three broad levels of social support. 3–8 with poor social support 9–11: moderate social support 12–14 with strong social support (58).

A Two-Item Conjoint Screen (TICS) for Alcohol and Other Drug Problems was also used to screen participants for their substance use problem, and it is considered a negative screening result when the patient answers no to both questions. If the patient answers yes to one or both questions, it is considered a positive screening result and may suggest a current alcohol or drug problem; the patient should have more detailed diagnostic assessments. A positive response to at least one question detects a current substance use disorder with a sensitivity of 79.3% and specificity of 77.9% (59).

The GAD-7 scale was also used to quantify the self-reported magnitude of anxiety symptoms for the 2 weeks immediately preceding the study. The GAD-7 uses a framework of anxiety symptoms described in the DSM-IV. Each item is scored on a Likert scale from zero (not at all) to four (nearly every day). A total score of eight or greater represents a reasonable cut-point for identifying probable cases of generalized anxiety disorder, according to the national HIV curriculum using a cut-off 8, The GAD-7 has a sensitivity of 92% and a specificity of 76% for the diagnosis of generalized anxiety disorder in HIV patients. Moreover, GAD-7 has acceptable psychometric validity in Ethiopian young adults (60).

Exercise Vital Sign (EVS) was used to determine whether the patient achieves the recommended amount of 150 minutes of moderate to vigorous physical activity per week. EVS assesses the average time spent exercising by multiplying responses to two self-reported questions. The responses are multiplied to display minutes per day of moderate-to-vigorous exercise. EVS takes less than 30 seconds to administer (61).

Trauma was also measured by using the Life Events Checklist for DSM-5 (LEC-5), a widely used self-report measure designed to screen for potentially traumatic events in a respondent's lifetime**.** The LEC assesses the occurrence of 17 major life events (e.g., a natural disaster, an

assault, a combat situation, a life-threatening illness, or an injury) that a person may have experienced, witnessed, or learned about happening to someone close to them. Moreover, all endorsed items across all exposure types were summed together to generate the number of potentially traumatic events that a person has experienced, giving a total score of 0/17 (62).

A STOP-BANG Sleep Apnea Questionnaire was used to screen for obstructive sleep apnea among the study participants. The SBQ includes four subjective items (STOP: snoring, tiredness, observed apnea, and high blood pressure) and four demographic items (BanG: BMI, age, neck circumference, and gender). Patients with a STOP-Bang score of 0 to 2 can be classified as low risk for moderate to severe OSA, whereas those with a score of 5 to 8 can be classified as high risk for moderate to severe OSA. Patients with STOP-Bang scores in the middle (3 or 4) were considered to be at intermediate risk (63)

Body Mass Index: - using the formula BMI = kg/m2 where kg is a person's weight in kilograms and m2 is their height in meters squared. A BMI of 25.0 or more is overweight, while the healthy range is 18.5 to 24.9, and less than 18.5 is considered underweight.

Patients' chart records were reviewed to assess for medical comorbidity, the regimen of HAART, and the current CD4 cell count status. Those with PLHIV were also asked if they had ever experienced a Nadir time CD4 cell count or a less than 200 CD4 cells count.

4.6.2 Data Collection Method

Immediately after the clinic visit, a face-to-face interview was conducted using structured and semi-structured questions relating to socio-demographic characteristics and all other anticipated factors by a trained BSC nurse who is fluent in both Amharic and the local languages. The COVID-19 prevention protocol was used appropriately by the data collectors during the interview.

4.7 Study Variables

4.7.1 Dependent variable

Neurocognitive impairment among HIV/AIDS and HTN patients yes/no

4.7.2 Independent Variables

- Socio-demographic Variables: Age, Sex, Educational level, Marital status, Occupation, Monthly Income, and residency
- Clinical variables and psychosocial variables
    - HIV infection
    - Current CD4 cell count
    - Nadir CD4 cell count
    - Duration of illness
    - Trans Maternal HIV infection
    - Regiment of HAART
    - Adherence of HAART
    - Depression
    - Anxiety
    - Substance use
    - Obstructive sleep apnea
    - Social support
    - Medical Comorbidity
    - HTN
    - Blood Pressure
    - Physical activity
    - BMI (kg/m^2)

4.8 Operational Definitions

Neurocognitive impairment:- Any client who received on RUDAS score of 22 or less out of a total of 30 was considered to have a neurocognitive impairment (55).

Substance use:- Participants who answer yes to one or both questions, on TICS for Alcohol and Other Drug Problems questionnaire is regarded as, an indication of possible substance use problem (59)

Medication Adherence:- Any client who scored ≥ 5 on MARS-10 was considered as good adherence, with a score less than five reflecting non-adherence (57).

Depression:- patient with a score of 0-4 on the Patient Health Questionnaire-9 was considered that the patient has no depression; the range is 5-9 mild depression, 10-14 moderate depression, 15-19 moderately severe depression, and 20-27 severe depression(56).

Anxiety:- Any client who scored of total points of 8 or greater on the GAD 7-item screening tool was classified as a possible case of anxiety disorders, respectively (60)

Obstructive sleep apnea (OSA):-Anyone scoring 0 to 2 was considered to be at low risk for OSA, while those scoring 5 to 8 were considered to be at high risk for severe OSA, and patients scoring in the middle (3 or 4) were considered to be at intermediate risk (63)

Social support:- Any client who scores 3–8 on the Oslo social support scale (OSSS-3) of measurement was conceded to poor social support, 9–11 moderate social support, and 12–14 strong social support (58).

Nadir CD4 cell count: - any time history of CD4 cell count <200cells/mm3

Current CD4 cell count: - the most recent CD4 count level on the medical chart review

Hypertension:-A person who had a documented hypertension status, use of BP-lowering agents

Blood Pressure:- an individual was Categorized as Controlled BP when = SBP 120-139 and DBP 80-89 or Stage I HTN = SBP 140-159 and DBP 90-99 or Stage II HTN = SBP >160 and DBP >100 (21)

The formula BMI (kg/m2) was calculated to assess the nutritional status of the participants. A BMI of 25.0 or more is considered overweight, while the healthy range is 18.5 to 24.9, and less than 18.5 were considered underweight.

Medical Comorbidity: - having documented statues of chronic medical conditions other than HTN/HIV such as ether of diabetes mellitus, Liver disease, Asthma, and other

Duration of illness: - the period from the patient's initial diagnosis of hypertension and/or HIV infection to the present.

Trans Maternal HIV infection: - Individual who has a history of acquired HIV infection through maternal transmission.

Physical activity was classified as either active or inactive, depending on whether the patient met the weekly recommendation of 150 minutes of moderate to vigorous physical activity (61).

4.9 Data processing & analysis

The collected data was sorted (given number and code) for both comparative groups. Data were entered into Epi data software version 4.6, and exported to and analyzed by the SPSS statistical package for social science version 26.0. The Hosmer–Lemeshow goodness test was checked to assess the fitness of the model. Descriptive statistics (mean and standard deviation (SD) were used to summarize continuous variables and simple frequencies were done to check the level of missing value and the presence of an influential outlier. To observe and compare baseline demographic data between the two group's independent t-test for continuous variables and a chi-square test categorical variable were used. The binary logistic regression model was fitted to identify factors associated with neurocognitive impairment. The models were fitted independently for hypertension and HIV/AIDS groups. The model fitness for each model was tested by Hosmer–Lemeshow goodness of fitness, and the results of the test showed that the models were fit for each model. To check an interaction or effect modification of the independent variables, the multicollinearity of the independent variables was checked using the variance inflation factor. There is no multicollinearity among the independent variables. Bivariable associations between dependent and several independent variables were examined one by one and those variables with p value less than 0.25 were entered into multivariable logistic regression. Multivariable logistic regression analysis was employed to identify factors associated with neurocognitive impairment. The odds ratio (OR) with 95% CI was computed to assess the level of association and statistical significance. Statistical significance was declared using a P-value ≤ 0.05. To compare the proportions of neurocognitive impairment between people living with hypertension and HIV/AIDS chi-square test was used. The result of this study is described in texts, tables, and graphs.

4.10 Data Quality Control

To assure the data quality, the data collection tool was prepared after an intensive review of relevant literature and related studies. Initially, the questionnaire was prepared in English and then translated into local Amharic and back to English by different individuals who had good abilities in both languages. The training was given to data collectors and supervisors for 2 days about the whole procedures of data collection, to make them familiar with the data collection tool and the objective of the study, discussing the contents of the questionnaire and issues of maintaining confidentiality. Before the actual data collection, Pre-test was conducted outside the study area on 10% of the total sample, for each of the five health institutions two trained clinical BSC graduates who speak Amharic and the local language were recruited for data collection. Regular supervision by the supervisor the principal investigator was made to ensure that all necessary data are properly collected, and filled questionnaires were checked for completeness and consistency by supervisors and principal investigator.

4.11 Ethical Consideration

The study will obtain ethical clearance from the ethical committee of the Institute of Health, Jimma University, and after a discussion of the purpose of the study permission was obtained from all Health institutions. Before data collection, for all participants, the aim of the study was explained and reassured that their responses be used only for research purposes and remain confidential. Similarly, after a clear discussion about the purpose of the study informed consent was obtained from each study subject while the study subjects' right to refuse was also respected. To assure the confidentiality of the study subjects personal Identifiers were not asked.

4.12 Dissemination of the Study Result

The final result of this study will be presented to Jimma University and disseminated to Gambella regional health bureau, the HAPCO office, all Health facilities which participated in this study, and other concerned governmental and non-governmental organizations. Efforts will also be made to publish this finding in peer-reviewed scientific journals

5. Results

A total of 711 (354 from People living with HIV/AIDS and 357 from hypertension) Patients were recruited into this study with a 99% response rate.

5.1 Socio-demographic Characteristics of the participant

The Socio-demographic characteristics of the participant between the PLHIV and hypertension groups were almost found similar except for the distribution of sex. The majority of patients in the PLHIV group were female 199 (56.2%) however; the majority of participants in the hypertension group were male 212(59.4%).

The majority of patients in these two groups, 270 (76.3%) in PLHIV, and 284 (79.6%) among hypertension participants were identified in defined age groups between 36 and 56, The mean age of hypertension patients was (43.91 ± 9.118), whereas the mean age of PLHIV respondents was (41.71 ± 9.542),

It was observed that only 42 (5.9%) of total patients had no formal education, 106 (14.9%) were educated 1-8 grade. moreover, 80 (22.6%) in the PLHIV group, 84 (23.5%) among hypertension patients were educated 9-12 grade, of the total respondents in the study 194 (27.3%) of them were a diploma graduates, and 153 (21.5%) were graduates with a degree and above.

It was observed that nearly half of the respondents in both groups, 146 (41.2%) in PLHIV versus 179 (50.1%) hypertension groups were married, around 134 (37.9%) in the case of PLHIV and 112 (31.4%) of hypertension patients were single.

More than half of respondents in both groups were employed with 197 (55.6%) in PLHIV and 205 (57.4%) among hypertension, of the remaining occupational groups 68 (19.2%) of PLHIV respondents and 48 (13.4%) hypertension participants were farmers.

The majority of the 539 (75.7%) patients in this sample estimated their monthly incomes to be above the poverty line, among PLHIV 267 (75.4%) and 272 (76.2%) in Hypertension.

The majority of patients in the sample were from Gambella town 516 (72.6%) than Majang zone 99(13.9%) and 20(2.8%) out of Gambella region (Table 2).

Table 3 Socio-demographic characters of people living with HIV/AIDS and hypertension at government hospitals in the Gambella region, southwest Ethiopia; 2022

		Disease status			Test Statics'
Variable	Category	HIV/AIDS n=354(100%)	Hypertension n=357(100)	Total	P value
Mean Age ±SD		41.71±9.542	46.09± 8.121	43.91±9.118	t test=.000
Age	<35	39 (11.0%)	24 (6.7%)	63 (8.9%)	CHI²=4.083 P value=.130
	36-56	270 (76.3%)	284 (79.6%)	554 (77.9%)	
	>57	45 (12.7%)	49 (13.7%)	94 (13.2%)	
Sex	Male	155 (43.8%)	212 (59.4%)	367 (51.6%)	CHI²=17.317 P value=.000
	Female	199 (56.2%)	145 (40.6%)	344 (49.1%)	
Educational status	No formal education	24 (6.8%)	18 (5.0%)	42 (5.9%)	CHI²=3.379 P value=.642
	1-8 grade	58 (16.4%)	48 (13.4%)	106(14.9%)	
	9-12 grade	80 (22.6%)	84 (23.5%)	16 (23.1%)	
	Any certification below the diploma	23 (6.5%)	29 (8.1%)	52 (7.3%)	
	Diploma	99 (28.0%)	95 (26.6%)	194 (27.3%)	
	Degree and above	70 (19.8%)	83 (23.2%)	153 (21.5%)	
Occupation statues	Employed	197 (55.6%)	205 (57.4%)	402 (56.5%)	CHI²=5.076 P value=.642
	Merchant	35 (9.9%)	44 (12.3%)	79 (11.1%)	
	Daily laborer	26 (7.3%)	31 (8.7%)	57 (8.0%)	
	Have no job	28 (7.9%	29 (8.1%)	57 (8.0%)	
	Farmer	68 (19.2%)	48 (13.4%)	116 (16.3%)	
permanent address	Gambella town	207(58.5%)	309 (86.6%)	516 (72.6%)	
	Majang zone	85 (24.0%)	14 (3.9%)	99 (13.9%)	P value= CHI²=
	Nuare zone	10 (2.8%)	10 (2.8%)	20 (2.8%)	
	Angnuwa zoon	43 (12.1%)	13 (3.6%)	56 (7.9%)	
	Out of Gambella region	9 (2.5%)	11(3.1%)	20 (2.8%)	
Marital statues	Married	146 (41.2%)	179 (50.1%)	325 (45.7%)	CHI²=5.777 P value =.216
	Single	134 (37.9%)	112 (31.4%)	246 (34.6%)	
	Widowed	14 (4.0%)	13(3.6%)	27 (3.8%)	
	Separated	27 (7.6%)	24 (6.7%)	51 (7.2%)	
	Divorced	33 (9.3%)	29 (8.1%)	62 (8.7%)	
Estimated monthly income	Above poverty line	267 (75.4%)	272 (76.2%)	539 (75.8)	CHI²= .057 P value =.811
	Below poverty line	87 (24.6%)	85 (23.8%)	172 (24.2%)	

5.2 Clinical and psychosocial Characteristics of the participant

Among the total participants in the hypertension group, the majority 226 (63.3%) had no depression, whereas 150 (42.4%) of the PLHIV study participants had no depression, compared to 59 (16.5%) in the Hypertension group, most patients 111(31.4%) in the PLHIV group had Moderate depression. About 44 (12.4%) Patients with PLHIV and 30 (8.4%) Hypertension cases had anxiety.

The body mass indices of patients were calculated to assess the nutritional status of the participants, and 59.0%, 20.1%, and 20.9 % of PLHIV had a healthy weight, overweight, and underweight, respectively, compared to hypertension respondents 245 (68.8%) a healthy weight, overweight 80 (22.4%), and 32 (9.0%) underweight.

It was discovered that of the 354 people living with HIV/AIDS who took part in the study, 84 (23.7%), 20 (8.5%), 43 (12.1%), and 51 (14.4%) used different substances such as alcohol, khat, cigarettes, and Gaya, whereas in the hypertension group 44 (12.3%) reported alcohol use 16 (34.5%) had khat use, 27 (7.6%) had cigarette use, and 45 (12.6%) had Gaya use.

It was observed that the majority of the PLHIV group had low risk of OSA 307 (86.7%) when compared to those with hypertension group were 271 (75.9%), and the proportion of high-risk OSA was higher in the hypertension group (12.0%) compared to 5.4% in PLHIV group.

Of the total study population, the majority (618, or 86.9%) had no medical comorbidity, but 44(12.4%) PLHIV patients and (13.7%) hypertension patients had at least one medical illness other than HIV/AIDS and hypertension. A higher adherence rate of 91.3% was observed among hypertension compared to PLHIV study participants 121(34.2%) were found non-adherence.

The majority (73.2%) of PLHIV participants had a recent CD4 cell count of 500 or higher. In addition, of 354 people living with HIV/AIDS, 24.6% reported a nadir date experience of CD4 cell count (<200 cells/mm3). Almost 75.1% of respondents in the hypertension groups had controlled blood pressure.

Among the PLHIV group, about 28.0% had Poor social support and (46.0%) had Moderate social support, those hypertension groups had better perceived social support, with 38.9%, and 48.2% having moderate to strong social support respectively.

Table 4 Distribution clinical parameters between people living with HIV/AIDS and hypertension in government hospitals in the Gambella region, southwest Ethiopia; 2022

		Disease status			Test statics
					P value
Variable	Category	HIV/AIDS N=354(100%)	Hypertension N=357(100%)	Total	
Anxiety	NO	310 (87.6%)	327 (91.6%)	637 (89.6%)	CHI^2= 3.090
	Yes	44 (12.4%)	33 (8.4 %)	74 (10.4%)	P value = .079
Depression	No	150 (42.4%)	226 (63.3%)	376 (52.9%)	CHI^2= 34.916
	Mild depression	45 (12.7%)	30 (8.4%)	75 (10.5%)	
	Moderate depression	111 (31.4%)	59 (16.5%)	170 (23.9%)	P value = .000
	Moderately severe depression	26 (7.3%)	25 (7.0%)	51 (7.2%)	
	Severe depression	22(6.2%)	17 (4.8%)	39 (5.5%)	
BMI	healthy weight	209 (59.9%)	245 (70.3%)	454 (63.9%)	CHI^2=20.0
	Overweight	71 (20.1%)	80 (22.4%)	151 (21.2%)	P value = .000
	Underweight	74 (20.9%)	32 (9.0%)	106 (14.9%)	
alcohol use	Yes	84 (23.7%)	44 (12.3%)	128 (18.0%)	CHI^2= 15.659
	NO	270 (76.3%)	313(87.7%)	583(82.0%)	P value =.000
kchat use	YES	20 (8.5%)	16 (4.5%)	36 (6.5%)	CHI^2= 4.683
	NO	324(91.5%)	341 (95.5%)	665 (93.5%)	P value = 0.03
Cigarette use	Yes	43(12.1%)	27(7.6%)	53 (8.9 %%)	CHI^2= 9.428
	NO	311(87.9%)	330 (92.4%)	648 (91.1%)	P value =.002
Gaya use	Yes	51(14.4%)	45 (12.6%)	96 (13.5%)	CHI^2=.494
	NO	303 (85.6%)	312 (87.4%)	615 (86.5%)	P value =.482
Medical comorbidity	NO	310 (87.6%)	308 (86.3%)	618 (86.9%)	CHI^2=.263
	Yes	44 (12.4%)	49 (13.7%)	93 (13.1%)	P value= .608
Physical activity	Inactive	101(28.5%)	119 (33.3%)	220 (30.9%)	CHI^2= 1.918.
	Active	253 (71.5%)	238 (66.7%)	491 (69.1%)	P value= .166

obstructive sleep apnea	low risk	307 (86.7%)	271 (75.9%)	578 (81.3%)	CHI^2= 14.689 P value= .001
	intermediate risk	28 (7.9%)	43 (12.0%)	71 (10.0%)	
	high risk	19 (5.4%)	43 (12.0%)	62 (8.7%)	
Medication Adherence	Non-adherence	121(34.2%)	32(9.0%)	153 (21.5%)	CHI^2= 66.928
	Adherence	233 (65.8%)	325 (91.3%)	558 (78.5%)	P value=.000
ART Regimen	1st line regimens	307 (86.7%)		307 (86.7%)	
	2nd line regimens	42 (11.9%)		42 (11.9%)	
	3rd line regimens	5 (1.4%)		5 (1.4%)	
acquired trans maternally HIV infection	NO	342 (96.6%)		342 (96.6%)	
	YES	12 (3.4%)		12 (3.4%)	
Most recent CD4 cell count	<500 CD4 count	95 (26.8%)		95 (26.8%)	
	>500 CD4 count	259 (73.2%)		259 (73.2%)	
duration of HIV Diagnosis	< 5 years	173 (48.9%)		173 (48.9%)	
	6-10 years	171(48.3%)		171 (48.3%)	
	>10 yeas	10 (2.8%)		10 (2.8%)	
Duration of hypertension Diagnosis	<5 year	208(58.3%)		208 (58.3%)	
	6-10 year	149(41.7%)		149(41.7%)	
stage of blood pressure	Stage I	89(24.9%)		89(24.9%)	
	controlled BP	268(75.1%)		268(75.1%)	
Nadir date of CD4cell	NO	268(75.7%)		268(75.7%)	
	YES	86(24.3%)		87(24.3%)	

Table 5 Distribution of psychosocial Parameters between people living with HIV/AIDS and hypertension at government hospitals in the Gambella region, southwest Ethiopia; 2022

		Disease status			Test statics
					P value
Variable	Category	HIV/AIDS N=354(100%)	Hypertension N=357(100%)	Total	
social support	Poor	99 (28.0%)	46 (12.9%)	145 (20.4%)	CHI^2= 45.510 P value= .001
	Moderate	163 (46.0%)	139 (38.9%)	302 (42.5%)	
	Strong	92 (26.8%)	172 (48.2%)	264 (37.1%)	
exposure to negative - life vents	did not have exposure to negative life events	199 (56.2%)	201 (56.3%)	400 (56.3%)	CHI^2= .157 P value= .924
	have 1-5 exposure to negative life events	99 (27.1%)	100 (28.0%)	196 (27.6%	
	have>5 exposure to negative life events	59 (16.7%)	56 (15.7%)	114 (16.2%)	

5.3 Magnitude of neurocognitive impairment among people living with HIV/AIDS and hypertension

The overall prevalence of neurocognitive impairment in this study (defined as an RUDAS score of less than or equal to 22) was 33.8%. The prevalence of neurocognitive impairment among people living with HIV/AIDS was 141 (39.8%), 95.0% CI (34.7- 45.1), which was higher than the hypertension group 99 (27.7%) 95.0% CI (23.1-32.7). This difference was statistically significant (p-value .001).

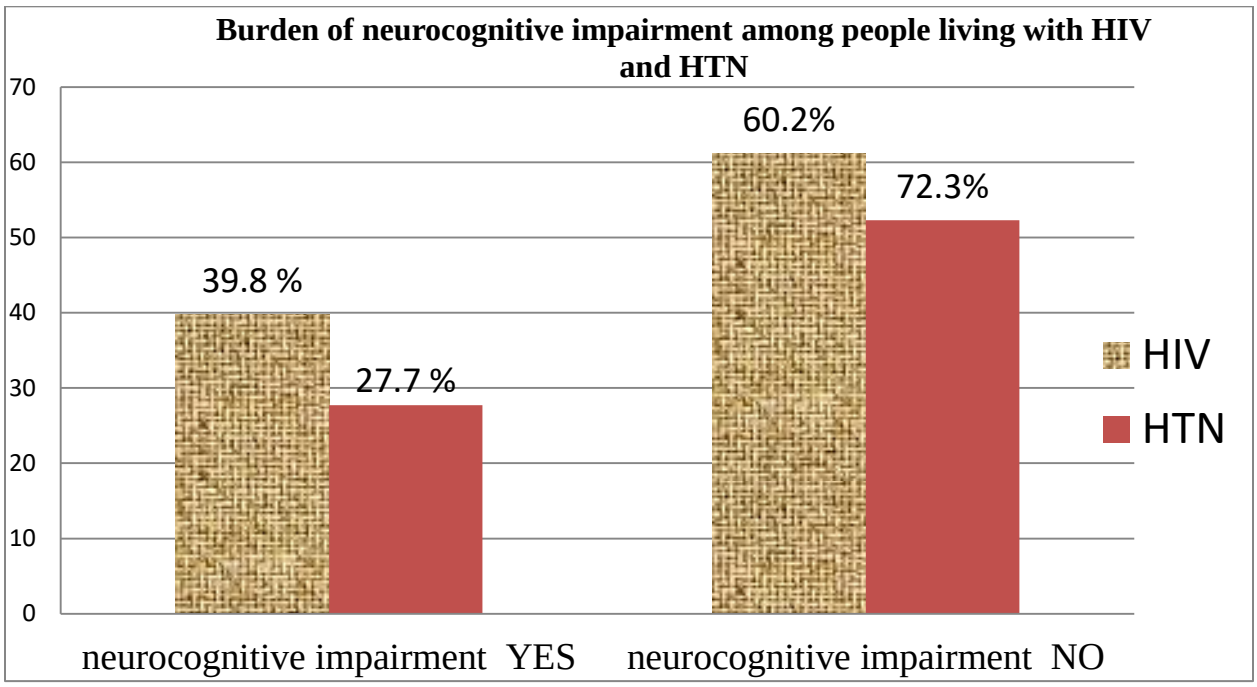

Figure 3 Magnitude of neurocognitive impairment among people living with HIV/AIDS and hypertension at government hospitals in the Gambella region, southwest Ethiopia, 2022

5.4 Factors associated with neurocognitive impairment between PLHIV and hypertension

Bivariate analysis was carried out to see the association between neurocognitive impairment explanatory variables, one whose p-value was less than 0.25 were selected for further analysis. Based on bivariate analysis, Sex female, age >57, depression, anxiety, BMI, obstructive sleep apnea, Gaya use (native tobacco), alcohol use, and Cigarette use, were found to be associated with NCI in both groups, In addition, poor social support, a nadir date of CD4cell count (<200cells/mm3) and 2nd line HARRT regiment were found to be associated with NCI in PLHIV study participants, and among hypertension group stage I blood pressure were associated with NCI and entered to multivariate analysis.

Table 6 Bivariate logistic regression analysis

Variable	Categories	Diseased statues							
		HIV/AIDS				Hypertension			
		NCI				NCI			
		Yes	No	COR(95%CI)	P Value	yes	No	COR(95%CI)	P Value
Sex	Male	45	110	1	1	45	167	1	
	Female	96	103	2.278 (1.461-3.554)	**.000***	54	91	2.202 (1.375-3.527)	**.001***
Age	<35	12	27	1	1	5	19	1	
	36-56	161	109	1.523 (.740-3.136)	**.253***	77	207	1.414 (.510-3.917)	.506
	>57	25	20	1.800 (.733-4.423)	**.200***	17	32	2.019 (.641-6.359)	**.230***
Marital status	Married	53	93	1	1	48	131	1	1
	single	56	78	1.260 (.779-2.039)	.347	32	80	1.092 9(.645-1.849)	.744
	Widowed	7	7	1.755(.584-5.275)	.317	4	9	1.213 (.357-4.122)	.757
	Separated	11	16	1.206 (.522-2.790)	.661	7	17	1.124 (.439-2.878)	.808
	Divorced	14	19	1.293 (.600-2.788)	.512	8	21	1.040 (.432-2.504)	.931
	No formal Education	24	34	1.000 (.392-2.552)	.936	7	11	1.660 (.574-4.804)	.350
	1-8 Grade	10	14	.988 (.490-1.994)	1.00	14	34	1.074 (.489-2.358)	.858
	9-12 Grade	30	50	.840 (.438-1.611)	.974	23	61	.984 (.499-1.940)	.962

Educational status	certification below diploma	7	16	.613 (.224-1.672)	.600	7	22	.830 (.312-2.205)	.709
	Diploma	40	57	.982(.529-1.824)	.339	25	70	.932 (.480-1.808)	.834
	Degree and above	30	42	1	1	23	60	1	1
Occupational status	Employed	77	120	1	1	57	148	1	1
	Merchant	13	22	.921 (.438-1.936)	.921	10	34	.764 (.354-1.647)	.492
	Daily laborer	11	15	1.143 (.499-2.618)	1.143	9	22	1.062 (.462-2.445)	.887
	Have no job	12	16	1.169 (.524-2.605)	1.169	9	20	1.168 (.502-2.717)	.718
	Farmer	28	40	1.091 (.622-1.912)	1.091	14	34	1.069 (.534-2.139)	.850
permanent address	Majang zone	36	49	.918 (.230-3.663)	.904	4	10	1.067 (.183-6.213)	.943
	Gambella town	79	128	.771 (.201- 2.959)	.705	88	221	1.062 (.275-4.095)	.931
	Nuare zone	3	7	.536 (.081-3.533)	.517	2	8	.667 (.087-5.127)	.697
	Angnuwa zoon	19	24	.990 (.233-4.202)	.989	2	11	.485 (.065-3.610)	.480
	Out of Gambella region	4	5	1	1	3	8	1	1
Estimated monthly income	Above poverty line	106	161	1	1	72	200	1	1
	Below poverty line	35	52	1.022 (.624-1.675)	.930	27	58	1.293 (.761-2.197)	.342
social support	Poor social support	43	56	1.511 (.840-2.718)	**.168***	14	32	1.098 (.540-2.234)	.796
	Moderate social support	67	96	1.373 (.806-2.341)	**.244***	36	103	.877 (.530-1.452)	.611

	Strong social support	31	61	1	1	49	123	1	1
exposure to negative life events	no exposure	76	123	1	1	51	150	1	1
	have 1-5 exposure	40	56	1.156 (.704-1.899)	.567	30	70	1.261 (.740 2.147)	.394
	have>5 exposure	25	34	1.190 (.659-2.147)	.564	18	38	1.393 (.731-2.654)	.313
Alcohol use	Yes	47	37	2.378 (1.445-3.914)	**.001***	16	28	1.583 (.816-3.075)	**.175***
	NO	94	176	1	1	83	230	1	1
kchat use	Yes	14	16	1.357 (.640-2.877)	.425	5	11	1.194 (.404-3.529)	.748
	NO	127	197	1	1	94	247	1	
Cigarette use	Yes	24	19	2.094 (1.100-3.988)	**.024***	14	13	3.104 (1.403-6.868)	**.005***
	NO	117	194	1	1	85	245	1	
Gaya use	Yes	36	15	4.526 (2.369-8.644)	**.000***	22	23	2.919 (1.541-5.529)	**.001***
	NO	105	198	1	1	77	235	1	1
Physically activity	Inactive	41	60	1.045 (.653-1.673)	.853	37	82	1.281 (.789-2.079)	.316
	Active	100	153	1	1	62	176	1	
Medication Adherence	Non-adherence	49	72	1.043 (.666-1.633)	.854	11	21	1.411 (.654-3.045)	.381
	Adherence	92	141	1	1	88	237	1	1
Medical comorbidity illness?	No	121	189	1	1	83	225	1	1
	Yes	20	24	1.302 (.689-2.458)	.416	16	33	1.314 (.688-2.513)	.408
obstructive sleep apnea	low risk	119	188	1	1	65	206	1	1
	intermediate risk	9	19	.748 (.328-1.709)	.491	14	29	1.530 (.763-3.069)	.231*
	high risk	13	6	3.423 (1.267-9.251)	**.015***	20	23	2.756 (1.423-5.337)	**.003***
BMI	healthy weight	75	134	1	1	59	186	1	
	Overweight	26	45	1.032 (.590-1.806)	.911	31	49	1.994 (1.166-3.411)	**.012***
	Underweight	40	34	2.102 (1.228-3.598)	**.007***	9	23	1.234 (.541-2.813)	.618
Anxiety	NO	114	196	1	1	84	240	1	1

	Yes	27	17	2.731(1.427-5.227)	**.002***	15	18	2.381 (1.149-4.935)	**.020***
Depression	No	38	112	1	1	50	176		
	Mild depression	18	27	1.965 (.975-3.960)	**.059***	8	22	1.280 (.537-3.049)	.577
	Moderate depression	54	57	2.792 (1.654-4.713)	**.000***	23	36	2.249 (1.222-4.140)	**.009***
	Moderately severe depression	15	11	4.019 (1.700-9.504)	**.002***	10	15	2.347 (.993-5.543)	**.052***
	Severe depression	16	6	7.860(2.869-21.53)	**.000***	8	9	3.129 (1.148-8.529)	**.026***
ART Regiments	1st line regimens	111	164	.451 (.124-1.636)	**.226***				
	2nd line regimens	24	45	.356 (.091-1.383)	**.136***				
	3rd line regimens	6	4	1	1				
Nadir date of CD4cell	NO	93	175	1	1				
	YES	48	38	2.377 (1.450-3.897)	**.001***				
duration of HIV Diagnosis	< 5 years	67	105	1	1				
	6-10 years	69	102	1.060 (.688-1.634)	.791				
	>10 yeas	5	6	1.306 (.383-4.449)	.669				
Trans maternally HIV infection	NO	136	206	1	1				
	YES	5	7	1.082 (.337-3.479)	.895				
recent CD4 count	<500 CD4 count	38	56	1.034 (.639-1.673)	.891				
	>500 CD4 count	103	157	1	1				
stage of blood pressure	Stage I					29	59	1.397 (.830-2.353)	**.208***
	controlled BP					70	199	1	1
Duration of HTN Diagnosis	<5 year					56	152	1	
	>5 year					43	106	1.101 (.689-1.759)	.687

Notes: * = Factors that have association at p-value <0.25 1= reference category

Factors associated with neurocognitive impairment among PLWHA and hypertension in the multivariable logistic regression

After controlling for confounders with multivariable binary logistic regression, the likelihood of neurocognitive impairment among people living with HIV/AIDS was twice as high for females (AOR = 2.2; 95% CI: 1.340-3.753), with a p-value of 002. Similarly, being female was a significant association among patients with hypertension, with an odds ratio (AOR) of 2.5 (95% CI: (1.502-4.393).

Anxiety was also associated with neurocognitive impairment in these two populations of patients with PLHIV and hypertension. HIV/AIDS patients who had anxiety were more likely to develop neurocognitive impairment than those who had no anxiety with an odds ratio of (AOR = 2.6, 95% CI: 1.225-5.870), whereas the chance of developing neurocognitive impairment in hypertensive patients was approximately 2.5 times higher than that of those without anxiety (AOR = 2.4, 95% CI: 1.015-6.151).

In addition, depression was also one of the factors that determined NCI for both PLHIV and hypertensive patients in this study, with a significant association between the probabilities of developing neurocognitive impairment and depression, Moderate depression (AOR = 2.1, 95% CI = 1.211-3.990), moderately severe depression (AOR = 3.2, 95% CI: 1.193-8.601), and severe depression (AOR = 4.0, 95% CI: 1.266-12.750) were significantly associated with neurocognitive impairment compared to those PLHIV participants who had no depression. Similarly, in hypertension patients, individuals with moderate depression had nearly two times the odds of suffering neurocognitive impairment than those without depression (AOR = 2.4, 95% CI: 1.262-4.807), whereas it was three times in those with moderate to severe depression (AOR = 2.7, 95% CI: 1.084-7.221), and about four times more likely to have neurocognitive impairment to those with severe depression than those without depression (AOR= 4.3, 95% CI: 1.498-12.746).

Use of cigarettes and Gaya use in the last year were also found to be a significant factor in the development of NCI in this study, with the odds of having NCI being about 2-3 times higher for those who used cigarettes and Gaya than for non-users (AOR = 2.1, 95% CI: 1.023-4.655), and (AOR = 3.0, 95% CI: 1.416-6.394), respectively. Similarly, in hypertension patients, NCI was

also found to have an association with cigarette users (AOR = 2.8, 95% CI: 1.134-7.206), and Gaya users (AOR = 4.3, 95% CI: 12.043-9.185).

In this study, obstructive sleep apnea also contributed to the prevalence of neurocognitive impairment in both the PLHIV and hypertension groups. Among people living with HIV/AIDS, respondents who had high-risk obstructive sleep apnea were four times more likely to have NCI compared to those with low-risk obstructive sleep apnea (AOR = 4.0, 95% CI: 1.3171-2.390). Similarly, the risk of developing NCI was four times higher in hypertension patients with high-risk obstructive sleep apnea than in those with low-risk obstructive sleep apnea (AOR = 4.0, 95% CI: 1.969-8.418).

The nadir date of CD4 cell count and underweight were independent predictors of NCI among people living with HIV/AIDS, Individuals who had any experience with a nadir date of CD4 cell count CD4 count (<200 cells/mm3) had nearly twice the odds of developing neurocognitive impairment than those who had not (AOR = 2.2, 95% CI: 1.248-4.005). Similarly, participants with an underweight BMI were associated with NCI (AOR = 3.0, 95% CI: 1.618-5.724), Unlikely in the case of hypertension patients (Table 7).

Table 8 multivariate logistic regression analysis of factors associated with neurocognitive impairment among people living with HIV/AIDS and hypertension attending follow-up treatment at government hospitals in the Gambella region in southwest Ethiopia; 2022 (n=354)

		HIV/AIDS			**HYPERTENSION**		
		NCI			NCI		
Variables	Category	Yes	No	AOR (95% CI)	Yes	No	AOR(95%CI)
Sex	Male	45	110	1	45	167	1
	Female	96	103	2.242 (1.340-3.753) **	54	91	2.569 (1.502-4.393) **
Depression	No	38	112	1	50	176	1
	Mild depression	18	27	1.956 (.897-4.264)	8	22	1.906 (.743-4.887)
	Moderate depression	54	57	2.198 (1.211-3.990) *	23	36	2.463 (1.262-4.807) **
	Moderately severe depression	15	11	3.204 (1.193-8.601) *	10	15	2.798 (1.084-7.221) *
	Severe depression	16	6	4.018 (1.266-12.750) *	8	9	4.369 (1.498-12.746) **
Anxiety	NO	114	196	1	84	240	1
	Yes	27	17	2.682 (1.225-5.870) *	15	18	2.826 (1.239-6.448) *
Cigarette use	Yes	28	19	2.183 (1.023-4.655) *	14	13	2.859 (1.134-7.206) *
	NO	113	194	1	85	245	1
Gaya use	Yes	36	15	3.010 (1.416-6.394) **	22	23	4.332 (2.043-9.185) *
	NO	105	198	1	77	235	1
obstructive sleep apnea	low risk	119	188	1	65	206	1
	intermediate risk	9	19	1.116 (.446-2.795)	14	29	2.074 (.951-4.522) *
	high risk	13	6	4.039 (1.3171-2.390) *	20	23	4.071 (1.969-8.418)
BMI	healthy weight	75	134				
	Overweight	26	45	1.140 (.602-2.159)			
	Underweight	40	34	3.043 (1.618-5.724) **			
Nadir date of CD4cell	NO	93	175	1			
	YES	48	38	2.235 (1.248-4.005) **			

Notes: **p-value <0.008; * p-value 0.009-0.05, 1 = Reference, BMI; Body Mass Index

6. DISCUSSION

This study reported that the prevalence of neurocognitive impairment is significantly higher in PLHIV participants (39.8%) compared respondents with hypertension (27.7%). The possible explanation may be variations in socio-demographic and clinical traits. For instance, the female sex is one of the demographic factors that are linked to an increased risk of neurocognitive impairment (64,65). Since HIV/AIDS infection is more common in women than in men in Ethiopia as well as, women are typically screened during prenatal appointments, In the current study more PLHIV study participants were female than hypertension study participants which might be contributed to the higher prevalence NCI among people living with HIV/AIDS. Furthermore, Additional burden in PLHIV study participants, for instance, According to the findings of the CHARTER group, HAND was higher among individuals who had a CD4 nadir, extreme immunosuppression may be implicated by HIV "legacy event" that results in irreversible brain damage(8,22,53), However, in this study patients with hypertension do not have this characteristic might be accounted. Similar to the previous study report from Southern Ethiopia (31), currently BMI of <18.5 kg/m2 was found to be another predictor of NCI among PLHIV/AIDS, Malnutrition in PLHIV causes significant immune suppression, central nervous system opportunistic infections which enables neurocognitive impairment (66) all this additional burden might it have a role for the higher prevalence NCI among PLHIV respondents.

However, the prevalence of NCI among people living with HIV/AIDS in the current study was low compared to the previous study conducted among hypertensive people in Tanzania (43.6%) (12), and a study in Argentina revealed (69%) of the participants had detectable lesions and (42 percent) had cognitive disorders (42). The higher prevalence in previous studies could be explained by differences in sample size; for example, in Tanzania, a total of 1,201 people were screened, which is significantly more than the current study; additionally, the mean age was 58.1 years, and just over half of all participants were 60 years of age or older. Older age is among the demographic factors that increase the risk of NCI (20). On the other hand, a study in Argentine with a lesser sample size of 19 patients that were evaluated by MRI might be accounted for by the higher prevalence of NCI among hypertensive people than in this study. The other reason may be inappreciable cultural and educational differences and environmental factors.

The magnitude of NCI among PLHIV in the current study is consistent with a multicenter study conducted in Europe (35%) (25) in the Netherlands (33%)(8), in Canada (40%,) And with previous studies done in Ethiopia (33.3%, 35.6%, 35.7%, 36.4%, 39.3%, 41%) (28,48–50,52,52). However, this study is lower than studies conducted in India (48%) (43), in Uganda (64.4%) (46), and 67.1 percent in Southern Ethiopia (31). The disparity can be explained by differences in study design and sample size; both the Ugandan study and the Gamo Gofa Zone study used much larger sample sizes (697 and 680 patients, respectively) than the current study. In addition, 59.6% of the participants in Gamo Gofa were reported to have poor medication adherence to their ART medication; moreover, the screening tool used in both of the above studies was the IHDS. Other socio-demographic variations might also play a role in the inconsistency.

On other hand, this study has shown a much higher magnitude of NCI among PLHIV than previous studies conducted in Tanzania (19.3%) (47), Nigeria (21.5%) (45), Central Africa (25%) (27), And 24.8 percent in Debre-Markos, Ethiopia (30). The lower prevalence in previous studies might be due to differences in inclusion criteria and the instrument for screening neurocognitive impairment. For instance, In Tanzania, the study participants were patients who had been on ART for at least 1 year without immunological failure, pre-existing neurological disease, or confounding comorbidities, and screen tests Frascati criteria leading to remarkable differences. Furthermore, specific clade subtypes might influence the presentation of neurological complications. A report from Nigeria indicated that clades A and G are the predominant subtypes of the virus (45), In contrast, clade C is the most common subtype in southern Africa and Ethiopia (67), and HIV-associated cognitive impairment is relatively higher in subtype clade B and C HIV infection (28).

The observed prevalence of NCI in participants with hypertension in this study (27.7%) is comparable to reports from the Heart-Brain Study in Argentina (22.1%) (10), and China (29.25%) (68). but the current study is less so than those done in India (35.5%) (18) and a study done in Jimma, Southwest Ethiopia, by Tesema Etefa et al. (30.8%) (21). The discrepancy might be due to socio-demographics, clinical characteristics, and variability in the tools utilized for the assessment of cognitive functions. For instance, the mean age of participants in Jimma Ethiopia was 53, and 55.5 years in India were relatively older than the current 46.09 years. Also, a study in Jimma, Ethiopia, reported that more than half of the participants had attained a grade below

eight; similarly, the mean number of years of education in India was 5.7. Educational attainment contributes to individual differences in cognitive skills; hence, people with higher education perform better across a broad range of cognitive tasks (52). All these well-defined risk factors could lead to such discrepancies; moreover, a higher rate of comorbid illness and poor blood pressure control in those previous studies can worsen the cognitive outcomes.

In this study, neurocognitive impairment was associated with socio-demographic factors with the female sex, this finding is in line with the study conducted in India(43) and the Heart-Brain Study in Argentina (10). Some possible hypotheses have been reported, such as women are more likely than men to experience psychological risk factors (such as poverty, low education, substance abuse, depression, early life trauma, and access barriers to healthcare), which can lower their cognitive reserve before actually experiencing illness and cause greater cognition dysfunction after infection. Furthermore, changes in sex steroid hormones across the menstrual cycle, and pregnancy, may contribute to women's increased susceptibility to NCI (64,65).

In this study, anxiety and depression were associated with neurocognitive impairment, several previous studies had reported co-occurring depression and anxiety were linked with neurocognitive impairment in hypertension as well as HIV patients(18,25,52). The possibility of clinical implications is that functional alterations of the medial prefrontal cortex (PFC) and altered connectivity between medial PFC and limbic structures (i.e., amygdala, hippocampus, Para hippocampal cortex) contribute to CI in MDD, and also disrupt cognition through effects on sympathetic arousal and glucocorticoid release (69).

According to the findings of this study cigarette use was a significant association with NCI with which the odds of having NCI being about 2-3 times higher for those who used cigarettes in between two groups. It is similar to findings from studies in Ethiopia among hypertensive patients at Jimma (21), ART Centre in Addis Ababa, and Debre-Markos (30,49). Furthermore, this study independently investigated the native tobacco (Gaya) and discovered a significant association with NCI; the likelihood of developing NCI for those who used was 3-4 times higher than for non-users, this finding was not discovered in previous studies. Pipe smoking involves the use of native tobacco species (Gaya). there is now a body of evidence indicating that chronic cigarette smoking is associated with an increased risk of numerous biomedical conditions that may directly or indirectly compromise brain neurobiology and cognition (70). In addition to drug

interaction and HIV, hastening disease progression may have contributed to the stronger association or may be due to the effect of tobacco on brain cells, which kills and prevents the formation of new brain cells (49).

Obstructive sleep apnea (OSA) is one of the factors associated with NCI in the current study. Several studies have reported associations between OSA and NCI over the years(7,71), and people with HIV/AIDS have been found to frequently experience it. In part because of the viral infection and Highly Active Anti-Retroviral Therapy, changes in body composition, such as central fat buildup and subcutaneous fat atrophy, are common (72). OSA is also thought to affect 50% of HTN sufferers (73). The effects of OSA, oxygen desaturation, changes in sleep architecture, and altered ventilation, increase the risk of cognitive impairment (71).

In this study, a nadir date of CD4 cell count (<200cells/mm3) was found to be an independent predictor of neurocognitive impairment in PLHIV. This is consistent with the findings of the largest cohort studies (CHARTER) group, and with studies done in the Netherlands (8,53). The possibility of clinical implications is that the extreme immunosuppression may be a significant HIV "legacy event" that results in irreversible brain damage and contributes to HAND (8,22,53).

Similar to the previous study report from Southern Ethiopia (31), In this study BMI of <18.5 kg/m2 was found to be another factor predictor of NCI among PLHIV/AIDS. Malnutrition in PLWHA causes significant immune suppression and leads them to develop central nervous system opportunistic infections in the cortical or subcortical structures of the brain, which enables neurocognitive impairment (66). Vitamin deficiencies, particularly B-12 deficiency, can raise the risk of several types of neurocognitive disorders (31,66).

Strength and Limitation

Strength

To the best of our knowledge, this is the first study that has attempted to compare the magnitude of neurocognitive impairment between people living with hypertension and HIV/AIDS. It is generalizable to study areas because included both urban and rural hospitals in the region

Limitation

The study has some limitations to take into consideration in interpretations of the result. The first limitation is with matching. It would have been better if we did a matching of important variables for neurocognitive impairment such as sex and age in both groups. The other potential limitation is that we did not conduct HIV testing in the hypertension comparison group to exclude those with positive HIV test results. Instead, we looked through the medical records of the patients to identify and to exclude those who had comorbidities (HIV infection and hypertension).a cross-sectional study we could not establish causal relationships between the associations we observed

7. Conclusion and Recommendation

7.1 Conclusion

The findings suggest that both people living with HIV/AIDS and hypertension have a higher burden of neurocognitive impairment. However, the prevalence of neurocognitive impairment is higher in people living with HIV/AIDS than in the hypertension group. To determine which of the previously indicated predictors is in charge of the observed difference in NCI between the two groups; the study further evaluated significant determinant variables for NCI. Based on the results, the study draws the conclusion that this difference can be attributed to variation in socio-demographic and clinical traits, such as female sex, and might be accounted for CD4 nadir and BMI because both CD4 nadir and BMI less than 18.5 were independently found to be predictors of NCI among PLHIV individuals, unlike patients with hypertension who do not have this characteristic.

7.2 Recommendation

To contribute to solving the prevailing problem of NCI between the two groups; the following are some recommendations for the stakeholders,

For the Ministry of Health and Gambella Regional Health Bureau

There is a need to set prevention programs for neurocognitive impairment, and updates treatment protocols for proper management, follow-up, and care of hypertension and HIV/AIDS patients.

The Gambella region health bureau needs to develop action plans for neurocognitive impairment diagnosis and management, as well as a health education program that focuses specifically on risk factors. Providing capacity building to health care providers on screening, diagnosing, and to cease the etiology, and therapeutic modalities for NCI in HIV/AIDS and hypertension patients should address the underlying cause(s).

Health professionals

For clinicians who work at the chronic clinics and ART follow-up clinic, It is important to routinely screen for NCI as well as abovementioned parameters which permits early and adequate clinical management of HIV and hypertension patients, and provide health education to enhance awareness of patient, working hard to stop psychoactive substance use through psycho-education and other methods should be given a concern

Recommendation to future researchers

It will be better if other factors are explored and longitudinal research is conducted.

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Annexes

Annex 1: English version of a consent form and assent form

Informed Consent

Dear Respondent:

My name is _____ I currently doing my master's degree in Integrated Clinical and Community Mental health at Jimma University. Am here to study Neurocognitive impairment and associated factors among PLHIV and hypertensive patients who have regular follow-up visits and you are chosen to participate in this study. You are chosen and included in the study as part of the sample population to complete the questionnaire designed by the researcher.

The information obtained in this study will be used only for research purposes to generate important information about Neurocognitive impairment and associated factors among people living with HIV/AIDS and hypertensive patients which are used to improve the service provider and to achieve changes in the service utilization for the prevention and control of HIV/AIDS as a general. To attain this study objective your goodwill and kindly participation are needed. Confidentiality is strictly protected and none of your responses will be reported separately. Therefore, there is no need to write your names or House ID numbers on these questionnaires. It is your right to participate or to refuse this study. In addition, you can drop any individual question or the whole questionnaire. However, your participation and contribution in the study are very important to come up with important findings, which may help local health planners to intervene in the problem locally. So please take a few minutes to answer the questions.

Do you have any opinions regarding this study? Do you agree to participate in this study?

Yes, Continue No, thank you! Questionnaire code number_____

Name of the data collector_____Sign_____ Date_____

Name of the supervisor_____Sign_____ Date _____

If you have any questions about this research study, please contact me (Mr. Abdul Hafez Kemal) at +251913281438 (email.hafezkemal@gmail.com) or my advisor Mr.Liyew Agenagnew, +251912806976 (liyew2003@gmail.com), and Mr.Shimelis Girma +251911721438 or Mr.Bediru Dawud +251913614815 or email bawud12@gmail.com

Annex 2 English version questionnaires

PART I. Socio-demographic and Personal Information

S.N	Questions	Responses and coding	Skip to
Q101	Age	_____years 88. Don't know 99. No response	
Q102	Sex	1. Male 2. Female	
Q103	Permanent address	1. Majang zone 2. Gambella town 3 Nuare zone 4 agnuwa zone 5. Out of Gambella region	
Q104	Marital Status	1. Married 2. Single 3. Widowed 4. Separated 5. Divorced	
Q105	Educational status	1. No formal education 2. Elementary(1-8 grade) 3. Secondary school (9-12) 4. Any certification below the diploma 5. Diploma 6. Degree and above	
Q106	Occupation	1. Employed 2. Merchant 3. Daily laborer 4. Have no job 5. Others, specify_____	
Q107	Estimated Monthly income	_____ Ethiopian Birr	

Part II Neurocognitive impairment assessment question

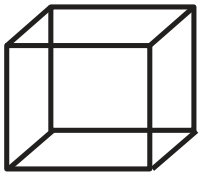
Item		Max score
108 Memory 1 (instruction) I want you to imagine that we are going shopping. Here is a list of grocery items. I would like you to remember the following items which we need to get from the shop. When we get to the shop in about 5 minutes, I will ask you what it is that we have to buy. You must remember the list for me. **Tea Cooking Oil, Eggs, Soap** Please repeat this list for me (Ask the person to repeat the list 3 times). (If a person did not repeat all four words, repeat the list until the person has learned them and can repeat them, or, up to a maximum of five times.) **109 Visio spatial Orientation** 2 I am going to ask you to identify/show me different parts of the body. (Correct = 1). Once the person correctly answers 5, part of the do not continue as maximum score is 5 points (1) show me your right foot (2) show me your left hand (3) with your right hand touch your left shoulder (4) with your left hand touch your right ear (5) which is (point to/indicate) my left knee (6) which is (point to/indicate) my right elbow (7) with your right hand point to/indicate my left eye (8) with your left hand point to/indicate my left foot **110 Praxis** **3** I am going to show you an action/exercise with my hands. I want you to watch me and copy what I do. Copy me when I do this (one hand in a fist, and the other hand palm down on the table or your knees and then alternate simultaneously.) Now do it with me. I would like you to keep doing this action at this pace until I tell you to stop - approximately 10 seconds (Demonstrate at moderate walking pace). **Score as:** Normal = 2 (very few if any errors; self-corrected; progressively better; good maintenance; only very slight lack of synchrony between hands)		------ **5**

Partially Adequate = 1 (noticeable errors with some attempt to self-correct; some attempt at maintenance; poor synchrony)

Failed = 0 (cannot do the task; no maintenance; no attempt whatsoever)

111 Visio-Constructional Cube Drawing

4 Please draw this picture exactly as it looks to you (Show the cube on the back of the page). ------ **--2**



(Yes = 1; No = 0) Score as

(1) Has the person drawn a picture based on a square?

(2) Do all internal lines appear in a person's drawing?

(3) Do all external lines appear in a person's drawing? ------ **--3**

112 Judgment

5 You are standing on the side of a busy street. There is no pedestrian crossing and no traffic lights. Tell me what you would do to get across to the other side of the street **safely**. (If a person gives an incomplete response that does not address both part of answer, use the prompt: "Is there anything else you would do?") Record exactly what the patient says and circle all parts of the response that were prompted.

……..

……..

……..

Score as:

Did person indicate that they would look for traffic? (YES = 2; YES PROMPTED = 1; NO = 0)

Did person make any additional safety proposals? (YES = 2; YES PROMPTED = 1; NO = 0) ------ **--4**

113 Memory recall

1 We have just arrived at the shop. (Can you remember the list of groceries we need to buy? (Prompt: If a person cannot recall any of the lists, say, "The first one was 'tea'." (Score 2 points each for any item recalled which was not prompted. Use only tea as a prompt)

Tea

Cooking Oil

Eggs -----**8**

Soap

114 Language

I am going to time you for one minute. In that one minute, I would like you to tell me the names of as many different animals as you can. We will see how many different animals you can name in one minute. (Repeat instructions if necessary). The maximum score for this item is 8. If a person names 8 new animals in less than one minute, there is no need to continue.

1. ……. 5. …….

2. ……. 6. …….

3. ……. 7. ……. -----**8**

4. ……. 8. …….

30

Part III Adherence to medication related question

s/no	Question	Answer
Q115	Do you ever forget to take your medication	1 yes 0 no
Q 116	Are you careless at times about taking your medication?	1 yes 0 no
Q 117	When you feel better, do you some time stope taking your medication	1 yes 0 no
Q 118	Sometime if you feel worse when you taking the medication, do you stop taking it.	1 yes 0 no
Q 119	I take my medication only when I am sick	1 yes 0 no
Q 120	It is unnatural for my mind and body to be controlled by medication	1 yes 0 no
Q 121	My thoughts are clearer on medication	1 yes 0 no
Q 122	By staying on medication, I can prevent getting sick	1 yes 0 no
Q 123	I feel weird like a 'zombie " on medication	1 yes 0 no
Q 124	Medication makes me feel tired and sluggish	1 yes 0 no

Part IV Assessment of social support (Oslo 3 questionnaire)

	Item	Score	
125	How many people are so close to you that you can count on them if you have great personal problems?	1 Non 2 1-2 people 3 3-5 people 4 5+	
126	How much interest and concern do people show in what you do.	1 'none' 2 'little' 3 'uncertain' 4 'some' 5 'a lot'	
127	How easy is it to get practical help from neighbors if you should need it?	1 'very difficult' 2 'difficult' 3 'possible' 4 'easy' 5 very easy	

PATR V Substance use-related question

128	Have you ever drunk or used drugs more than you meant to? In the past 12 months?	1. Yes 2. No	
129	Have you felt you wanted or needed to cut down on your drinking or drug use?	1 .yes 2 no	
130	If yes, for question ---what? (Multiple responses possible)	1. Chat 2. Alcohol 3. Smoking 4. Drugs 5.Other,specify_____	

PART VI Depression-related question

S.N	Question	Response and coding 0. not at all 1. several days 2. more than half of the day 3. nearly every day	Skip up
131	Little interest or pleaser in doing things		
132	Feeling down or depressed or hopeless		
133	Treble failing to stay asleep or sleep too much		
134	Feeling tired or having little energy		
135	Poor appetite or overeating		
136	Feeling bad about yourself or that you are a failure or have let yourself or your family dawn		
137	Terrible concentrating on doing things such as reading a newspaper or watching television		
138	Thoughts that you would be better off dead or hurting yourself		
139	Psychomotor agitation and retardation		
140	If you checked off any problem how difficult have those problems made it for you to do your work take care of things at home or get along with other people	0. not difficult at all 1. somewhat difficult 2. very difficult 3. extremely difficult	

Part VII Anxiety assessment questionnaire

	Over the last 2 weeks, how often have you been bothered by the following problems?	**Scoring** Not at all = 0 Several days = +1 More than half the days= 2 Nearly every day=3	
141	. Feeling nervous, anxious, or on edge		
142	Not being able to stop or control worrying		
143	Worrying too much about different things		
144	Trouble relaxing		
145	Being so restless that it is hard to sit still		
146	Becoming easily annoyed or irritable		
147	Feeling afraid as if something awful might happen		

Part VIII trauma-related Question

Instructions: Listed below are several difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that it happened to you personally, you witnessed it happen to someone else, you learned about it happening to a close family member or close friend, you were exposed to it as part of your job (for example, paramedic, police, military, or other first responder); you're not sure if it fits; or (f) it doesn't apply to you. Be sure to consider your entire life (growing up as well as adulthood) as you go through the list of events.

	Event	Happed to me	Witnessed it	Learned about it	Part of my job	Not sure	Doesn't apply	
148	Natural disasters (for example, floods, hurricanes, tornado, earthquake							
149	Fire or explosion							
150	Transportation accidents (for example, car accidents, boat accidents, train wrecks, and plane crashes)							
151	Serious accident at work, home, or during recreational activity							
152	Exposure to a toxic substance (for example, dangerous chemicals, radiation)							
153	Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)							
154	Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)							
155	Other unwanted or uncomfortable sexual experience							
156	Sexual assault (rape, attempted							

	rape, made to perform any type of sexual act through force or threat of harm)							
157	Other unwanted or uncomfortable sexual experience							
158	Combat or exposure to a war-zone (in the military or as a civilian)							
159	Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)							
160	Life-threatening illness or injury							
161	Severe human suffering							
162	Sudden violent death (for example, homicide, suicide)							
163	Sudden accidental death							
164	Serious injury, harm, or death you caused to someone else							
165	Any other very stressful event or experience							

PART X Physical activity-related questioners (Exercise Vital Sign (EVS))

	Item		
166	On average, how many days per week do you engage in moderate to strenuous exercises (like a brisk walk)?	Record number of days (0–7) ----------	
167	On average, how many minutes per day do you exercise at this level?	7 Categories: 10, 20, 30, 40, 50, 60, 90, 120, and ≥150 min ----------	

Part XI Body Mass Index

Instruction calculates Body Mass Index using a person's height and weight. The formula is BMI = kg/m2 where kg is a person's weight in kilograms and m2 is their height in meters squared. Record as following

A BMI of 25.0 or more is overweight, while the healthy range is 18.5 to 24.9.less than 18.5 underweight

Q		(kg/m3)	Score	
168	BMI (Body Mass Index)	----------/----------	1 under Weight 2 normal 3 overweight	

Hypertension-related assessment (BP)

	Question	Score	Skip
169	Blood pressure status using digital Stigma - nanometer SBP ---------- DBP----------	1 Stage I HTN = SBP 140-159 and DBP 90-99 2 Stage II HTN = SBP >160 and DBP >100 3 Controlled BP = SBP 120-139 and DBP 80-89	

PART XII Obstructive sleep apnea (OSA) assessment question

	STOP-BANG Sleep Apnea Questionnaire	**Score if** **Yes = 1** **No = 0**	
170	Do you SNORE loudly (louder than talking or loud enough to be heard through closed doors)?		
171	Do you often feel TIRED, fatigued, or sleepy during the daytime?		
172	Has anyone OBSERVED you stop breathing during your sleep?		
173	Do you have or are you being treated for high blood PRESSURE?		
174	BMI more than 35kg/m2?		
175	AGE over 50 years old?		
176	NECK circumference > 16 inches (40cm)?		
177	GENDER: Male?		

PART XIII HIV infection AND HTN related questioners

Q178	When have you made HIV test? Duration of illness (years)	(_____ Month _____year in E.C) 88. Don't remember 99. No response	If 88 or 99 use chart review
179	Have you born WITH HIV (acquired trans maternally HIV infection)	1 = yes 0 = no	
Q180	Have you been to undergo any time experience of a CD4 count level below or less than 200cells/mm3	1 yes 2 no ---------- 88. Don't remember 99. No response	If 88 or 99 use chart review
Q181	When have you made HTN diagnosed (Duration of illness (years)	(_____ Month _____year in E.C) 88. Don't remember 99. No response	If 88 or 99 use chart review

PART XIv Review the patients' chart records on medication-related variables and comorbidity Assessment of antiretroviral therapy			
Q	Regimens	Type of combination	1 if Yes/ and 0 if the answer is no
182	1st line regimens	TDF + 3TC + DTG (FDC)	
		TDF + 3TC + EFV (FDC)	
		AZT + 3TC + EFV	
		AZT + 3TC + NVP	
		TDF + 3TC + NVP	
		ABC + 3TC + EFV	
183	2nd line regimens	TDF + 3TC + LPV/r or ATV/r	
		AZT + 3TC + LPV/r or ATV/r	
		AZT + 3TC + ATV/r or LPV/r	
		AZT + TDF + 3TC + (ATV/r or LPV/r)	
		TDF+3TC + ATV/r or LPV/r	
184	3rd line regimens	DRVr+ABC+3TC+EFVor NVP	
		DRV/r a + DTGb + AZT+3TC	
Q185	current CD4 cell count;	1 <200	
		2 200-350	

		3 351-500	
		4 ≥500	

Review the patients' chart records on medical comorbidity

	Comorbidity assessment	Score 1 = if the patient have any of comorbidity 0 = no comorbidity diagnosis	
186	Is chronic medical illness other than HTN /HIV currently? 1 DM 2 Liver disease 3 Asthma 4 Other specify----------		

Annex 3: Amharic version; consent form and assent form

በእውቀት ላይ የተመሠረተ ስምምነት

ውድ መልስ ሰጪ

ስሜ _____ በአሁኑ ጊዜ በጂማ ዩኒቨርሲቲ ኢንተግሬትድ ክሊኒካል እና ማህበረሰብ የአእምሮ ጤና የማስተርስ ዲግሪዬን እየሰራሁ ነው። እዚህ የመጣሁት ኤች አይ ቪ እና በከፍተኛ የደም ግፊት ታማሚዎች መካከል የነርቭ ማስተዋል እክልእና ከዚህ ጋር ተያያዥ ጉዳዬችን ለማጥናት ነው;; እና በዚህ ጥናት ላይ ለመሳተፍ በተመራማሪው የተነደፈውን ጥያቄ ለማጠናቀቅ በጥናቱ ውስጥ የናሙናው ህዝብ አካል ሆነህ ተመርጠው ተካትተዋል;; የዚህ ጥናት አላማም በኤች አይ ቪ/ኤድስ እና በከፍተኛ የደም ግፊት በታማሚዎች መካከል ስለ ነርቭ የማሰብ ችሎታ መዛባት እና ተያያዥ ጉዳዬችን ለማጥናት ና የህክምና አሰጣጡን ወደ ተሻለ ደረጃ ለማሻሻል ብሎም ኤች አይ ቪን ለመቆጣጠር ለመግታት የሚረዳ ጠቃሚ መረጃ ለማመንጨት ና ለማግኘት ነው:: ይህን የጥናት ዓላማ ለማሳካት የ እርስዎ በጎ ፈቃድህና ና በደግነት ተሳትፎ ማድረግ ያስፈልጋል ። ምስጢራዊነት በጥብቅ የተጠበቀ እና የእርስዎ ምላሾች አንዳቸውም በተናጠል ሪፖርት አይደረግም. ስለሆነም በዚህ ጥያቄዎች ላይ የእርስዎን ስም ወይም የቤት መታወቂያ ቁጥር መጻፍ አያስፈልግም. በዚህ ጥናት መካፈል ወይም አለመቀበል መብትህ/ዎ ሲሆን ። በተጨማሪም ማንኛውንም ጥያቄ ወይም ጠቅላላውን ጥያቄ ልትጥል ትችላለህ ። ይሁን እንጂ የእርስዎ ተሳትፎና አስተዋጽኦ አስፈላጊ የሆኑ ግኝቶችን ለማግኘት በጣም አስፈላጊ ነው፤ ይህ ደግሞ የአካባቢው የጤና እቅድ አውጪዎች በአካባቢያቸው ችግር ውስጥ ጣልቃ እንዲገቡ ሊረዳቸው ይችላል። ስለዚህ እባካችሁ ለጥያቄዎቹ መልስ ለመስጠት ጥቂት ደቂቃዎችን ውሰዱ ። ይህን ጥናት በተመለከተ አስተያየት አለህ? በዚህ ጥናት ለመካፈል ተስማምተሃል? አዎ, ቀጥል አይደለም, አመሰግናለሁ!

የመጠይቁ መለያ ኮድ_____//_____

የመረጃ ጠያቂው ስም_____ ፊርማ _____ቀን_____

የሱፐርቫይዘር ስም_____ ፊርማ_____ቀን_____ይህን

የምርምር ጥናት በተመለከተ ጥያቄ ካለዎት እባክዎን ያነጋግሩኝ (Mr. Abdul Hafez Kemal)

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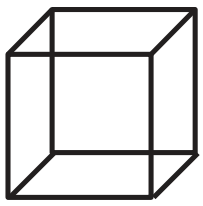
Annex; 4 Amharic version questionnaires

ክፍል 1፡ መሠረታዊ የሆኑ የማህበራዊ እና የግል ሚጃዎችን የሚሟላቱ ጥያቄዎች

S.N	ጥያቄዎች	አማራጭ መልሶች	አስተያየት
Q101	እድሜ	_____years 88. 99 አለማወቅ። ምላሽ የለም	
Q102	ጾታ	1. ወንድ 2. ሴት	
Q103	ቋሚ አድራሻ	1. ማጃንግ ዞን 2 ጋምቤላ ከተማ 3-ኙዌር ዞን4. 4 አኝዋ ዞን 5 ከ ጋምቤላ ክልል ውጪ	
Q104	የጋብቻ ሁኔታ	1. ያገባ 2. ያላገባ 3. ባሎ/ ሚስቱ የሞተ 4. ተለያይተው 5. የተፋታ	
Q105	የትምህርት ደረጃ	1. መደበኛ ትምህርት የለም (ያልተማረ) 2. አንደኛ ደረጃ (1-8 ክፍል) 3. ሁለተኛ ደረጃ (9-12) 5. ከዲፕሎማ በታች የሆነ ማንኛውም የምስክር ወረቀት 6. ዲፕሎማ 7. ዲግሪ እና ከዚያ በላይ	
Q106	ስራ	1. ተቀጣሪ 2. ነጋዴ 3. የቀን ሰራተኛ 4. ስራ የለኝም 5.ሌሎች፣ካለ(ይገለፅ)_____	
Q107	የተገመተው ወርሃዊ ገቢ	_____ የ ኢትዮጵያ ብር	

ክፍል ሁለት Rowland's Universal Dementia Assessment Scale

ኮድ	ጥያቄ		ውጤት
	108 ትውስታ 1.(መመሪያዎች) እሁን ለ ግብይት እየሄድን እንደሆነ በምናብዎ እንዲያስቡ እጠይቅዎታለሁ፡ ፡ የምንገዛቸውን የሸቀጣሸቀጦች ዝርዝር እነግርዎታለሁ ። ከሱቁ ለማግኘት የሚያስፈልጉንን የሚከተሉትን ዕቃዎች እንዲያስታውሱ እጠይቃለሁ። በ 5 ደቂቃ ውስጥ ወደ ሱቁ ስንገባ ምን መግዛት እንዳለብን እጠይቅዎታለሁ። ዝርዝሩን ለእኔ ያስታውሱኛል። ቡና ፣ የምግብ ዘይት ፣ እንቁላል ፣ ሳሙና ። እባክዎን ይህንን ዝርዝር እንደገና ይድገሙ (ግለሰቡ ዝርዝሩን 3 ጊዜ እንዲደግሙ ይጠይቁ)። (ተሳታፊው ሁሉንም አራት ቃላቶች እስከ ሚማረው ወይም እስከ አምስት ጊዜ ይድገሙት።)		
	109 አቀማመጥ/ኦሪንቴሽን 2. የተለያዩ የሰውነት ክፍሎችን እንዲለዩ / እንዲያሳዩኝ እጠይቅዎታለሁ። (ትክክል = 1)። አንድ ሰው የዚህን ጥያቄ 5 ክፍሎች በትክክል ከመለሰ በኋላ ከፍተኛው ውጤት 5 ስለሆነ አይቀጥሉ (1) ቀኝ እግርዎን ያሳዩኝ (2) የግራ እጅዎን ያሳዩ (3) የቀኝ እጅዎን በግራ ትከሻዎ ይንኩ (4) በግራ እጅዎ የቀኝ ጆሮዎን ይንኩ (5) የግራ ጉልበቴን ያመልክቱ / ይጠቁሙ) (6) የቀኝ እጆቼን (ያመለክቱ / ይጠቁሙ) (7) በግራ እጅዎ የግራ እጄን ይጠቁሙ (8) በግራ እጅዎ በግራ እግራዎ ላይ ያመልክቱ / ይጠቁሙ		-----/5
	110 እንቅስቃሴ 3. እኔ በእጆቼ አንድ እንቅስቃሴ አሳይዎታለሁ ። እኔን እንዲመለከቱ እና የምሰራውን እንዲደግሙ እጠይቃለሁ ። ይህንን በምሠራበት ጊዜ የምሰራውን ይድገሙ . (በአንድ እጅህ ቡጢ እንደመጨበጥ ፣ ሌላኛው መዳፍ ተዘርግቶ ጠረጴዛ ላይ - በአንድ ጊዜ በመለዋወጥ		

	አሳይ።) አሁን ከእኔ ጋር ያድርጉት ። አሁን እንዲያቆሙ እስከነገርዎ ድረስ ይህን እንቅስቃሴ በዚህ ፍጥነት እንዲቀጥሉ እፈልጋለሁ ። ለ10 ሴኮንድ ያህል ጠብቅ (በመጠነኛ የመራመጃ ፍጥነት አሳይ) በቂ = 2 (ስህተቶች ካሉ በጣም ጥቂቶች ፣ እራሳቸው የታረሙ ፣ በሂደት የተሸሻሉ ፤ ጥሩ ዘላቂነት ፤ በእጆች መካከል በጣም ጥቂት አለመናበብ ብቻ) በከፊል በቂ = 1 (ራስን ለማረም አንዳንድ ሙከራዎች፤ የሚታዩ ስህተቶች ፤ ውስን ዘላቂነት፤ የመናበብ ችግር) አልተሳካም = 0 (ተግባሩን ማከናወን አልተቻለም ፤ ምንም ዘላቂነትም ሆነ ሙከራ የለም)		------/2
	111 ስዕል(Visoconstructional Drawing)) 4. እባክዎን ይህንን ስዕል በትክክል እርስዎን እንደሚታይዎትይሳሉ (በገጹ ጀርባ ላይ ያለውን ኪዩብ ያሳዩ) (አዎ = 1) ውጤት አያያዝ 1. ተሳታፊው በካሬ ላይ ተመስርተው ስዕሉን ስለዋል? 2. ሁሉም የውስጥ መስመሮች ስዕሉ ውስጥ ይታያሉ? 3. ሁሉም ውጫዊ መስመሮች ስዕሉ ውስጥ ይታያሉ? 		------/3

	112 ውሳኔ (Judgment) 5. መጨናነቅ በሚበዛበት የመኪና መንገድ ዳር ቆመዋል ብለን እናስብ ። የእግረኛ መሻገሪያ ወይም የትራፊክ መብራቶች (የመንገድ ተቆጣጣሪ የመብራት ምልክቶች) በአካባቢው የሉም። መንገዱን በሰላም ለመሻገር ምን እንደሚያደርጉ ይንገሩኝ ። (አንድ ሰው ሁለቱንም የመልስ ክፍሎች የማያሟላ ምላሽ ከሰጠዎት; ተከታዩን ይጠይቁ “ሌላ የሚያደርጉት ነገር አለ?”) ተሳታፊው ምን እንደሚል በትክክል ይመዝግቡ እና በተከታይ ጥያቄ የተሰጡትን የምላሽ ክፍሎች በሙሉ ይክብቡ። …… ተሸከርካሪ አለመኖሩን እንደሚያዩ አመልክተዋል? (አዎ = 2 ፤ አዎ: በተከታይጥያቄ = 1 ፤ አላመለከቱም= 0) ሌላ ማንኛውንም የደህንነት መጠበቂያ መንገድ አመልክተዋል› (አዎ = 2 ፤ አዎ: በተከታይ ጥያቄ = 1 ፤ አላመለከቱም=0)		------/4
	113 የማስታወስ ችሎታ **1.** (የመጀመሪያውን ትእዛዝ አስታውስ) አሁን ወደ ሱቁ ደርሰናል ። ልንገዛቸው የሚፈልጓቸውን የሸቀጣሸቀሻ ሸቀጦችን ዝርዝር ለማስታወስ ይችላሉ? (ጥቆማ: - ተሳታፊው ከዝርዝሩ ውስጥ አንዳቸውንም ባያስታውስ ‹የመጀመሪያው‹ ቡና ›ነበር ።› ብለህ አስታውስ) ። ቡና ብቻ እንደ ማስታወሻ ተጠቀም) ቡና ምግብ ዘይት እንቁላል ሳሙና		------/8

	114 ቋንቋ **6.** አሁን ለአንድ ደቂቃ ያህል ሰአት እይዛለሁ ። በዛው ደቂቃ ውስጥ የቻልዎትን ያህል ብዙ የተለያዩ እንስሳትን ስሞች ሊነግሩኝ እፈልጋለሁ ። በአንድ ደቂቃ ውስጥ ስንት የተለያዩ እንስሳትን መሰየም እንደሚችሉ እናያለን ። (አስፈላጊ ከሆነ መመሪያውን ይድገሙ) ። የዚህ ጥያቄ ከፍተኛ ውጤት 8 ነው። አንድ ሰው 8 አዳዲስ እንስሳትን ከአንድ ደቂቃ ባነሰ ጊዜ ውስጥ ከሰየመ ለመቀጠል አያስፈልግም ። 1. _____ 2._____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____		-------/8
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ክፍል III ከመድሀኒት ቁርኝት ጋር የተያያዘ ጥያቄ መከተል （MARS)

ኮድ	ጥያቄ	ውጤት
Q115	መድኃኒት መውሰድህን ረስተህ ታውቃለህ?	1 = አዎ 0 = አይደለም
Q 116	አንዳንድ ጊዜ መድኃኒት ለመውሰድ ግድ የለሽ ነህ?	1 = አዎ 0 = አይደለም
Q 117	ጥሩ ስሜት ሲሰማህ መድኃኒት መውሰድህን የምታቆምበት ጊዜ አለ?	1 = አዎ 0 = አይደለም
Q 118	አንዳንድ ጊዜ መድኃኒቱን በምወስድበት ጊዜ የባሰ ስሜት ቢሰማህ መድኃኒቱን መውሰድህን ታቆማለህ?	1 = አዎ 0 = አይደለም
Q 119	መድኃኒቴን የምወስደው በታመምኩበት ጊዜ ብቻ ነው	1 = አዎ 0 = አይደለም
Q 120	አዕምሮና ሰውነቴ በመድሀኒት ቁጥጥር ስር መዋላቸው ተፈጥሮአዊ አይደለም	1 = አዎ 0 = አይደለም
Q 121	ሀሳቤ በመድሀኒት ላይ ይበልጥ ግልጽ ነው	1 = አዎ 0 = አይደለም
Q 122	መድሃኒት ላይ በመቆየት, መታመም መከላከል እችላለሁ	1 = አዎ 0 = አይደለም
Q 123	በመድኃኒት ላይ እንደ 'ዞምቢ ' እንግዳ ሆኖ ይሰማኛል	1 = አዎ 0 = አይደለም
Q 124	መድሃኒት ደከመኝ እና ታካች ያደርገኛል	1 = አዎ 0 = አይደለም

ክፍል IV የማህበራዊ ድጋፍ ግምገማ (ኦስሎ 3 ጥያቄ መከተል)

	ጥያቄ	ውጤት	ውጤት
Q 125	አስቸጋሪ የሆነ የግል ሁኔታ ካጋጠማችሁ ከአንተ ጋር በጣም የሚቀራረቡ በእነሱ ልትታመኑባቸው የምትችሏቸው ስንት ሰዎች አሉ?	1 የለም 2 1-2 ሰዎች 3 3-5 ሰዎች 4 5+	
Q 126	ሰዎች በምታደርጉት ነገር ምን ያህል እንደሚያስቡና እንደሚያሳስባቸው ያሳያሉ?	1 'የለም' 2 'ትንሽ' 3 'እርግጠኛ ያልሆነ' 4 'አንዳንዶቹ' 5 'ብዙ'	
Q 127	የሚያስፈልግህ ከሆነ ከጎረቤቶችህ ተግባራዊ እርዳታ ማግኘት ምን ያህል ቀላል ነው?	1 'በጣም አስቸጋሪ' 2 'አስቸጋሪ' 3 'ይቻላል' 4 'ቀላል' 5 በጣም ቀላል	

ክፍል V የአደንዛዥ ዕፅ ሱሰኝነት ተያያዥ ጥያቄ (Two-Item Conjoint Screen (TICS) for Alcohol and Other Drug Problems)

Q 128	ቀደም ባሉት 12 ወራት ውስጥ ካሰብከው በላይ የአልኮል መጠጥ ወስደህ ወይም ዕፅ ወስደህ ታውቃለህ?	1. አይ 2. አዎ	
Q 129	የአልኮል መጠጥ ወይም የአደንዛዥ ዕፅ ሱሰኝነትህን መቀነስ እንደምትፈልግ ወይም እንደምያስፈልግህ ተሰምቶህ ታውቃለህ?	0 አይ 1 አዎ	

Q 130	አዎ ከሆነ ለጥያቄ ---የ ምትጠቀመዎ የ ሱስ አይንት ምንድን ነው? (ብዙ ምላሾች ይቻላል)	1. ጫት 2. የአልኮል መጠጥ 3. ማጨስ (ሲጋራ) 4. መድሀኒቶች 5 ሌላ፣ _____	

ክፍል VI የመንፈስ ጭንቀት (ድባቴ) ጋር የተያያዘ ጥያቄ › PHQ-9 questioner

S.N	**ጥያቄ፡** ባለፉት 2 ሳምንታት ውስጥ በሚከተሉት ችግሮች ምን ያህል ጊዜ ተቸግረሃል?	ምላሽ እና ኮድ 0. በጭራሽ አይደለም 1. በርካታ ቀናት 2. ከቀኑ ከግማሽ በላይ 3. በየቀኑ ማለት ይቻላል	አስተያየት
131	ነገሮችን ለማከናወን እምብዛም ፍላጎት ወይም ደስታ አይኖርህም		
132	የተስፋ መቁረጥ የመንፈስ ጭንቀት ወይም ተስፋ መቁረጥ የመውደቅ ስሜት		
133	መተኛት አለመቻል እንቅልፍ አለመቆየት ወይም ከመጠን በላይ መተኛት		
134	የድካም ስሜት ወይም ጉልበት ማነስ		
135	የምግብ ፍላጎት ማጣት ወይም ከመጠን በላይ መብላት		
136	ስለ ራስህ መጥፎ ስሜት ወይም ስኬታማ እንዳልሆንክ ወይም ራስህንም ሆነ ቤተሰብህን እንዳሳጣህ ኣይነት ስሜት		
137	ጋዜጣ እንደማንበብ ወይም ቴሌቪዥን እንደመመልከት ያሉ ነገሮች ላይ ትኩረት ማድረግ		

	በጣም ከባድ ነው።		
138	ብትሞት ወይም ራስህን ብትጎዳ ይሻላል የሚል አስተሳሰብ		
139	በጣም ቀስ ብሎ መንቀሳቀስ ወይም መናገር ሌሎች ሊያተውሉ ይችሉ ነበር ወይም በተቃራኒው በጣም መጨነቅ ወይም እረፍት ከማጣት የተነሳ ከ ወትሮ በበለጠ ብዙ እየተንቀሳቀሱ ነበር		
140	ማንኛውንም ችግር ካችጋገጡ ። እነዚህ ችግሮች ሥራዎን ለመስራት፤ በቤትህ ውስጥ ነገሮችን ለመንከባከብ ፤ማማከናወን ወይም ከሌሎች ሰዎች ጋር ተስማምቶ መኖር ምን ያህል ከባድ አድርገውቦታል ?	0. በጭራሽ አስቸጋሪ አይደለም 1. በመጠኑም ቢሆን አስቸጋሪ 2. በጣም አስቸጋሪ 3. እጅግ በጣም አስቸጋሪ	

ክፍል VII ጭንቀት ግምገማ ጥያቄ (GAD- 7 questionnaires)

	ጥያቄ ባለፉት 2 ሳምንታት ውስጥ በሚከተሉት ችግሮች ምን ያህል ጊዜ ተቸግረዋል?	**ውጤት** 0 በጭራሽ አይደለም 1 አያሌ ቀናት = 2 ከግማሹ ቀን በላይ 3 በየቀኑ ማለት ይቻላል	
141	. የፍርሃት ስሜት፣ ጭንቀት ወይም በዳርቻው ለይ መጨነቅ ስሜት		
142	መጨነቅን ማቆም ወይም መቆጣጠር አለመቻል		

143	ስለተለያዩ ነገሮች ከመጠን በላይ መጨነቅ		
144	ዘና ማለት አስቸጋሪ ነው		
145	በጣም ከመረበሽ የተነሳ ቁጭ ብሎ መቀመጥ ይከብዳል		
146	በቀላሉ መበሳጨት ወይም መናደድ		
147	አንድ አስከፊ ነገር ሊከሰት ይችላል ብሎ መፍራት		

ክፍል VIII ከአሰቃቂ ሁኔታ ጋር የተያያዘ ጥያቄ (Life Events Checklist for DSM-5(LEC-5)

ከዚህ በታች የተዘረዘሩት አንዳንድ ጊዜ በሰዎች ላይ የሚደርሱ በርካታ አስቸጋሪ ወይም ውጥረት የሞላባቸው ነገሮች ናቸው ። ለእያንዳንዱ ክንውን አንድ ወይም ከዚያ በላይ የሆኑትን ሳጥኖች በግሌ የደረሰብህ መሆኑን ለመጠቆም በስተቀኝ በኩል ያለውን ሳጥን ፈትሽ በሌላ ሰው ላይ ሲከሰት አይታችኋል፣ በቅርብ የቤተሰባችሁ አባል ወይም የቅርብ ወዳጃችሁ ላይ እየደረሰ መሆኑን ተምራችኋል፣ በሥራችሁ ውስጥ (ለምሳሌ ፓራሜዲክ፣ ፖሊስ፣ ወታደራዊ ወይም ሌላ የመጀመሪያ ምላሽ ሰጪ) ሆናችሁ ተጋልጠዋል፤ እርግጠኛ አይደለህም፤ ወይም በአንተ ላይ አይሠራም።

የተከናወኑትን ነገሮች በዝርዝር ስታሳልፍ መላ ሕይወትህን (ማደግም ሆነ አዋቂነት) ግምት ውስጥ ማስገባትህን አረጋግጥ

	ክስተቶች	ተፈፀመኝ	በሌላ ሰው ላይ ሲከሰት አይታችኋል	ስለዚህ ጉዳይ ተማርኩ	የስራ ዬ ክፍል	እርግጠኛ ያልሆነ	አይሰራም
148	የተፈጥሮ አደጋዎች (ለምሳሌ ጎርፍ, አውሎ ነፋስ, አውሎ ነፋስ, የመሬት መንቀጥቀጥ						
149	እሳት ወይም ፍንዳታ						

150	የትራንስፖርት አደጋ (ለምሳሌ የመኪና አደጋ፣ የጀልባ አደጋ፣ የባቡር አደጋ እና የአውሮፕላን አደጋ)						
151	በሥራ ቦታ፣ በቤት ወይም በመዝናኛ ወቅት ከባድ አደጋ						
152	ለመርዛማ ንጥረ ነገር መጋለጥ (ለምሳሌ, አደገኛ ኬሚካሎች, ጨረራ)						
153	አካላዊ ጥቃት (ለምሳሌ ጥቃት ሲሰነዝሩ፣ ሲመቱ፣ ሲደበደቡ)						
154	በመሣሪያ (ለምሳሌ በቢላዋ፣ በጠመንጃ፣ በቦንብ መትረፍ፣ ማስፈራራት)						
155	ሌሎች የማይፈለጉ ወይም ምቹ ያልሆኑ የወሲብ ተሞክሮዎች						
156	የወሲብ ጥቃት (አስገድዶ መድፈር፣ አስገድዶ የመድፈር ሙከራ ማድረግ፣ ማንኛውንም ዓይነት የወሲብ ድርጊት በኃላ ወይም ጉዳት እንደሚያደርሱ ማስፈራራት)						
157	ሌሎች የማይፈለጉ ወይም የማይመቹ የወሲብ ተሞክሮ						
158	ውጊያ ወይም ለጦርነት ቀጠና መጋለጥ (በጦር ወይም በሲቪል)						
159	ምርኮ (ለምሳሌ ታፍኖ፣ ተጠልፏል፣ ታግቷል፣ የጦርነት እስረኛ መሆን)						
160	ለሕይወት አስጊ የሆነ በሽታ ወይም						

	ጉዳት						
161	ከባድ የሰው ሥቃይ						
162	ድንገተኛ አሰቃቂ ሞት (ለምሳሌ ግድያ፣ ራስን ማጥፋት)						
163	ድንገት ድንገተኛ ሞት						
164	በሌላው ሰው ላይ ያደረከው ከባድ ጉዳት፣ ጉዳት ወይም ሞት						
165	ማንኛውም ሌላ በጣም ውጥረት ክስተት ወይም ተሞክሮ						

ክፍል X (የአካል ብቃት እንቅስቃሴ ወሳኝ ምልክት (EVS)) መከተል

	ጥያቄ		
166	በአማካይ በሳምንት ውስጥ መጠነኛና አድካሚ የሆነ የአካል ብቃት እንቅስቃሴ (እንደ አንድ የእግር ጉዞ) ምን ያህል ቀን ታሳልፋለህ?	የቀን ብዛት (0–7) ----------	
167	በዚህ ደረጃ በአማካይ በቀን ስንት ደቂቃ የአካል ብቃት እንቅስቃሴ ታደርጋለህ?	7 ምድቦች ፡- 10, 20, 30, 40, 50, 60, 90, 120 እና ≥150 ደቂቃ ----------	

ክፍል XI የሰውነት ብዛት ማውጫ（BMI）

መመሪያዎች የአንድን ሰው ቁመትና ክብደት በመጠቀም የሰውነት ብዛት ማውጫን ያሰላል። BMI = kg/m2 ሲሆን kg በኪሎ ግራም ውስጥ የአንድ ሰው ክብደት ሲሆን m2 ደግሞ በሜትር አራት ማዕዘን

ቁመታቸው ነው. እንደሚከተለው ይመዝገቡ;; 25.0 ወይም ከዚያ በላይ የሆነ ቢኤምአይ ከመጠን በላይ ወፍራም ሲሆን ጤናማው ክልል ደግሞ ከ18.5 እስከ 24.9 ከ 18.5 በታች ዝቅተኛ ክብደት አለው

ኮድ	ጥያቄ	(kg/m3)	ውጤት
168	BMI (ቢኤምአይ (የሰውነት ብዛት ማውጫ)	----------/--------	1 ከክብደት በታች 2 የተለመደ 3 ከመጠን በላይ ውፍረት
169	Blood Pressure （የደም ግፊት ልኬት）	SBP ----------/ DBP----------	1 Stage I HTN = SBP 140-159 and DBP 90-99 2 Stage II HTN = SBP >160 and DBP >100 3 Controlled BP = SBP 120-139 and DBP 80-89

ክፍል XII የ ኦብስትራክቲቭ እስሊፕ አፕኒ አ (OSA) መገምገሚያ መጠየቅ

	ጥያቄ	ውጤት	
170	በምትተኛበት ጊዜ ድምፃችሁን ከፍ አድርጋችሁ ትጮኻላችሁን? ተኝታችሁ ሳለ ድምፃችሁን ከፍ አድርጋችሁ（ማንኮራፋት）？	0 አይደለም 1 አዎ	
171	በቀን ውስጥ ብዙውን ጊዜ ድካም ፣ ድካም ወይም የእንቅልፍ ስሜት ይሰማሃል?	0 አይደለም 1 አዎ	
172	በእንቅልፍህ ወቅት መተንፈስህን እንዳቆመህ የተመለከተ ሰው አለ?	0 አይደለም 1 አዎ	
173	ከፍተኛ የደም ግፊት ስላለብህ ሕክምና ተደርጎልሃል ወይስ ሕክምና እየተደረገለት ነው?	0 አይደለም 1 አዎ	
174	BMI (ቢኤምአይ) ከ 35ኪሎ ግራም/m2 ወይም ከዚያ በላይ?	0 አይደለም 1 አዎ	
175	ዕድሜው ከ50 ዓመት በላይ ነውን?	0 አይደለም 1 አዎ	

176	ከ (40cm) ሴንቲ ሜትር የሚበልጥ የአንገት ዙሪያ መለኪያ NECK circumference > 16 inches (40cm)?	0 አይደለም 1 አዎ	
177	ጾታ - ወንድ?	0 አይደለም 1 አዎ	

ክፍል XIII የ ኤች አይ ቪ ኤድስ እና ከፍተኛ የደም ግፊት ጋር የተያያዙ ጥያቄወች

	ጥያቄ		
Q178	በ ምርመራ የ ኤች አይ ቪ ኤድስ በደምህ ውስጥ እንዳለብክ ያወከው የተረጋገጠው መች ነው ?	_____ወር _____ዓመት 88. አላስታውስም 99. ምላሽ የለም	88 ወይም 99 88 ወይም 99 የህክምና ሰንጠረዥ ክለሳ ይጠቀሙ
179	ከኤች አይ ቪ ጋር ተወልደሃልን?	1 = አዎ 0 = አይደለም	
Q180	ከ200cells/mm3 በታች ወይም< ያነሰ የ CD4 የቁጥር መጠን ልምድ አጋጥሞዎታል?	1 = አዎ 0 = አይደለም 88. አላስታውስም 99. ምላሽ የለም	88 ወይም 99 88 ወይም 99 የህክምና ሰንጠረዥ ክለሳ ይጠቀሙ
Q181	በ ምርመራ ከፍተኛ የደም ግፊትእንዳለብክ ያወከው መች ነው ?		

ክፍል XIv የታካሚዎቹን ሠንጠረዥ መዝገብ ይመልከቱ （ Review the patients' chart）

የታካሚዎቹን ሠንጠረዥ መዝገብ ይመልከቱ እናም የሚቀጥለውን መጠየቆችን በመጠቀም ግለሰቡ የሚወስድውን መድሃኒት ; የ ሲዲ ፍር መጠን እንዲሁም ኮሞርቢዲቲ መኖሩን ያመልክቱ።

Assessment of antiretroviral therapy			
ኮድ	Regimens	Type of combination	Yes/ no
182	1st line regimens	TDF + 3TC + DTG (FDC)	
		TDF + 3TC + EFV (FDC)	
		AZT + 3TC + EFV	

		AZT + 3TC + NVP	
		TDF + 3TC + NVP	
		ABC + 3TC + EFV	
183	2nd line regimens	TDF + 3TC + LPV/r or ATV/r	
		AZT + 3TC + LPV/r or ATV/r	
		AZT + 3TC + ATV/r or LPV/r	
		AZT + TDF + 3TC + (ATV/r or LPV/r)	
		TDF+3TC + ATV/r or LPV/r	
184	3rd line regimens	DRVr+ABC+3TC+EFVor NVP	
		DRV/r a + DTGb + AZT+3TC	
	CD4 status		
185	current CD4 cell count;	1 <200	
		2 200-350	
		3 351-500	
		4 ≥500	

	Comorbidity assessment	Score 1 = if the patient have any of comorbidity 0 = no comorbidity diagnosis	
186	Is chronic medical illness other than HTN /HIV currently? 1 DM 2 Liver disease 3 Asthma 4 Other specify----------		