PREVALENCE AND CORRELATES OF COMMON MENTAL DISORDERS IN PERSONS LIVING WITH HIV IN PUBLIC PRIMARY CARE FACILITIES IN EKURHULENI DISTRICT

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DECLARATION

I, Aniekan Edet, hereby declare that this research is my own unaided work, except where due acknowledgement for assistance received has been made. It is being submitted for the degree of Master of Family Medicine at the University of the Witwatersrand, Johannesburg. It has not been submitted previously for any other degree or examination at this or any other university.

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Finally, I want to acknowledge the Department of Family Medicine and Primary Care for the opportunity to be a part of this M.MED programme. Thank you.

DEDICATION

I dedicate this research report to my wife, Nwabisa Nancy Edet, and son, Mfonabasi Oarabile Edet. Thank you for being my support system and for your understanding all throughout this programme. This work is also dedicated to my parents for all your prayers and support. God bless you.

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Prevalence and correlates of common mental disorders in persons living with HIV in public primary care facilities in Ekurhuleni District

Abstract

Background

The prevalence of common mental disorders (CMDs) in people living with human immunodeficiency virus (PLHIV) is estimated to be more than in the general population. These CMDs are associated with poor HIV treatment outcomes. Therefore, guidelines recommend that healthcare workers screen for CMDs in PLHIV. The CMD prevalence in PLHIV in Ekurhuleni District was not previously found.

Aims

To determine the prevalence and correlates of CMDs in PLHIV in primary healthcare facilities in Ekurhuleni District.

Setting

A cross-sectional study conducted across seven primary health facilities in the eastern sub-district of Ekurhuleni District.

Methods

Data was collected from 403 randomly selected participants, using a questionnaire incorporating the scores of the PHQ-9, GAD-7 and substance use disorder (SUD) criteria of DSM 5. The proportion screening positive for CMDs was calculated. Univariate and multivariate analysis was done using 'R' statistical software. A 95% confidence interval was adopted.

Results

Of the 403 participants studied, 63% were female, and the mean age was 43±11 years. Forty percent of participants screened positive for CMDs, 16.6% for depression, 15.1% for generalised anxiety disorder (GAD) and 24.1% for SUD. CMDs were associated with poor adherence and unsuppressed viral load, while being female and increasing age were associated with reduced risk of CMDs. Also, males were 11 times more likely to have severe SUD. Healthcare workers in the facilities screened only 16%, 14% and 40% of the cohort for depression, GAD and SUDs, respectively.

Conclusion

The prevalence of CMDs remain high, with negative impact on HIV treatment outcomes. Adherence to recommendations to screen for CMDs in PLHIV is low.

Contribution

This study quantifies and reveals the impact of CMDs in the treatment of PLHIV in Ekurhuleni District, and some factors that are associated with these CMDs.

Keywords: common mental disorders; depression; generalised anxiety disorder; substance-use disorder; PLHIV; CMDs; PHQ-9; GAD-7.

Introduction

Previous studies suggest that the prevalence of common mental health disorders (CMDs) in people living with HIV (PLHIV) in primary care in South Africa is higher than in the general population. Some of these screening studies suggest prevalence as high as five times that of the general population.[1-3] This higher prevalence has been attributed to the initial feeling of uncertainty after the diagnosis of HIV, perceived discrimination, social or mental isolation, and non-disclosure of HIV status, which may preclude affected persons from getting the required clinical and psychosocial support.[4] One study even linked this higher prevalence to the negative effects of the virus or the antiretroviral therapy drugs on the brain.[5,6] However, some of these factors have changed over time. For instance, the periodic South African stigma index survey reported a sizeable decrease in HIV-related internalised stigma between 2014 and 2020, from 43% to 23.4%, respectively.[7,8] Similarly, there have been changes in the number of people disclosing their HIV status to partners or family members.[9] These variations may have also resulted in changes in the prevalence of CMDs in PLHIV.

The commonest of these CMDs is depression, followed by generalised anxiety disorder (GAD) and substance use disorders (SUDs).[10] They have been associated with poor antiretroviral therapy (ART) outcomes, including decreased adherence, retention in care, viral suppression and overall quality of life.[11,12] They may have negatively impacted on South Africa's aspirations of attaining the third '90' of the UNAIDS 90-90-90 targets, which aimed to ensure that 90% of all persons receiving lifelong ART attain sustained viral suppression by the year 2020.[12] However, as at March 2019, only 57.9% of patients who started ART were remaining on treatment, and 83% of those tested had achieved viral suppression, in Ekurhuleni District.[13] Furthermore, despite increasing uptake into the ART programme, only 63 – 88% of PLHIV are adherent to ART in just 2 years after initiation, and 11% and 25.1% are lost-to-follow-up (LTF) at 1 year and 5 years respectively.[14,15] These suboptimal outcomes may be attributed in part to common mental disorders.

The South African National Department of Health (SA NDoH) ART guidelines have therefore recommended that healthcare workers screen for CMDs before and after ART initiation.[16] The degree of adherence to this recommendation in primary care

remains unknown. Some studies have however suggested that managing these CMDs in PLHIV resulted in improved ART outcomes.[17] This reinforces the need to screen for CMDs in PLHIV. There is also paucity of data evaluating the prevalence of CMDs in PLHIV in primary healthcare in Ekurhuleni District, and furthermore, no study was found that estimated the proportion of PLHIV screened, by their treating health facility, for CMDs in the district, as recommended by the SA NDoH.[16]

This study therefore aims to determine the prevalence of depression, GAD and SUDs in primary healthcare facilities in the eastern sub-district of Ekurhuleni district, South Africa, as well as, their associated factors. The study will further evaluate the proportion of PLHIV who were screened, by their treating health facility, for CMDs during their last two clinic visits.

Materials and Methods

Study Design

This was a cross-sectional, quantitative study using an investigator administered questionnaire.

Study Participants

The study involved 403 participants aged 18 years and older, living with HIV, across seven clinics in the eastern sub-district of Ekurhuleni Health District, South Africa, between the 22 November 2021 and the 25 March 2022.

Exclusion criteria

Those who were unable to give consent, such as persons with intellectual disability, were excluded from the study. Also, every patient presenting with a medical emergency was excluded.

Inclusion criteria

This included persons who were living with HIV, whether on treatment or not, were 18 years or older, and a regular client at any of the public primary care clinics within the eastern sub-district of Ekurhuleni District.

Study Settings

The study was conducted in the Eastern sub-district of Ekurhuleni, which is one of the three sub-districts of Ekurhuleni Health District and, excluding the mobile clinics, it had 30 primary healthcare clinics that were providing ART services to 85,509 adults as at 31 March 2020 based on data from the district health information system (DHIS).

Four of these healthcare facilities operate for 24 hours, of which three are community health centres (CHCs) and one is a clinic. These four are also similar in that they had full-time doctors and nurses. They also have allied health professionals, some of whom were available on a weekly basis. These four facilities provide a comprehensive package of primary health care (PHC) services, which include; preventive/promotive services such as immunisation, curative services such as ART, and rehabilitative services such as psychology, physiotherapy and occupational therapy services. Mental health care services are provided in these clinics by the mental health care nurse and psychiatry medical officers and registrars. The others were PHC day clinics, operating for 8 to 12 hours daily, and were entirely nurse-led, with weekly support visits by doctors.

Sample and sampling

The sample size was calculated using Raosoft online sample size calculator. The sample size was found to be 383 using a confidence interval of 95%, a response distribution of 50% and a margin of error of 0.05. This was increased by 5% to account for missing variables, increasing to 403 participants. A stratified random sampling was applied to select facilities and participants. The primary healthcare facilities were grouped into 2 strata. Strata 1 had four CHCs providing 24 hour services, while strata 2 had twenty-six clinics providing healthcare services for between 8 – 12 hours per day. One facility was chosen from strata 1 and six facilities from strata 2, by simple random sampling. With regard to participant selection, 109 participants were chosen from strata 1 and 294 participants from strata 2, by use of simple ballot. Sampling was done proportionate to the size of the strata and population. Simple balloting was conducted by placing folded papers containing an equal number of ‘yes’ and ‘no’ in a box on each day of data collection, and those that met the inclusion criteria were given

one opportunity to pick one paper from the box. This was continued until the sample size was reached.

Study instrument

The researcher developed a questionnaire that incorporated the scores of other previously validated tools, including the PHQ-9 and the GAD-7. [18,19] The DSM-5 diagnostic criteria for SUD was used to assess for SUDs. The questionnaire was divided into 5 parts. The first part contains sociodemographic and clinical variables of participants. The second part contains questions directed to the participant assessing if they had been screened CMDs by healthcare workers in the facility, in their last two clinic visits. Screening for CMDs was also assessed using the last 2 clinic visit notes in the participant files. The third part contains the PHQ-9 score, while the fourth part contains the GAD-7 score. The PHQ-9 and GAD-7 have been validated in primary care and in local South African languages, including Isi-Zulu. [18, 19]

Lastly, the 5th part will adopt a “Yes” or “No” response to each of the 11 DSM 5 criteria for the diagnosis of SUD, which is the gold standard for diagnosis. A “yes” response scores one and a “no” response scores zero. An affirmative response to 2 or 3 of the criteria indicates a mild SUD; four or five criteria indicate a moderate SUD, and 6 or more criteria indicate a severe SUD.[20] This will be administered for each substance used. The copyrights for the PHQ-9 and the GAD-7 is owned by Pfizer Inc, and both questionnaires are publicly available and free to use without permission.[21,22] Scores of ≥ 9 for PHQ-9, ≥ 8 for GAD-7, and the DSM 5 substance use disorder criteria (≥ 2) will be accepted as a positive screen for depression, generalised anxiety disorder and substance use disorder, respectively.

The instrument was reviewed by two Family Physicians for content validity. The Kappa statistic was then calculated to determine the inter-rater reliability, and a value 0.83 was obtained, which was considered optimal.[23] A research assistant fluent in Isi-Zulu and English language assisted in translation of the content of the instrument to participants during administration of the questionnaire. Prior to initiation of data collection, the research assistant was trained in forward and backward translation, as well as, in research ethics to ensure confidentiality. Confidentiality was also achieved

by replacing the names of participants with codes. The questionnaire is attached on appendix 1.

Data collection

The 7 facilities chosen were visited three to four days a week between the 22 November 2021 and the 25 March 2022, recruiting 8 – 15 participants per day, requiring 20 to 35 minutes per participant. The researcher approached all persons meeting the inclusion criteria, and those that gave consent were included in the study. Each participant was separately taken to a room with privacy where the questionnaire was administered. A consent form was signed and the paper-based, researcher-administered questionnaire was completed using data from participants' verbal responses and their clinic folders.

Pilot Study

A pilot study was conducted, at a similar clinic not selected for the study, to determine feasibility of study and potentially improve on its design. It exposed potential logistical problems that were subsequently addressed. The pilot sample was not incorporated into the main research cohort. Participants who screened positive for any CMD were referred to the facility doctor for further assessment and management. One participant with suicidal ideation and intent during the pilot study was immediately referred to one of the facility's doctor for admission.

Data analysis

The data collected were analysed using the 'R' statistical software and mapped to a vector containing '0' and '1', representing the absence or presence of a variable, respectively. The number of categories per variable determines the number of vectors created. Data cleaning was carried out by evaluating each measured study variable; errors identified in the data cleaning process were corrected using participant information from the questionnaire. Age and viral load were categorised and encoded based on previous studies and expert knowledge. The characteristics of the patients were presented using frequencies and percentages. The percentage of participants

that had been screened for CMDs was calculated. The percentages of those who screened positive for depression, GAD and SUDs were also calculated.

Univariate logistic regression was conducted to determine the association between each measured variable and the response variable. Significant variables at a 20% significance level were considered potential candidates for multivariable analysis. As reported by a previous study, the number of events per variable (EPV) is an important factor that could influence the estimated association between the variables and the outcome variables. A sample size with an EPV of ten and more is frequently recommended to avoid biases in the estimation.[24] As a result, the multivariable analysis was conducted with the backward elimination method of variable selection. The final model is reported with the selected variables' unadjusted odds ratio (OR) and adjusted odds ratio (aOR) .A confidence interval (CI) of 95% was used, and a p-value of < 0.05 was considered significant.

Ethical considerations

Ethical approval to conduct the study was obtained from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (Protocol number: M210116). Ethics approval was also obtained from the Ekurhuleni Health District Ethics Committee (Research project number: 11/02/2021-01).

An informed consent form was obtained and signed by the participants who agreed to respond to the questionnaire and to participate in the clinical study.

Results

Socio-demographic characteristics

Of the 403 participants studied, 63% were female (Table 1). The mean age of participants was 43 ± 11 years, with a range of 18 to 87 years. A majority (61%) of the questionnaire was administered in the English language. Regarding employment, 39% of the patients had a full-time employment, 6% received social grants or pension, while the rest had no regular source of income.

It is however important to note that there were some missing variables. This was because some data were not entered into the questionnaire, in which case the

numbers did not affect the calculated sample size, and therefore did not affect the power of the study. Another reason for this was that some participants had not been on antiretroviral therapy for up to six months, and as such did not have a viral load result or some were only starting ART on the day they participated in the study. In this instance, analysis was done using participants with data on the variable of interest.

Table 1: Socio-demographic characteristics of participants

Characteristics	Number (N)	Percentage (%)	mean ± SD
Age	(403)		43 ± 11.76
18–30	62	15.4	
31–40	113	28	
41–50	121	30	
> 50	107	26.6	
Sex	(403)		
Male	151	37.5	
Female	252	62.5	
Level of education	(395)		
No matric	292	73.9	
Matric or higher	103	26.1	
Relationship status	(402)		
Married	70	17.4	
Cohabitation	115	28.7	
Single	216	53.9	
Presence of support system	(395)		
Never	15	3.8	
Sometimes	73	18.4	
Always	307	77.8	
Experienced discrimination in the last 6 months	(393)		
Yes	25	6.4	
No	368	93.6	

Clinical characteristics

Viral suppression was defined at two thresholds; <50 or <200 copies/ml, to allow for 'viral blips' (Table 2). Using 50 as the threshold, 70% of the cohort had achieved viral suppression. This increased to 82% at a threshold of <200 copies/ml. Most of the participants (91%) were on first-line ART, with most of these on a Dolutegravir-based regimen. Also, 23% of the cohort reported having chronic pain, while 67% reported complete adherence to ART.

Forty-eight participants screened positive for alcohol-use disorder, with 52% being mild while 27% and 21% were moderate and severe, respectively. Seventy-four screened

positive for tobacco-use disorder, with 26% being mild and severe, while 48% were moderate. Only eight and two patients screening positive for cannabis- and opioid-use disorders, respectively. Participants did not report using any other substance.

Table 2: Clinical characteristics of participants

Characteristics	Number (N)	Percentage (%)
Viral suppression	(364)	
≤ 50	254	69.8
> 50	110	27.2
Viral suppression	(364)	
≤ 200	298	81.9
> 200	66	18.1
Antiretroviral therapy type	(394)	
EFV-based	107	27.2
DTG-based	253	64.2
PI-based	28	7.1
NVP-based	6	1.5
Adherence in previous month	(395)	
0 missed dose	263	66.6
1–2 missed dose	89	22.5
≥ 2 missed doses	43	10.9
Previous history of default	(394)	
Yes	58	14.7
No	336	85.3
Disclosed HIV status	(395)	
Yes	367	92.9
No	28	7.1
Other chronic diagnosis	(403)	
Yes	145	36
No	258	64
Psychosocial stressors present	(403)	
Yes	102	25.3
No	301	74.7
Chronic pain present	(400)	
No	309	77.3
Yes	91	22.7
Types of substance used:		
Alcohol		
No	230	57.1
Yes	173	42.9
Tobacco		
No	305	75.7
Yes	98	24.3
Cannabis		
No	388	96.3
Yes	15	3.7
Opioid		
No	401	99.5
Yes	2	0.50
No substance used		
Yes	204	50.6
No	199	49.4

Table 3: Substance-use disorder sub-types

Disorder type	Mild	Moderate	Severe	Total
Alcohol-use disorder	25	13	10	48
Tobacco-use disorder	19	36	19	74
Cannabis-use disorder	3	2	3	8
Opioid-use disorder	1	0	1	2

Prevalence of Common Mental Disorders

Sixty-seven persons (16.6%) screened positive for depression, sixty-one (15.1%) screened positive for generalised anxiety disorder and ninety-seven (24.1%) screened positive for substance-use disorder (Figure 1). Of those that screened positive for SUDs, 48% had mild SUD, while 26% each had moderate and severe SUD. While 163 (40%) of the cohort screened positive for CMDs, only 112 (27.8%) screened positive for one CMD, 40 (9.9%) screened positive for two CMDs and 11 (2.7%) of the cohort had all three CMDs.

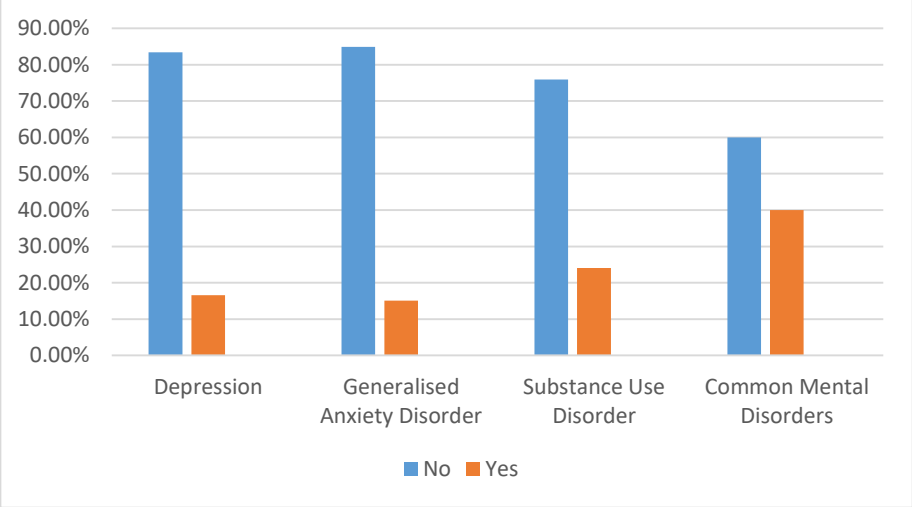

Figure 1: Prevalence of Common Mental Disorders in people living with HIV

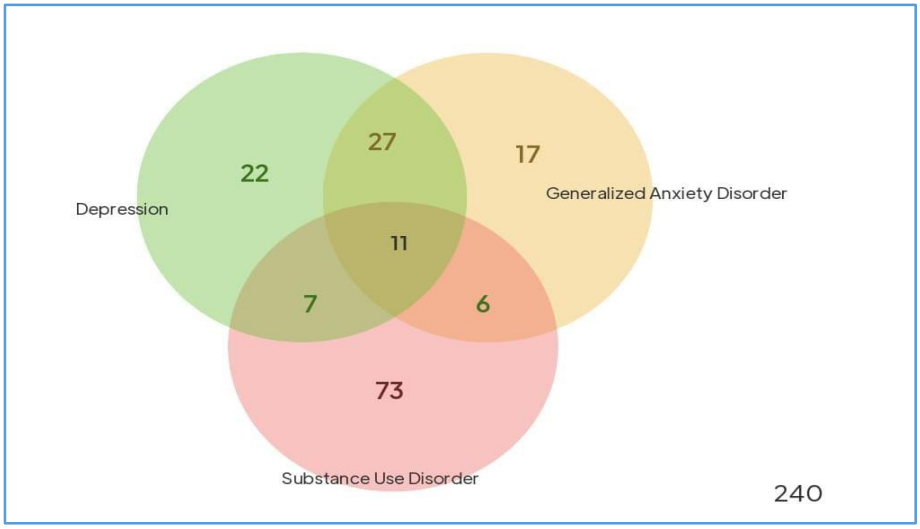

Figure 2: Prevalence of comorbid common mental disorders

Factors associated with common mental disorders among PLHIV

The association between each study variable and CMD is shown in Table 3. Language, level of education, availability of family support, relationship status, discrimination, year of diagnosis, presence of chronic pain and psychosocial stressors were not significantly associated in CMD in the univariate analysis. However, screening positive for CMDs was significantly associated with viral non-suppression (OR=2.17; 95% CI: 1.26-3.72; p=0.005) in the univariate analysis.

Table 4: Factors associated with Common Mental Disorders among PLHIV

Characteristics	CMD			
	No	Yes	OR (95% CI) p-value	aOR (95% CI) p-value
Age (years)				
18–30	29	33	1	
31–40	60	52	0.76(0.41-1.42) 0.391	
41–50	75	45	0.53(0.28-0.98) 0.043	
over 50	76	30	0.35(0.18-0.67) 0.002	
Sex				
Male	76	75	1	1
Female	164	85	0.53(0.35-0.79) 0.002	0.61(0.37:0.99) 0.025
Viral load				
≤50	161	91	1	
>50	64	45	1.24(0.79-1.97) 0.352	
≤200	197	103	1	

>200	28	33	2.17(1.26-3.72) 0.005	
Chronic diagnosis				
No	144	112	1	1
Yes	96	48	0.64(0.42-0.98) 0.042	3.16(1.07-9.29) 0.035
Adherence (previous 1 month)				
No missed dose	176	84	1	1
1–2 missed doses	43	46	2.24(1.37-3.66) 0.001	2.62(1.49-4.60) 0.001
>2 missed doses	18	25	2.91(1.51-5.63) 0.002	2.44(1.15-3.08) 0.015
Chronic pain				
No	189	117	1	
Yes	51	40	1.27(0.79-2.03) 0.328	
Psychosocial stressors				
No	181	118	1	
Yes	59	42	1.09(0.69-1.72) 0.707	
Employment status				
Regular	110	70	1	
Non-regular	129	88	1.07(0.72-1.61) 0.736	
Screened for CMD (last 2 clinic visits):				
No	138	55	1	1
Yes	99	99	2.51(1.65-3.81) 0.000	2.95(1.79-4.88) <0.001
Clinic attendance in last 6 months:				
Over 80%	151	81	1	
Less than 80%	85	71	1.58(1.02-2.36) 0.036	
Presence of social support				
Never	6	9	1	
Sometimes	39	34	0.58(0.19-1.80) 0.347	
Always	191	113	0.39(0.14-1.14) 0.085	

Factors associated with Depression in PLHIV

Screening positive for depression was associated with having chronic pain and failure to achieve viral suppression (>200 copies/ml) in both the univariate and multivariate analyses (Table 4). However, screening for depression was associated with significantly lower risk of depression only in our univariate analysis (OR=0.18; 95% CI: 1.42-4.36; p=0.001).

Table 5: Factors associated with Depression among PLHIV

Characteristics	**Depression**			
	No	**Yes**	**OR (95% CI) p-value**	**aOR (95% CI) p-value**

Age (years)				
18–30	47	15	1	
31–40	87	26	0.94(0.45-1.94) 0.859	
41–50	109	12	0.34(0.15-0.79) 0.012	
over 50	93	14	0.47(0.21-1.06) 0.068	
Sex				
Male	137	14	1	1
Female	199	53	2.61(1.39-4.88) 0.003	2.30(1.08-4.88) 0.030
Viral load				
≤50	219	35	1	
>50	87	23	1.65(0.92-2.96) 0.090	
≤200	258	40	1	1
>200	48	18	2.42(1.28-4.57) 0.006	2.49(1.16-5.35) 0.019
Chronic diagnosis				
No	215	43	1	
Yes	121	24	0.99(0.57-1.71) 0.976	
Adherence (previous 1 month)				
No missed dose	227	36	1	1
1–2 missed doses	67	22	2.07(1.14-3.76) 0.016	2.77(1.36-5.63) 0.005
> 2 missed doses	35	8	1.44(0.62-3.35) 0.396	1.11(0.39-3.17) 0.841
Chronic pain (previous 1 month)				
No	267	42	1	1
Yes	66	25	2.41(1.37-4.23) 0.002	2.49(1.27-4.91) 0.008
Psychosocial stress				
No	258	43	1	1
Yes	78	24	1.85(1.05-3.23) 0.032	
Employment status				
Regular source of income	161	21	1	1
None or irregular source of income	173	45	1.99(1.14-3.49) 0.016	2.52(1.26-5.04) 0.009
Screened for CMD				
No	174	21	1	1
Yes	153	46	0.18(1.42-4.36) 0.001	3.85(1.94-7.66) 0.000
Clinic attendance in last 6 months:				
Over 80%	198	36	1	
Less than 80%	128	29	1.25(0.73-2.13) 0.142	
Presence of social support				
Never	9	6	1	
Sometimes	53	20	1.63(0.68-3.93) 0.276	
Always	268	39	1.71(0.76-3.85) 0.198	

Factors associated with Generalised Anxiety Disorder in PLHIV

In the univariate analysis, being female (OR= 2.80; 95% CI: 1.43-5.45; p= 0.003), having a viral load above 200 copies/ml (OR= 3.61; 95% CI: .91-6.86; p= 0.000) and having chronic pain (OR= 2.41; 95% CI: 1.35-4.32; p = 0.003) was significantly associated with generalised anxiety disorder (Table 5). This association persisted in the multivariate analysis. Also, those with GAD were four times more likely to have an unsuppressed viral load, and were more likely to have poor adherence, compared to those who did not screen positive for GAD.

Table 6: Factors associated with GAD among PLHIV

Characteristics	GAD		OR (95% CI) p-value	aOR (95% CI) p-value
	No	Yes		
Age (years)				
18–30	43	19	1	
31–40	95	18	0.43(0.20-0.90) 0.024	
41–50	106	15	0.32(0.15-0.69) 0.003	
>50	98	9	0.21(0.09-0.50) 0.000	
Sex				
Male	139	12	1	1
Female	203	49	2.80(1.43-5.45) 0.003	4.56(1.87-11.13) 0.001
Viral load				
≤50	225	29	1	
>50	87	23	2.05(1.13-3.74) 0.019	
≤200	266	32	1	1
>200	46	20	3.61(1.91-6.86) 0.000	4.54(2.07-9.97) 0.000
Chronic diagnosis				
No	214	44	1	1
Yes	128	17	0.65(0.35-1.17) 0.154	3.67(1.12-12.09) 0.041
Adherence (previous 1 month)				
No missed dose	235	28	1	1
1–2 missed doses	70	19	2.27(1.20-4.32) 0.039	2.57(1.18-5.60) 0.043
>2 missed doses	31	12	3.25(1.50-7.04) 0.002	3.40(1.25-9.24) 0.021
Chronic pain (previous 1 month)				

No	271	38	1	1
Yes	68	23	2.41(1.35-4.32) 0.003	3.20(1.57-6.52) 0.001
Psychosocial stressors				
No	271	38	1	
Yes	81	21	1.69(0.94-3.03) 0.078	
Employment status				
Regular source of income	161	21	1	
Non-regular source of income	178	48	1.72(0.97-3.04) 0.061	
Screened for CMD (last 2 clinic visits):				
No	171	24	1	
Yes	168	31	1.31(0.74-2.33) 0.35	
Clinic attendance in last 6 months:				
Over 80%	200	34	1	
Less than 80%	134	23	1.01(0.57-1.79) 0.974	
Presence of social support				
Never	10	5	1	
Sometimes	57	16	0.56(0.17-1.88) 0.349	
Always	268	39	0.29(0.09-0.90) 0.032	

Factors associated with Substance Use Disorder in PLHIV

The univariate analysis showed no significant association between substance use disorder and availability of social support or employment status (Table 6). Females were 80% less likely to have substance use disorder (p = 0.000) compared to males in both the univariate and multivariate analyses. Further analysis revealed that males were 11 times more likely to have severe substance use disorder. Similarly, SUDs was associated with having a clinic attendance less than 80% (OR= 1.69; 95% CI: 1.13-2.55; p= 0.011).

Table 7: Factors associated with SUDs among patients with PLHIV

Characteristics	SUD		OR (95% CI) p-value	aOR (95% CI) p-value
	No	Yes		
Age (years):				
18–30	24	38	1	1
31–40	50	63	0.80(0.42-1.50) 0.478	0.59(0.27-1.30) 0.193
41–50	62	59	0.60(0.32-1.12) 0.109	0.43(0.20-0.96) 0.040
>50	68	39	0.36(0.19-0.69) 0.002	0.22(0.10-0.52) 0.000
Sex				
Male	41	110	1	1

Female	163	89	0.20(0.13-0.32) 0.000	0.19(0.11-0.32) 0.000
Viral load				
≤50	129	125	1	1
>50	64	46	0.74(0.47-1.17) 0.195	0.54(0.31-0.94) 0.029
≤200	161	137	1	
>200	32	34	1.25(0.73-2.13) 0.415	
Chronic diagnosis				
No	124	134	1	
Yes	80	65	0.75(0.45-1.13) 0.171	
Adherence (previous 1 month)				
No missed dose	148	115	1	1
1–2 missed doses	33	56	2.18(1.33-3.58) 0.001	2.15(1.18-3.91) 0.012
>2 missed doses	21	22	1.2(0.89-1.71) 0.364	0.81(0.36-1.85) 0.618
Chronic pain (previous 1 month)				
No	156	153	1	
Yes	48	43	0.91(0.57-1.46) 0.704	
Psychosocial stressors				
No	151	150	1	
Yes	53	49	0.93(0.59-1.45) 0.754	
Employment status				
Regular source of income	88	94	1	
Non-regular source of income	116	102	0.82(0.56-1.22) 0.333	
Screened CMD:				
No	120	75	1	1
Yes	80	119	2.38(1.59-3.57) 0.000	2.26(1.36-3.74) 0.002
Clinic attendance in last 6 months:				
≥80%	174	44	1	1
<80%	151	22	1.69(1.13-2.55) 0.011	1.688(1.02-2.79) 0.041
Presence of social support:				
Never	4	11	1	
Sometimes	36	37	0.37(0.11-1.28) 0.118	
Always	161	146	0.33(0.10-1.06) 0.062	

Discussion

Prevalence of common mental disorders

Our study assessed the prevalence and correlates of CMDs in PLHIV in a South African health district. We found a high CMD prevalence of 40%, which was significantly associated with younger age, being male, having poor adherence, and unsuppressed viral load. This prevalence was comparable with studies conducted in

South Africa and Ethiopia, where the CMD prevalence were 43.7% and 32.7%, respectively.[2,25] It was however higher than in a study conducted in Zimbabwe where the prevalence of CMDs was 18%.[26] The lower prevalence in the Zimbabwean study may be due to the higher sample size, which may underestimate the CMD prevalence. Another reason may be that different screening instruments were used in both studies. These have different sensitivities, specificities and predictive values, for detecting CMDs in PLHIV.

Factors associated with common mental disorders

Also, considering there had been changes in important CMD risk factors such as the number of PLHIV disclosing their HIV status to their sexual partners, HIV-associated stigma and treatment options, one may have expected a change in CMD prevalence. For instance, only 30% of women disclosed their HIV status to their sexual partners in 2015, while 58% and 81.8% disclosed in 2018 and 2021, respectively.[27-29] This was however not the case as the prevalence of CMDs in PLHIV remains high according to findings of this index study. A potential explanation for this high prevalence may be the study period, which coincided with the COVID-19 pandemic that resulted in increased mortality, social isolation and loss of income.[30] These resulted in changes in socio-economic circumstances of several persons, an important risk factor for CMDs.[31]

These mental disorders have been associated with poor ART adherence in primary and tertiary health facilities in Mozambique, which was in agreement with our study.[32] This poor adherence subsequently resulted in failure of HIV suppression. Also in congruence with our study were findings that the lower age group had higher incidence of CMD, while level of education and employment status were not predictors of CMD.[33] Furthermore, in our study, being male increased the risk for CMDs unlike in the study conducted by Duko et al.,[25] where being female was a risk factor for CMD. This may be due to the lack of any support programs that focus on men, and men are less likely to volunteer information on their mental health, in order to get support.

Factors associated with depression

This was however not the case for depression, where women were more than two times more likely to be depressed than men in our cohort. This was consistent with most studies reviewed.[34,35] We also showed that screening for depression was

associated with lower risk of depression. This strengthens previous recommendation to screen for depression and refer for management, when positive.[16] Similarly, the presence of psychosocial stressors, unsuppressed viral load and poor adherence were associated with depression in our study and other studies reviewed.[35] However, in an American study conducted by Joseph et al.,[36] chronic pain was not associated with depression, unlike what was found in our index study where those with chronic pain were more than twice more likely to be depressed. Differences in these may be attributable to their methodology, use of PHQ-8 and its cut-off score, as well as a more detailed definition of pain in their study. Pain was assessed using the Brief Pain Inventory and sub-categorised based on severity and whether current or not.

Prevalence of depression

This methodological variance may also explain differences found across studies assessing the prevalence of depression among PLHIV. In our study, only 16.6% screened positive for depression. This was much lower than in studies in the United States of America and across clinics in South Africa where 36% and 40% of PLHIV screened positive for depression, respectively.[1,37] The American study used the University of Michigan Composite International Diagnostic Interview (UM-CIDI) and the DSM III, while the South African study employed the MINI International Neuropsychiatric Interview and included only 65 participants, which may overestimate the prevalence of depression. Another reason may be that low cut-offs were used in these studies which also included patients with mild depressive symptoms. A sub-Saharan African (SSA) study however reported a pooled prevalence of 13.9% for major depressive disorder, which was quite similar to our index study.[38] This study included 13 studies from 7 countries.

Prevalence of generalised anxiety disorder

Similarly, only 15.1% of the participants screened positive for GAD in our study. This was comparable with studies in Brazil and Zambia, where the prevalence of GAD was 14% and 13.3%, respectively.[39,40] However, the prevalence of GAD were much higher in studies in the United States of America (31%) and Ethiopia (22%). [41,42] The Ethiopian study was conducted in a hospital setting where patients are likely to be more ill, compared to clinics, and the Beck Anxiety Inventory scale was used to assess for GAD.

While the American study used the GAD-7, it adopted a higher cut-off score (10 versus 8 in our study) and used a higher sample size recruited over four years, their calculated prevalence was more than twofold higher than our current study. This difference may be attributable to sociocultural differences between study sites and the use of convenience sampling in the American study, which may bias their study.

Factors associated with generalised anxiety disorder

Regarding factors associated with GAD in PLHIV, Belete et al.[41] found that being female, lacking social support and having perceived stigma, were all associated with the presence of GAD symptoms. In a Brazilian study, being female or having chronic pain was also associated with increased incidence of GAD.[36,40] These findings were consistent with our study, where being female and chronic pain were associated with increased incidence of GAD by five times and three times, respectively, in our multivariate analysis. We also found that unsuppressed viral load and poor adherence were associated with increased GAD symptoms. There was no association between viral load or adherence, and GAD symptoms in the Brazilian study.[40] This association was however made in the American and Malaysian studies respectively.[43,44] The Malaysian study further investigated and found association between GAD and substance use.

Prevalence of substance-use disorders

Among our cohort, 24.1% screened positive for substance-use disorder. Of these, 48% had mild SUD, while 26% each had moderate and severe SUD. This was similar to a study in Cape Town which assessed for 'problematic drug use' in PLHIV using the Drug Use Disorder Identification Test (DUDIT). [45] Twenty percent of participants screened positive for SUDs, but the authors did not determine the severity of the SUDs in their sample. Regarding the types of substances used, we found that the commonest substances used by our cohort were alcohol (42.9%) and tobacco (24.3%). Only 3.7% and 0.5% disclosed using cannabis and opioid, respectively. Alcohol was also the commonest substance used among PLHIV in Nigeria, followed by oral sedatives (21%), cannabis (3.6%) and cocaine, inhalants and solvents (0.26%). [46] Alcohol followed by tobacco were also the commonest in Mthatha, South Africa.[47] In our study

however, among those with severe SUD, the commonest substance used was tobacco followed by alcohol, then cannabis.

Factors associated with substance-use disorders

With regard to factors associated with substance-use disorder, participants who had previously defaulted ART, had less than 80% clinic attendance or unsuppressed viral load, were more likely to screen positive for SUDs in our study. Female participants were 80% less likely than males to screen positive for SUDs, in both our univariate and multivariate analyses. Also, males were 11 times more likely to have severe SUDs compared to females. Kader et al.,[45] like in our study, reported that males were more likely to be hazardous substance users. This is consistent with SUDs in the general population.[48] They also found that participants with SUDs were more likely to be unemployed, and poorly adherent. These have negative impact on ART outcomes. The US National Institute of Health (NIH) also observed that 'substance use disorders (SUDs) are prevalent among people with HIV and contribute to poor health outcomes; therefore, screening for SUDs should be a routine part of clinical care'. [49]

Adherence to recommendation to screen for common mental disorders

We therefore evaluated the proportion of participants that were screened by healthcare workers for CMDs in their last two clinic visits. We assessed if patients had been screened for CMDs based on recall and on clinical notes. Only 16% were screened for depression, 14% for GAD and 40% for SUDs based on participant recall. A review of clinical notes revealed that only 1% of those screened for CMDs had the screening documented in their clinical records. These numbers were quite small considering that both the SA NDoH and the US NIH recommend that all persons living with HIV be screened for CMDs before and during ART.[16,49] Also, this reveals that practitioners do not always document when they screen patients for CMDs. One doctoral study however reported a depression screening rate of 10% at baseline that improved to 100% after a structured training, with resultant improvement in ART outcomes.[50] Therefore, the training of healthcare practitioners to screen for CMDs may improve ART outcomes.

We attempted to assess for association between those who were screened by healthcare workers for CMDs and the presence of a CMD. Unexpectedly, screening

for CMDs in our study did not always reduce the incidence of CMDs. It appeared to be associated with higher prevalence of CMDs in most instances. This may be due to the study design which did not ensure adequate power to assess for such association. It may also have been because patients who screened positive did not always receive the required management after being identified by screening tools.[51] We however did not assess the proportion of those who were screened that were referred for management.

Limitations of study

This study was not without limitations. Some aspects of the questionnaire relied on recall of participants, and it is known that patients with CMDs, especially depression, may have poor memory. The time frame for recall was reduced to the last two clinic visits to reduce the probability of poor recall. Also, the use of screening tools such as the PHQ-9 and GAD-7 instead of diagnostic interviews may have also influenced the study findings. It must be stated that these screening tools have been locally validated and found to have good psychometric properties, and the DSM-5 criteria, which is gold standard, was also used to screen for SUDs. Another limitation was that of missing data. However, apart from the viral load data, the number of all other variables did not affect the power of the study. Finally, our study was limited by not assessing if those that were screened for CMD received any management. This may guide future research.

Irrespective of the above limitations, this was a study involving patients managed across different primary care facilities.

Conclusion

Our finding in this present study indicates that the prevalence of CMDs in PLHIV remains high. It also found that those without CMDs have better ART outcomes than those with CMDs. These outcomes include viral suppression, adherence to treatment, and clinic attendance. We have also shown that being female, lacking social support, experiencing HIV-associated stigma, having other chronic diagnosis or experiencing chronic pain, is associated with CMDs, with its attendant poorer HIV management outcomes. However, the adherence to SA NDoH recommendation to screen for CMDs

in PLHIV, is very low. Therefore, systems need to be put in place to motivate healthcare workers screen for CMDs in PLHIV. Further research may be necessary to determine how this should be implemented.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Authors' contribution

Original research design, proposal: AE, SA and AAA. Data collection: AE. Data analysis: AE. Research supervision: SA and AAA final manuscript: AE, SA and AAA. All authors approved the final report.

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Data availability statement

The datasets supporting this study's findings are available on request from the corresponding author, AE., upon reasonable request. The data are not publicly available due to ethical restrictions.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated institution or agency of the authors.

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Appendices

Appendix I: **STUDY QUESTIONNAIRE**

Questionnaire

Study Title: Prevalence and correlates of common mental health disorders in persons living with HIV in public primary care facilities in Ekurhuleni district

Section A

1) Age: _____ years

2) Sex: (A) Male [ ] (B) Female [ ]

3) Language in which questionnaire is administered:

(A) English [ ] (B) Isi-Zulu [ ] (C) Isi-Xhosa [ ] (D) Others [ ] _____

4) Employment status:

(A) Full-time employed [ ] (B) Part-time employed [ ] (C) Unemployed [ ] (D) Pensioner

5) Education:

(A) No matric [ ] (B) Matric [ ] (C) Vocational qualification [ ] (D) Higher degrees [ ]

6) Specific antiretroviral drugs being used (present & 6 months ago):

(A) EFV-based [ ] (B) NVP -based [ ] (C) DTG-based [ ]

(D) LPV/r-based [ ] (E) ATV/r-based [ ] (F) 3rd line [ ] Other: _____

7) Relationship status:

(A) Married [ ] (B) Unmarried partnership [ ] (C) Divorced/separation [ ]

(D) Single [ ] (E) Widow(er) [ ]

8) Do you have family members that can assist you financially or emotionally when in difficulties?

(A) Never [ ] (B) Sometimes [ ] (C) Most times [ ] (D) Always [ ]

9) Do you feel that you have been discriminated against because of your HIV status in last 6 months?

(A) None [ ] (B) Sometimes [ ] (C) Most times [ ] (D) Always [ ]

10) Last viral load & Date: _____

11) Year of HIV diagnosis: _____

12) Other current chronic diagnoses: (A) Yes [ ] (B) No [ ].

Specify:

(A) Diabetes mellitus [ ] (B) Arthritis [ ] (C) Chronic Kidney Disease [ ]

(D) Hypertension/cardiac disease [ ] (E) Asthma/COPD [ ] (F) Others: _____

13) Have you experienced any stressful event listed below in the last 6 months? (A) Yes [ ] (B) No [ ]

(A) Bereavement [ ] (B) Loss of income/employment [ ] (C) Physical abuse [ ]

(D) New sickness [ ] _____ (E) Others: _____

14) Do you feel any worrying pain in your body that affects your ability to perform your duties, and that has been present for more than 1 month?

(A) None [ ] (B) Sometimes [ ] (C) Most times [ ] (D) Always [ ]

15) In the last 1 month, how many times have you forgotten to take your medications:

Zero [ ] 1 – 2 [ ] 3 – 4 [ ] 5 – 6 [ ] > 6 [ ]

16) Have you ever stopped taking your ART for any 2 consecutive months?

(A) Yes [ ] (B) No [ ]

17) Have you informed any member of your family or friends about your HIV status?

(A) Yes [ ] (B) No [ ]

18) Clinic attendance in the last 6 months based on patient file:

(A) Kept all appointment [ ] (B) Kept some appointments [ ] (C) Kept no appointment [ ]

19) Have you been previously diagnosed of:

(A) Depression [ ] (B) Generalized anxiety disorder [ ] (C) Substance use disorder [ ]

Section B

20) Have you been asked any of the questions below in the last 2 clinic visits?

Feelings of persistent sadness, depression, or loss of interest in previously liked activities PHQ-9:

(A) Y [ ] (B) N [ ]

Feelings of excessive worry or anxiousness or any questions in GAD-7:

(A) Y [ ] (B) N [ ]

Use of illicit drugs, alcohol or “dagga” or nyaope (excluding cigarette) or any questions in section E:

(A) Y [ ] (B) N [ ]

21) Screened for common Mental disorders based last 2 clinic visit notes:

(A) Y [ ] (B) N [ ]

Section C

22) PHQ-9 score: _____

Section D

23) GAD-7 score: _____

Section E

24) Tick substances you have used in the last month: (A) Yes [ ] (B) No [ ]

(A) Alcohol [ ] (B) Tobacco [ ] (C) Cannabis/dagga [ ]

(D) Opioids/heroin/nyaope [ ] (E) Cocaine [ ] (F) Inhalants [ ]

(G) Tik [ ] (H) Caffeine [ ] (I) benzodiazepines/sleeping pills [ ]

25) How long (in months) have you been using the substance in 1, 2, 3 & 4 respectively?

(A) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(B) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(C) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(D) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(E) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(F) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(G) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(H) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]
(H) 0 – 3 [ ]	3 – 6 [ ]	6 – 12 [ ]	> 12 – 24 [ ]	> 24 [ ]

26) Do you take the substance in larger amounts or for longer than you're meant to?

A (A) Y [ ] (B) N [ ]	**B** (A) Y [ ] (B) N [ ]	**C** (A) Y [ ] (B) N [ ]
D (A) Y [ ] (B) N [ ]	**E** (A) Y [ ] (B) N [ ]	**F** (A) Y [ ] (B) N [ ]
G (A) Y [ ] (B) N [ ]	**H** (A) Y [ ] (B) N [ ]	**I** (A) Y [ ] (B) N [ ]

27) Have you had failed attempts to cut-down or stop using the substance?

A (A) Y [ ] (B) N [ ]	**B** (A) Y [ ] (B) N [ ]	**C** (A) Y [ ] (B) N [ ]
D (A) Y [ ] (B) N [ ]	**E** (A) Y [ ] (B) N [ ]	**F** (A) Y [ ] (B) N [ ]
G (A) Y [ ] (B) N [ ]	**H** (A) Y [ ] (B) N [ ]	**I** (A) Y [ ] (B) N [ ]

28) Do you spend a lot of time getting, using, or recovering from use of the substance?

A (A) Y [ ] (B) N [ ]	**B** (A) Y [ ] (B) N [ ]	**C** (A) Y [ ] (B) N [ ]
D (A) Y [ ] (B) N [ ]	**E** (A) Y [ ] (B) N [ ]	**F** (A) Y [ ] (B) N [ ]
G (A) Y [ ] (B) N [ ]	**H** (A) Y [ ] (B) N [ ]	**I** (A) Y [ ] (B) N [ ]

29) Do you have cravings and urges to use the substance?

A (A) Y [ ] (B) N [ ]	**B** (A) Y [ ] (B) N [ ]	**C** (A) Y [ ] (B) N [ ]
D (A) Y [ ] (B) N [ ]	**E** (A) Y [ ] (B) N [ ]	**F** (A) Y [ ] (B) N [ ]
G (A) Y [ ] (B) N [ ]	**H** (A) Y [ ] (B) N [ ]	**I** (A) Y [ ] (B) N [ ]

30) Do you fail or delay performing your responsibilities at work, home, or school because of substance use?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

31) Do you continue to use the substance, even when it causes problems in relationships?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

32) Do you give up important social, occupational, or recreational activities (like activities with friends and families or at work) because of substance use?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

33) Do you repeatedly use substances in dangerous situations (e.g driving, operating machines)?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

34) Do you continue to use, even when you know you have a physical or psychological problem that could have been caused or made worse by the substance?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

35) Do you need more of the substance, than previously, to get the same effect you want?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

36) Have you developed withdrawal symptoms (or feel unwell if you do not use the substance), which can be relieved by taking more of the substance?

A (A) Y [ ] (B) N [ ] **B** (A) Y [ ] (B) N [ ] **C** (A) Y [ ] (B) N [ ]

D (A) Y [ ] (B) N [ ] **E** (A) Y [ ] (B) N [ ] **F** (A) Y [ ] (B) N [ ]

G (A) Y [ ] (B) N [ ] **H** (A) Y [ ] (B) N [ ] **I** (A) Y [ ] (B) N [ ]

37) Total score from questions 3 – 13 for:

Substance A:_____ Substance B:_____ Substance C:_____

Substance D:_____ Substance E:_____ Substance F:_____

Substance G:_____ Substance H:_____ Substance I:_____

Substance J:_____

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
Add the score for each column	+	+	+	
Total Score *(add your column scores)* =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.

PATIENT HEALTH QUESTIONNAIRE-9
(PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING *0* **+** _____ **+** _____ **+** _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	**Somewhat difficult**	**Very difficult**	**Extremely difficult**
☐	☐	☐	☐

Appendix II: **PARTICIPANT INFORMATION SHEET**

WITS UNIVERSITY

PARTICIPANT INFORMATION LEAFLET

STUDY TITLE:

PREVALENCE AND CORRELATES OF COMMON MENTAL HEALTH DISORDERS IN PERSONS LIVING WITH HIV IN PUBLIC PRIMARY CARE FACILITIES IN EKURHULENI DISTRICT.

Introduction:

I, Dr. Aniekan Edet, is conducting a research titled, “Prevalence and Correlates of Common Mental Health disorders in persons living with HIV in public primary care facilities in Ekurhuleni District”. Research is a process used in seeking new knowledge. In this study we want to observe how common disorders like depression, anxiety and substance abuse is among persons living with HIV, and also determine what factors influence this.

Invitation to Participate:

I am inviting you to take part in this research study.

What is involved in the study? The following steps will be involved:

1. Your permission will be obtained to participate in the study.
2. You will be asked questions limited to the attached questionnaire, and will be assisted in filling the questionnaire.
3. Some information, such as blood test results, will be obtained from your clinic file. Once entered into the data collection form, the data will not be identified with you.
4. This will take approximately 30 to 60 minutes of your time.
5. The observations will be done in 7 healthcare facilities in the eastern sub-district of Ekurhuleni.
6. The questionnaire will be administered by Dr. Aniekan Edet and collected immediately.

Risks of being involved in the study:

There is minimal risk involved as all information will be handled confidentially. Your name or Identification number will not be in the questionnaire. Only a code will be used. All the questionnaire will

be stored safely and only the researchers will have access to them. Information given will not be known by the clinic staff and will not affect your treatment or care the clinic.

Benefits of being in the study:

There is no direct benefit to participating in this study.

Distress Protocol:

After the observation is completed, those who screen positive for depression, anxiety disorder or substance abuse will be appropriately referred for management within the public health system. This referral will be to the Family Physician responsible for the facility.

Those who experience emotional distress as a result of the interview will be referred to a Psychologist or Registered Counselor.

Alternative procedures or courses of treatment that might be advantageous to the subject:

None.

The Participant will be given pertinent information on the study while involved in the project and after the results are available:

Yes.

Participation is voluntary

You will not be penalized for refusing to participate. You can opt out or discontinue your participation anytime without penalty, or loss of benefits to which you are otherwise entitled; and any data collected from you will in default be destroyed, unless you specifically consent to its retention.

Reimbursements

There is to be no payment for participation in the study. Participants may be given light refreshments such as bottled water or non-alcoholic drinks etc., during the interview.

Confidentiality

All information will be treated in the strictest confidence and will only be available to the Principal Investigator (PI) and his Supervisor. The only exceptions - and all of them are rare - would normally be:

1. personal information may be disclosed if required by law
2. the Human Research Ethics Committees of the University may exceptionally require personal data to respond to a formal complaint, or for a compliance audit

All data collected in the course of the study will be securely retained for two (2) years, if a scientific publication arises from the study and six (6) years, if there is no publication. Thereafter it will be destroyed accordingly.

Contact details of researcher/s: to enable prospective or actual Participants to get further information, or report adverse events, please provide e-mail and telephone contact details of the Principal Investigator and his/her Supervisor. This is as follows:

Principal Investigator: Dr. Aniekan Edet

edetaniekan@yahoo.com
0837106322
Supervisor: Dr. Samuel Agbo
sam2012agbo@gmail.com
0833208377
Co-Supervisor: Dr. Afolake A. Amodu
flakypee@yahoo.com
0796187030

Outputs

The outputs may include the proportion of persons living with HIV screened for common mental health disorders, the prevalence of these common mental health disorders in PLHIV and the factors that influence the prevalence. The Principal Investigator will gladly disclose this to you upon completion of the study.

Contact details of HREC administrator and chair – for reporting of complaints / problems

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg. A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research. If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

Thank you for reading this Study Information Sheet.

Date: _____ (Month and Year only) Sign: _____

Appendix III: **STUDY CONSENT FORM**

Consent form

Research Title: PREVALENCE AND CORRELATES OF COMMON MENTAL HEALTH DISORDERS IN PERSONS LIVING WITH HIV IN PUBLIC PRIMARY CARE FACILITIES IN EKURHULENI DISTRICT

I have read the attached ***participant information leaflet***, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research. The following will be done:

1. *To be asked questions on the attached questionnaire*
2. *Information will be retrieved from your clinic record such as blood test results etc.*

Print Name of Participant_____

Signature of Participant _____

Date _____
Day/month/year

If unable to read and/or write;

A literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb-print as well.

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely. The following will be done:

1. *To be asked questions on the attached questionnaire*
2. *Information will be retrieved from your clinic record such as blood test results etc.*

Print name of witness_____ AND Thumb print of participant

Signature of witness _____

Date _____
Day/month/year

*Adopted from World Health Organisation Research Ethics Review Committtee (WHO ERC) *informed consent form template for clinical studies* (modified)

Appendix IV: **ETHICS APPROVAL (WITS HREC)**

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Mr Aniekan Edet

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M210116

NAME: (**Principal Investigator**)	Mr Aniekan Edet
DEPARTMENT:	Family Medicine Ekurhuleni Health District (Simunye Clinic, Daveyton East Clinic, Tsakane Clinic, Springs Clinic, Nigel Clinic, Payneville Clinic and Phillip Moyo Community Health Centre)
PROJECT TITLE:	Prevalence and correlates of common mental health disorders in persons living with HIV in public primary care facilities in Ekurhuleni district
DATE CONSIDERED:	29/01/2021
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr S. Agbo and Dr A.A. Amodu
APPROVED BY:	CB Penny Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	06/05/2021

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions.Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **January** and will therefore be due in the month of **January** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix V: **ETHICS APPROVAL (EKURHULENI HEALTH DISTRICT)**

City of Ekurhuleni

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

EKURHULENI HEALTH DISTRICT RESEARCH PERMISSION

Research Project Title: Prevalence and Correlates of Common Mental Health Disorders in Persons Living with HIV in Public Primary Care Facilities in Ekurhuleni District.

NHRD No: GP_202011_052

Research Project Number: 11/02/2021-01

Name of Researcher(s): Dr Aniekan Edet

Division/Institution/Company: University of the Witwatersrand

Date of review by the EHDRC: 11 February 2021

DECISION TAKEN BY THE EKURHULENI HEALTH DISTRICT RESEARCH COMMITTEE (EHDRC)

- This document certifies that the above research project has been reviewed by the EHDRC and permission is granted for the researcher(s) to commence with the intended research project.
- Facilities approved for the research: Daveyton East clinic, Phillip Moyo CHC, Simunye clinic (Brakpan), Nigel clinic, Paynville clinic, Springs clinic and Tsakane clinic.
- Participants' rights and confidentiality must be maintained throughout the study period and when disseminating the findings.
- No resources (financial, material and human resources) from the health facilities will be used for the study. Neither the district nor the health facilities will incur any additional cost for the study.

Title: Prevalence and Correlates of Common Mental Health Disorders in Persons Living with HIV in Public Primary Care Facilities in Ekurhuleni District.

- The EHDRC must be informed in writing before publication or presentation of research findings and a copy of the report/publications/presentation must be submitted to the EHDRC
- The district must be acknowledged in all the reports/publications generated from the research.
- The researcher will be expected to provide the EHDRC with
  - Six monthly progress updates including any adverse events
  - The final study report in electronic format
  - Present the final research findings at the annual Ekurhuleni research conference if possible.

- The EDHRC reserves the right to withdraw the approval, if any of the conditions mentioned above have being breached
- The research committee wishes the researcher(s) the best of success.

THEMBANI MASIMA

DEPUTY CHAIRPERSON: CITY OF EKURHULENI

Dated: 25/01/2021

DR Ronel Kellerman

CHAIRPERSON: GAUTENG DEPARTMENT OF HEALTH (EKURHULENI HEALTH DISTRICT)

Dated: 15/03/2021

Appendix VI: **PLAGIARISM (TURNITIN) REPORT**

Research report for Turnitin.docx

by Aniekan Edet

Submission date: 19-Dec-2022 03:06PM (UTC+0200)
Submission ID: 1984463416
File name: Research_report_for_Turnitin.docx (98.57K)
Word count: 4895
Character count: 26073

Introduction

Previous studies suggest that the prevalence of common mental health disorders (CMDs) in people living with HIV (PLHIV) in primary care in South Africa is higher than in the general population. Some of these screening studies suggest prevalence as high as 5 times that of the general population [1–3]. This higher prevalence has been attributed to the initial feeling of uncertainty after the diagnosis of HIV, perceived discrimination, social or mental isolation, and non-disclosure of HIV status, which may preclude affected persons from getting the required clinical and psychosocial support [4]. One study even linked this higher prevalence to the negative effects of the virus or the antiretroviral therapy drugs on the brain [5,6]. However, some of these factors have changed over time. For instance, the periodic South African stigma index survey reported a sizeable decrease in HIV-related internalised stigma between 2014 and 2020, from 43% to 23.4%, respectively [7,8]. Similarly, there have been changes in the number of people disclosing their HIV status to partners or family members [9]. These changes may have also resulted in changes in the prevalence of CMDs in PLHIV.

The commonest of these CMDs is depression, followed by generalised anxiety disorder (GAD) and substance use disorders (SUDs) [10]. They have been associated with poor antiretroviral therapy outcomes, including decreased adherence, retention in care, viral suppression and overall quality of life [11,12]. They may have negatively impacted on South Africa's aspirations of attaining the third "90" of the UNAIDS 90-90-90 targets, which aimed to ensure that 90% of all persons receiving lifelong antiretroviral therapy (ART) attain sustained viral suppression by the year 2020 [12]. This was however not achieved, as in Ekurhuleni, only 57.9% of clients were remaining on ART as at March 2019, and 83% of those tested had achieved viral suppression [13]. Furthermore, despite increasing uptake into the ART programme, only 63 – 88% of persons living with HIV (PLHIV) are adherent to ART in just 2 years after initiation, and 11% and 25.1% are lost-to-follow-up (LTF) at 1 year and 5 years respectively [14,15].

The South African National Department of Health (SA NDoH) ART guidelines have therefore recommended screening for CMDs before, during, and after ART initiation [16].

The degree of adherence to this recommendation in primary care remains unknown. Some studies have however suggested that managing these CMDs in people living with HIV (PLHIV) resulted in improved ART outcomes [17]. This reinforces the need to screen for CMDs in PLHIV. There is also paucity of data evaluating the prevalence of CMDs in PLHIV in primary healthcare in Ekurhuleni District, and furthermore, no study was found that estimated the proportion of PLHIV screened for CMDs in the district.

This multi-center study therefore aims to estimate the prevalence of depression, GAD and SUDs in primary healthcare facilities in the eastern sub-district of Ekurhuleni district, South Africa, as well as, the factors that are associated with their presence. The study will further evaluate the proportion of PLHIV who have been screened for CMDs in their last 2 clinic visits.

Materials and Methods

Settings and Participants

This was a cross-sectional, analytical study conducted involving 403 participants aged 18 years and older, living with HIV, across seven clinics in the eastern sub-district of Ekurhuleni Health District, South Africa, between the 22nd of November 2021 and the 25th of March 2022. The Eastern sub-district is one of the 3 sub-districts of Ekurhuleni Health District and, excluding the mobile clinics, it had 30 primary healthcare clinics that were providing ART services to 85,509 adults as at 31st March 2020 based on data from the District Health Information System (DHIS).

Four of these healthcare facilities operate for 24 hours, of which three are Community Health Centers (CHCs) and one is a clinic. These four are also similar in that they had full-time doctors and nurses. They also have allied health professionals, some of whom were available on a weekly basis. These four facilities provide a comprehensive package of Primary Health Care (PHC) services, which include; preventive/promotive services such as immunisation, curative services such as antiretroviral therapy, and rehabilitative services such as psychology, physiotherapy and occupational therapy services. Mental health care services are provided in these clinics by the mental health care nurse and psychiatry medical officers and registrars. The others were primary health care day clinics, which were entirely nurse-led, with weekly support visits by doctors.

Sample and sampling

The sample size was calculated using Raosoft online sample size calculator. The sample size was found to be 383 using a confidence interval of 95%, a response distribution of 50% and a margin of error of 0.05. This was increased by 5% to account for missing variables, increasing to 403 participants. A stratified random sampling was applied to select facilities and participants. The Primary healthcare facilities were grouped into 2 stratas. Strata 1 had four CHCs providing 24 hour services, while strata 2 had twenty-six day clinics. One facility was chosen from strata 1 and six facilities from strata 2, by simple random sampling. With regards to participant selection, 109 participants were chosen from strata 1 and 294 participants from strata 2, by use of simple ballot. Sampling was done proportionate to the size of the strata and population. People who were unable to give consent, such as persons with intellectual disability, were excluded from the study. Also, every patient presenting with a medical emergency was excluded.

Data collection

The 5 facilities chosen were visited three to four days a week between the 22nd of November 2021 and the 25th of March 2022, recruiting 8 - 15 participants per day over 20 to 30 minutes. The researcher approached all persons meeting the inclusion criteria, and those that gave consent were included into the study by means of simple ballot. . Balloting was conducted by placing folded papers containing twenty “yes” and twenty “no” in a box on each day of data collection, and those that met the inclusion criteria were given one opportunity to pick one paper from the box. Each participant was separately taken to a room with privacy where the questionnaire were administered. The questionnaire was filled using data from participant verbal responses and their clinic folders.

A pilot study was conducted, at a similar clinic not selected for the study, to determine feasibility of study and potentially improve on its design. It exposed potential logistical problems that were subsequently addressed. The pilot sample was not incorporated into the main research cohort. Participants who screened positive for any CMD were referred to the facility doctor for further assessment and management. One participant had suicidal ideation and intent during the pilot study, was immediately referred to one of the facility’s doctor for admission.

Study instrument

The researcher developed a questionnaire that incorporated other previously validated tools, including the PHQ-9 and the GAD-7 [18,19]. The DSM 5 criteria was used to assess for SUDs. Scores of ≥ 9 for PHQ-9, ≥ 8 for GAD-7, and the DSM 5 substance use disorder criteria (≥ 2) were accepted as a positive screen for depression, generalised anxiety disorder and substance use disorder, respectively. The instrument was reviewed by two Family Physicians for content validity. The Kappa statistic was then calculated to determine the inter-rater reliability, and a value 0.83 was obtained, which was considered optimal [20]. A research assistant fluent in Isi-Zulu and English language assisted in translation of the content of the instrument to participants during administration of the questionnaire. Prior to initiation of data collection, the research assistant was trained in forward and backward translation, as well as, in research ethics to ensure confidentiality.

Data analysis

The data collected were analysed using the "R" statistical software and mapped to a vector containing "0" and "1", representing the absence or presence of a variable, respectively. The number of categories per variable determines the number of vectors created. Data cleaning was carried out by evaluating each measured study variable; errors identified in the data cleaning process were corrected using participant information from the questionnaire. Age and viral load were categorised and encoded based on previous studies and expert knowledge. The characteristics of the patients were presented using frequencies and percentages. The percentage of participants that had been screened for CMDs was calculated. The percentages of those who screened positive for depression, GAD and SUDs were also calculated.

Bivariate logistic regression was conducted to determine the association between each measured variable and the response variable. Significant variables at a 20% significance level were considered potential candidates for multivariable analysis. As reported by a previous study, the number of events per variable (EPV) is an important factor that could influence the estimated association between the variables and the outcome variables. A sample size with an EPV of ten and more is frequently recommended to avoid biases in

the estimation [21]. As a result, the multivariable analysis was conducted with the backward elimination method of variable selection. The final model is reported with the selected variables' odds ratio (OR). A confidence interval (CI) of 95% was used, and a p-value of < 0.05 was considered significant.

Ethical considerations

Ethical approval to conduct the study was obtained from the Human Research Ethics Committee (HREC) of the School of Health Sciences of the University of the Witwatersrand (Protocol number: M210116). Ethics approval was also obtained from the Ekurhuleni Health District Ethics Committee (Research project number: 11/02/2021-01).

Results

Socio-demographic characteristics

Four hundred and thirty six participants were approached to participate in the study in order to recruit the 403 participants required. Of the 403 participants studied, 37% were male and 63% were female. The mean age of participants was 43 ± 11 years, with a range of 18 to 87 years. A majority (81%) of the questionnaire was administered in the English language. Regarding employment, 39% of the patients had a full-time employment, 6% received old-age grants or pension, while the rest had no regular source of income.

It is however important to note that there were some missing variables. This was because some data was not entered into the questionnaire, in which case the numbers did not affect the calculated sample size, and therefore did not affect the power of the study. Another reason was because some participants had not been on treatment for up to 6 months, and as such did not have a viral load result or some were only starting ART on the day they participated in the study, and also, could not respond to questions on adherence. In this instance, analysis was done using participants with data on the variable of interest.

Table 1: Socio-demographic characteristics of participants

Characteristic	*Number (N)*	*Percentage (%)*
Age (years):	mean ± SD = 43 ± 11.76	

18 – 30	62	15.4
31– 40	113	28
41 – 50	121	30
> 50	107	26.6
Sex:	(403)	
Male	151	37.5
Female	252	62.5
Level of education:	(395)	
No matric	292	73.9
Matric or higher	103	26.1
Relationship status:	(402)	
Married	70	17.4
Unmarried partnership	115	28.7
Single	216	53.9
Presence of support system:	(395)	
Never	15	3.8
Sometimes	73	18.4
Always	307	77.8
Experienced discrimination in the last 6 months:	(393)	
Yes	25	6.4
No	368	93.6

Clinical characteristics

Viral suppression was defined at two thresholds; <50 or <200 copies/ml, to allow for “viral blips”. Using fifty as the threshold, 70% of the cohort had achieved viral suppression. Most of the participants (91%) were on first-line antiretroviral therapy, with most of these on a Dolutegravir-based regimen. Also, chronic pain was defined as any worrying pain lasting at least one month.

Table 2: Clinical characteristics of participants

Characteristic	*Number (N)*	*Percentage (%)*

Viral suppression:	(364)	
≤ 50	254	69.8
> 50	110	27.2
Viral suppression:	(364)	
≤ 200	298	81.9
> 200	66	18.1
Antiretroviral therapy type:	(394)	
EFV-based	107	27.2
DTG-based	253	64.2
PI-based	28	7.1
NVP-based	6	1.5
Adherence in previous 1 month:	(395)	
0 missed dose	263	66.6
1 – 2 missed dose	89	22.5
≥ 2 missed dose	43	10.9
Previous history of default:	(394)	
Yes	58	14.7
No	336	85.3
Disclosed HIV status:	(395)	
Yes	367	92.9
No	28	7.1
Other chronic diagnosis:	(403)	
Yes	145	36
No	258	64
Psychosocial stressors present:	(403)	
Yes	102	25.3
No	301	74.7
Chronic pain present:	(400)	
No	309	77.3
Yes	91	22.7

Prevalence of Common Mental Disorders

Sixty-seven persons (16.6%) screened positive for depression, 15.1% screened positive for Generalised Anxiety Disorder and 24.1% screened positive for substance-use disorder. However, 163 (40%) of the cohort screen positive for CMDs, 40 (9.9%) screened positive for only two CMDs and 11 (2.7%) of the cohort had all three CMDs. This is depicted in figure 2.

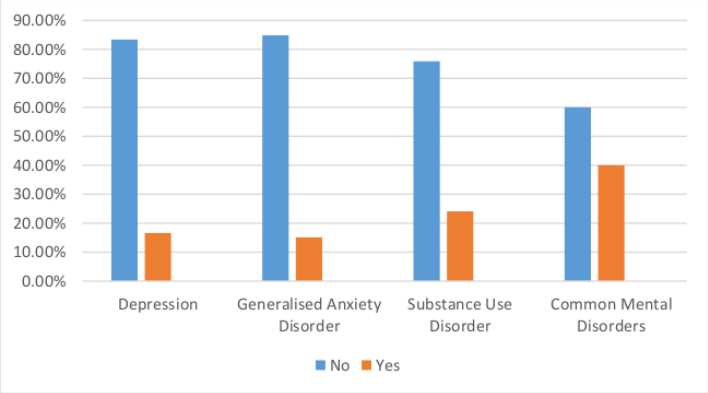

Figure 1: Prevalence of Common Mental Disorders in people living with HIV

Figure 2: Prevalence of comorbid common mental disorders

Factors influencing common mental disorders among PLHIV

The association between each study variable and CMD is shown in Table 3. Language, level of education, availability of family support, relationship status, discrimination, year of diagnosis, presence of chronic pain and psychosocial stressors were not significantly associated in CMD in the bivariate analysis. However, those with CMDs were significantly more likely to be have poor adherence or be virally unsuppressed than those without CMDs.

Table 3: Factors associated with Common Mental Disorders among PLHIV

Characteristics	CMD (N = 400)			
	No	Yes	OR (95% CI) p-value	aOR (95% CI) p-value
Age (years):				
18-30	29	33	1	
31-40	60	52	0.76(0.41-1.42) 0.391	
41-50	75	45	0.53(0.28-0.98) 0.043	
over 50	76	30	0.35(0.18-0.67) 0.002	
Sex:				
Male	76	75	1	1
Female	164	85	0.53(0.35-0.79) 0.002	0.61(0.37:0.99) 0.025
Viral load:				
≤200	197	103	1	
>200	28	33	2.17(1.26-3.72) 0.005	
Chronic diagnosis:				
No	144	112	1	1
Yes	96	48	0.64(0.42-0.98) 0.042	3.16(1.07-9.29) 0.035
Adherence:				
No missed dose	176	84	1	1
1-2 missed doses	43	46	2.24(1.37-3.66) 0.001	2.62(1.49-4.60) 0.001
Over 2 missed doses	18	25	2.91(1.51-5.63) 0.002	2.44(1.15-3.08) 0.015
Previous history of default:				
No	211	122	1	1
Yes	27	31	1.99(1.13-3.48) 0.017	1.77(0.98-3.20) 0.164
Clinic attendance in last 6 months:				
Over 80%	151	81	1	
Less than 80%	85	71	1.58(1.02-2.36) 0.036	

Screened for CMD (last 2 clinic visits):				
No	138	55	1	1
Yes	99	99	2.51(1.65-3.81) 0.000	2.95(1.79-4.88) <0.001
Language				
0	187	137	1	1
1	52	23	0.60(0.35-1.03) 0.066	0.56(0.29-1.09) 0.060.

Factors associated with Depression in PLHIV

Participants who screened positive for depression were more likely to have chronic pain and failure to achieve viral suppression (>200 copies/ml) in both the bivariate and multivariate analysis. However, screening for depression only reduced the risk of screening positive for depression only in our bivariate analysis.

Table 4: Factors associated with Depression among PLHIV

Characteristics	Depression			
	No	Yes	OR (95% CI) p-value	aOR (95% CI) p-value
Sex:				
Male	137	14	1	1
Female	199	53	2.61(1.39-4.88) 0.003	2.30(1.08-4.88) 0.030
Employment status:				
Regular source of income	161	21	1	1
No or Non-regular source of income	173	45	1.99(1.14-3.49) 0.016	2.52(1.26-5.04) 0.009
Level of education:				
No Matric	251	41	1	1
Matric	77	26	2.07(1.19-3.60) 0.010	1.88(0.94-3.77) 0.074
Viral load				
≤200	258	40	1	1
>200	48	18	2.42(1.28-4.57) 0.006	2.49(1.16-5.35) 0.019
Psychosocial stress:				
No	258	43	1	1
Yes	78	24	1.85(1.05-3.23) 0.032	
Chronic pain:				
No	267	42	1	1
Yes	66	25	2.41(1.37-4.23) 0.002	2.49(1.27-4.91) 0.008

Forgot				
No missed dose	227	36	1	1
1-2 missed doses	67	22	2.07(1.14-3.76) 0.016	2.77(1.36-5.63) 0.005
Over 2 missed doses	35	8	1.44(0.62-3.35) 0.396	1.11(0.39-3.17) 0.841
Screened for CMD				
No	174	21	1	1
Yes	153	46	0.18(1.42-4.36) 0.001	3.85(1.94-7.66) 0.000

Factors associated with Generalised Anxiety Disorder in PLHIV

In the bivariate analysis, being female, having a viral load above 200 copies/ml and having chronic pain was significantly associated with generalised anxiety disorder (p = 0.003, 0.000 and 0.003, respectively). This association persisted in the multivariate analysis. Also, those with GAD were four times more likely to have an unsuppressed viral load, and were more likely to have poor adherence, compared to those who did not screen positive for GAD.

Table 5: Factors associated with GAD among PLHIV

Characteristics	GAD (N = 400)			
	No	Yes	OR (95% CI) p-value	aOR (95% CI) p-value
Age (years):				
18-30	43	19	1	
31-40	95	18	0.43(0.20-0.90) 0.024	
41-50	106	15	0.32(0.15-0.69) 0.003	
over 50	98	9	0.21(0.09-0.50) 0.000	
Sex:				
Male	139	12	1	1
Female	203	49	2.80(1.43-5.45) 0.003	4.56(1.87-11.13) 0.001
Chronic diagnosis				
No	214	44	1	1
Yes	128	17	0.65(0.35-1.17) 0.154	3.67(1.12-12.09) 0.041

Level of education:					
No Matric	257	35		1	1
Matric or higher	78	25	2.35(1.33-4.17) 0.003		2.33(1.14-4.77) 0.019
Viral load:					
≤200	266	32		1	1
>200	46	20	3.61(1.91-6.86) 0.000		4.54(2.07-9.97) 0.000
Chronic pain:					
No	271	38		1	1
Yes	68	23	2.41(1.35-4.32) 0.003		3.20(1.57-6.52) 0.001
Adherence:					
No missed dose	235	28		1	1
1-2 missed doses	70	19	2.27(1.20-4.32) 0.039		2.57(1.18-5.60) 0.043
Over 2 missed doses	31	12	3.25(1.50-7.04) 0.002		3.40(1.25-9.24) 0.021

Factors associated with Substance Use Disorder in PLHIV

The bivariate analysis showed no significant association between substance use disorder and relationship status, level of education, availability of family support or employment status. Females were 80% less likely to have substance use disorder (p = 0.000) compared to males in both the bivariate and multivariate analysis. Further analysis revealed that males were 11 times more likely to have severe substance use disorder. Similarly, SUDs was associated with having a viral load above 50 copies/ml and clinic attendance less than 80% (p = 0.029 and 0.041 respectively).

Table 6: Factors associated with SUDs among patients with PLHIV

Characteristics	SUD (N = 403)			
	No	Yes	OR (95% CI) p-value	aOR (95% CI) p-value
Age (years):				
18-30	24	38	1	1
31-40	50	63	0.80(0.42-1.50) 0.478	0.59(0.27-1.30) 0.193
41-50	62	59	0.60(0.32-1.12) 0.109	0.43(0.20-0.96) 0.040
over 50	68	39	0.36(0.19-0.69) 0.002	0.22(0.10-0.52) 0.000
Sex:				

Male	41	110	1	1
Female	163	89	0.20(0.13-0.32) 0.000	0.19(0.11-0.32) 0.000
Language:				
English	156	171	1	1
Others	47	28	0.54(0.32-0.91) 0.020	0.58(0.29-1.14) 0.114
History of defaulting treatment:				
No	180	156	1	
Yes	21	37	2.03(1.14-3.61) 0.015	
Clinical attendance in last 6 months:				
≥80%			1	1
<80%			1.69(1.13-2.55) 0.011	1.688(1.02-2.79) 0.041
Screened CMD:				
No	120	75	1	1
Yes	80	119	2.38(1.59-3.57) 0.000	2.26(1.36-3.74) 0.002
Viral load:				
≤50	129	125	1	1
>50	64	46	0.74(0.47-1.17) 0.195	0.54(0.31-0.94) 0.029
Adherence:				
No missed dose	148	115	1	1
1-2 missed doses	33	56	2.18(1.33-3.58) 0.001	2.15(1.18-3.91) 0.012
Over 2 missed doses	21	22	1.2(0.89-1.71) 0.364	0.81(0.36-1.85) 0.618

Discussion

Our study assessed the prevalence and correlates of CMDs in PLHIV in a South African health district. We found a high CMD prevalence of 40%, which was significantly associated with younger age, being male, having poor adherence, and unsuppressed viral load. This prevalence was comparable to studies conducted in South Africa and Ethiopia, where the CMD prevalence were 43.7% and 32.7%, respectively [2,22]. It was however higher than in a study conducted in Zimbabwe where the prevalence of CMDs was 18% [23]. The lower prevalence in this study may be due to the higher sample size, which may underestimate the CMD prevalence. Another reason may be that different

screening instruments were used in both studies. These have different sensitivities, specificities and predictive values, for detecting CMDs in PLHIV.

Also, considering there had been changes in important CMD risk factors such as the number of PLHIV disclosing their HIV status to their sexual partners, HIV-associated stigma and treatment options, one may have expected a change in CMD prevalence. For instance, only 30% of women disclosed their HIV status to their sexual partners in 2015, while 58% and 81.8% disclosed in 2018 and 2021, respectively [24–26]. This was however not the case as the prevalence of CMDs in PLHIV remains high according to findings of this index study. A potential explanation for this high prevalence may be the study period, which coincided with the COVID-19 pandemic that resulted in increased mortality, social isolation and loss of income [27]. These resulted in changes in socioeconomic circumstances of several persons, an important risk factor for common mental disorders [28].

These mental disorders have been associated with poor ART adherence in primary and tertiary health facilities in Mozambique, which was in agreement with our study in both the bivariate and multivariate analysis [29]. This poor adherence subsequently resulted failure of HIV suppression. Also in congruence with our study were findings that lower age group had higher incidence of CMD, while level of education and employment status were not predictors of CMD [30]. Furthermore, in this present study, being male increased the risk for CMDs in our study unlike in Duko et al [22], where being female was a risk factor for CMD. This may be because there are rarely any support programs that focus on men, and men are less likely to volunteer information on their mental health, in order to get support.

This was however not the case for depression, where women were more than two times more likely to be depressed than men in our cohort. This was consistent with most studies reviewed [31,32]. We also showed that screening for depression was associated with lower risk of depression. This strengthens previous recommendation to screen for depression and refer for management, when positive [16]. Similarly, the presence of psychosocial stressors, unsuppressed viral load and poor adherence were associated with depression in our study and other studies reviewed [32]. However, in a study by Joseph et al [33] in the United States, chronic pain was not associated with depression,

unlike what was found in our index study where those with chronic pain were more than two times more likely to be depressed. Differences in these may be attributable to methodology, use of PHQ-8 and its cut-off, as well as a more detailed definition of pain in their study. Pain was assessed using the Brief Pain Inventory and sub-categorised based on severity and whether current or not.

These methodological variance may also explain differences found across studies assessing the prevalence of depression among PLHIV. In our study, only 16.6% screened positive for depression. This was much lower than in studies in the United States of America and across clinics in South Africa where 36% and 40% of PLHIV screened positive for depression, respectively [1,34]. The American study used the University of Michigan Composite International Diagnostic Interview (UM-CIDI) and the DSM III, while the South African study employed the MINI International Neuropsychiatric Interview and included only 65 participants, which may overestimate the prevalence of depression. Another reason may be that low cut-offs were used in these studies which also included patients with mild depressive symptoms. A Sub-Saharan African (SSA) study however reported a pooled prevalence of 13.9% for major depressive disorder, which was quite similar to our index study [35]. This study included 13 studies from 7 countries.

Similarly, only 15.1% of the participants screened positive for GAD in our study. This was comparable to studies in Brazil and Zambia, where the prevalence of GAD was 14% and 13.3%, respectively [36,37]. However, the prevalence of GAD were much higher in studies in the United States of America (31%) and Ethiopia (22%) [38,39]. The Ethiopian study was conducted in a hospital setting where patients are likely to be more ill, compared to clinics, and the Beck Anxiety Inventory scale was used to assess for GAD. While the study in the America used the GAD-7, it adopted a higher cut-off (10 versus 8) and used a higher sample size recruited over 4 years, their calculated prevalence was more than 2 times higher than our current study. This difference may be attributable to sociocultural differences between study sites and the use of convenience sampling in the American study, which may bias their study.

Regarding factors influencing GAD in PLHIV, Belete et al [38] found that being female, lacking social support and having perceived stigma, were all associated with the presence of GAD symptoms. Being female or having chronic pain was also associated with

increased incidence of GAD in Brazil [33,37]. These were consistent with our study, where being female and chronic pain were associated with increased incidence of GAD by five times and three times, respectively, in our multivariate analysis. We also found that unsuppressed viral load and poor adherence were associated with increased GAD symptoms. There was no association between viral load or adherence, and GAD symptoms in the Brazilian study [37]. This association was however made in the America and in Malaysia [40,41]. The Malaysian study also investigated and found association between substance use and GAD.

Furthermore, 24.1% of our cohort screened positive for substance-use disorder. Of these, 48% had mild SUD, while 26% each had moderate and severe SUD. This was similar to a study in Cape Town which assessed for "problematic drug use" in PLHIV using the Drug Use Disorder Identification Test (DUDIT) [42]. Twenty percent of participants screened positive for SUDs, but the authors did not determine the severity of the SUDs in their sample. Regarding the types of substances used, we found that the commonest substances used by our cohort were alcohol (42.9%) and tobacco (24.3%). Only 3.7% and 0.5% disclosed using cannabis and opioid, respectively. Alcohol was also the commonest substance used among PLHIV in Nigeria, followed by oral sedatives (21%), cannabis (3.6%) and cocaine, inhalants and solvents (0.26%) [43]. Alcohol followed by tobacco were also the commonest in Mthatha, South Africa [44]. In our study however, among those with severe SUD, the commonest substance used was tobacco followed by alcohol, then cannabis.

With regards to influencing factors, participants who had previously defaulted antiretroviral therapy, had less than 80% clinic attendance or unsuppressed viral load, were more likely to screen positive for SUDs in our study. Female participants were 80% less likely than males to screen positive for SUDs, in both our bivariate and multivariate analysis. Also, males were 11 times more likely to have severe SUDs compared to females. Kader et al [42], like in our study, reported that males were more likely to be hazardous substance users. This is consistent with SUDs in the general population [45]. They also found that participants with SUDs were more likely to be unemployed, and poorly adherent, but not default treatment. These have negative impact on ART outcomes. The US National Institute of Health (NIH) also observed that "substance use

disorders (SUDs) are prevalent among people with HIV and contribute to poor health outcomes; therefore, screening for SUDs should be a routine part of clinical care" [46].

We therefore evaluated the proportion of participants that were screened for CMDs in their last 2 clinic visits. We assessed if patients have been screened for CMDs based on recall and clinical notes. Only 16% were screened for depression, 14% for GAD and 40% for SUDs based on participant recall. A review of clinical notes revealed that only 1% of those screened for CMDs had the screening documented in their clinical records. These numbers were quite small considering that both the SA NDoH and the US NIH recommend screening for CMDs before and during ART [16,46]. Also, this reveals that practitioners do not always document when they screen patients for CMDs. One doctoral study however reported a depression screening rate of 10% at baseline that improved to 100% after a structured training, with resultant improvement in ART outcomes [47]. Therefore, training healthcare practitioners to screen for CMDs may improve ART outcomes.

Surprisingly, screening for CMDs in our study did not always have the desired outcome. It appeared to be associated with higher prevalence of CMDs in most instances. This may be because patients who screened positive did not always receive the required management after being identified by screening tools [48]. We however did not assess the proportion of those who were screened that were referred for management.

This study was not without limitations. Some aspects of the questionnaire relied on recall of participants, and it is known that patients with CMDs, especially depression, may have poor memory. The time range for recall was reduced to the last 2 clinic visits to reduce the probability of poor recall. Also, the use of screening tools such as the PHQ-9 and GAD-7 instead of diagnostic interviews, may also influence the study findings. It must be stated that these screening tools have been locally validated and found to have good psychometric properties, and the DSM 5 criteria, which is gold standard, was also used to screen for SUDs. Another limitation was that of missing data. However, apart from the viral load data, the number of all other variable did not affect the power of the study.

Irrespective of the above limitations, this was a multi-centre study involving patients managed across different primary care facilities.

Conclusion

This present study found that the prevalence of CMDs in PLHIV remains high. It also found that those without CMDs had better antiretroviral therapy outcomes than those with CMDs. These outcomes include viral suppression, adherence to treatment, and clinic attendance. We also showed females, those who lacked social support or experienced HIV-associated stigma, had other chronic diagnosis or experienced chronic pain, were more likely to have CMDs, with its attendant poorer ART outcomes. However, screening for CMDs did not always lower the incidence of CMDs. As stated above, this may have been due to inadequate management after screening positive. Therefore, systems need to be put in place for diagnostic assessments and management of those that screen positive for CMDs. Further research may be necessary to determine how this should be implemented.

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Appendix VII: **PROOF-READER'S COVERING LETTER**

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January 9th, 2022

ENGLISH PROOF-READING/EDITING

To Whom It May Concern

The journal article titled, 'Prevalence and Correlates of Common Mental Disorders in People Living with HIV in Primary Health Care Facilities in Ekurhuleni District' to be submitted by Dr A. EDET et al has been proof-read and edited for proper English language, syntax, grammar, punctuation, British spelling and overall style by F.E. MEYER. As requested, the manuscript text, 6 tables and 2 figures were formatted. The 48 references were checked according to the Vancouver referencing guidelines of the African Journal of Primary Health Care & Family Medicine (PHCFM) (https://aosis.co.za/documents/Vancouver_Reference_style_guide.pdf). The research content and/or the authors' intentions were not altered during the process.

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F.E. Meyer

F.E. MEYER
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Appendix VIII: **APPROVED RESEARCH PROTOCOL**

PREVALENCE AND CORRELATES OF COMMON MENTAL DISORDERS IN PEOPLE LIVING WITH HIV IN PRIMARY HEALTHCARE FACILITIES IN EKURHULENI DISTRICT

By

Student number: 1968484

Student: Dr. A. Edet

Supervisor: Dr S. Agbo

Co-supervisor: Dr A. A. Amodu

A Research Protocol submitted to the Department of Family Medicine, University of the Witwatersrand

Contents

Abstract

Background

The prevalence of common mental disorders (CMDs) in people living with HIV is estimated to be more than triple the prevalence in the general population. These CMDs are associated with poor adherence to antiretroviral therapy (ART), decreased retention in care, increased viral and immunologic failure, and a poorer overall quality

of life. These may negatively impact on South Africa's aspiration towards achieving the third UNAIDS "90". South African ART guidelines also recommends screening for these disorders during and after ART initiation.

Study aims:

To determine the prevalence and correlates of CMDs in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni Health District, South Africa.

Proposed Methodology

Study design: A cross-sectional quantitative study.

Study area: The eastern sub-district of Ekurhuleni Health District has 30 primary healthcare facilities providing ART services.

Study population: There are 85,509 adults ≥ 18 years receiving ART by 31 March 2020.

Sample and sampling: Sample size was 383 using Raosoft online sample size calculator. It was increased by 5% to 402 to account for incomplete responses. A Stratified Random Sampling technique will be applied to recruit participants into the study.

Expected outcomes:

The primary outcomes of this study include the prevalence of depression, generalised anxiety disorder and substance use disorders in adults living with HIV, as well as, the factors that are associated with a higher prevalence. The secondary outcome assesses the proportion of adults receiving antiretroviral therapy that were screened for mental disorders in the last 2 ART clinic visits prior to assessment.

Analysis: The data will be captured using the latest versions of Microsoft excel, and presented as summaries in the form of means, interquartile ranges and proportions. The percentage of those that screen positive for depression, generalised anxiety disorder and substance-use disorder, using the PHQ-9, GAD-7 and DSM-5 criteria for substance-use disorder, respectively, will be calculated. Then, the factors associated with these disorders will be determined using simple and multivariate logistic regression. Estimates used will be a 95% confidence interval (CI), and a p-value of < 0.05 will be considered significant.

Ethical considerations: Ethical approval will be obtained from the University of the Witwatersrand Human Research Ethics Committee.

1 Introduction

The prevalence of common mental health disorders (CMDs) in people living with HIV (PLHIV) in primary care in South Africa is up to five times the prevalence in the general population [1,2]. With South Africa having a HIV prevalence of 7.9 million in 2017, and a CMD prevalence ranging 43.7% to 56% in this population, the magnitude of the problem becomes more obvious. This is because CMDs have been shown to be associated with poor antiretroviral therapy outcomes, by resulting in decreased adherence, retention in care, viral suppression and overall quality of life [3,4]. Common Mental Disorders may therefore have a negative impact on the aspirations of South

Africa to achieve the third “90” of the UNAIDS 90-90-90 targets, which aims to ensure that 90% of all persons receiving lifelong antiretroviral therapy (ART) attain sustained viral suppression. The deadline to attain this target was the year 2020 [4].

However, by 2016, only 78.4% of adults on ART in South Africa had attained viral suppression [5]. In Ekurhuleni, only 57.9% of clients were remaining on ART as at March 2019, and 83% of those tested had achieved viral suppression [6]. Furthermore, despite increasing uptake into the ART programme, only 63 – 88% of persons living with HIV (PLHIV) are adherent to ART in just 2 years after initiation, and 11% and 25.1% are lost-to-follow-up (LTF) at 1 year and 5 years respectively [7,8]. HIV/AIDS and tuberculosis was also the leading cause of death in adults aged 25 to 49 years, living with HIV in Ekurhuleni District [6]. Some of these poor outcomes are attributable to depression, generalized anxiety disorder (GAD) and substance use disorders (SUD) [3]. These underpin the importance of evaluating for CMDs.

The South African National Department of Health (SA NDoH) ART guidelines therefore have recommended screening for CMDs prior to, during, and after ART initiation [9]. This recommendation however remains largely ignored even in primary care, where most PLHIV are initiated and treated [10]. This may be due to the high numbers of patients that need to be screened. A targeted approach focusing on persons at risk of having CMDs, may be employed if high-risk groups are identified. This study therefore aims to estimate the prevalence of these CMDs in primary healthcare facilities and the factors that are associated with the presence of these CMDs. As a secondary outcome, this study will also evaluate the proportion of PLHIV who have been screened for CMDs six months prior to assessment.

1.2 Literature review

1.2.1 Common mental Disorders:

Common mental disorders describe psychiatric conditions that have a prevalence of greater than 10% in the general population, and typically includes depressive disorders, anxiety disorders and substance use disorders [11]. The clinical presentations of these disorders vary in severity, which may make identification difficult in patients presenting to primary care with other problems. They may also present with psychosomatic features, which further confound the diagnosis. As discussed above, these disorders may negatively impact on antiretroviral therapy outcomes. Consequently, this study focuses on quantifying the magnitude of CMDs in PLHIV, as well as, identifying the factors that may influence them, including prior screening for CMDs.

A diagnosis of depression is made if the following features such as depressed mood, irritability, weight changes, sleep disturbances, suicidal ideations, intent or attempt, anhedonia, loss of energy, feelings of guilt or worthlessness etc, are present for at least 2 weeks. The hallmark of generalized anxiety disorder is persistent and excessive worry about life events and activities, lasting at least 6 months, and this worry is uncontrollable by the affected individual [12]. Substance-use disorders (SUDs) however, are defined as a maladaptive pattern of substance use that results in role failure, risky drug use, legal or relationship problems. The DSM 5 recognizes 11 criteria for the diagnosis of SUDs. Two or three criteria indicate a mild SUD, 4 - 5 and more than 6 criteria indicate a moderate and severe SUD, respectively [13]. These disorders arise from the use of ten different groups of psychoactive substances, including

caffeine, cannabis, hallucinogens, opioids, sedatives, hypnotics, anxiolytics, tobacco, stimulants such as cocaine, and other unknown substances [12].

The DSM 5 however requires the presence of impairment or distress, the exclusion of "another medical condition" and substance use, prior to the diagnosis of depression and GAD [12]. Physical examination and laboratory tests may also be used to buttress any diagnosis. These therefore preclude the use of epidemiological tools, such as the Patient Health Questionnaire, for making definitive diagnosis of CMDs. These tools however have high sensitivities and good predictive values which may aid in correctly diagnosing more than 80% of those who screen positive.

In SA, CMDs are diagnosed in 12.6% of the general population [11]. By administering the Composite International Diagnostic Interview (CIDI) on a nationally representative general population of 4 351 adults, the South African Stress and Health (SASH) group found that the lifetime prevalence of CMDs was 30.3%, with anxiety disorders being the most common [14]. Using the same diagnostic instrument (CIDI) on a national cohort of PLHIV, the prevalence of CMDs was higher at 43.7% [2].

1.2.2 Depression and PLHIV

Depression is a common human experience when faced with loss, stress, or changes in circumstance. It may be mild and self-limiting or may be severe with debilitating symptoms [15]. In a multisite study among PLHIV in the United States of America (USA), the prevalence of major depression alone was 36% compared with 6.7% in the general population [16]. This was comparable to the findings in a meta-analysis in Sub-Saharan Africa (SSA) where the pooled prevalence was found to be 37.8%, although the authors noted that the instruments used yielded a high false positive rate [17]. It

has a prevalence of 10% in the general population and a prevalence of 40% in PLHIV in clinics across SA [1]. In a multi-center study in South Africa, the authors concluded that the “rates of mental disorder were substantially higher in people living with HIV/AIDS than generally found in populations in developing countries and similar to HIV positive groupings in developed countries.” This study also reported the prevalence of depression as 34.9% at initiation , reducing to 26% after 6 months on antiretroviral therapy (ART) [2]. The findings from the multi-center study are particularly important because it queries the contribution of the antiretroviral drug, Efavirenz, which has been associated with depression.

Other factors associated with depression in PLWHIV include stigma, diagnosis of HIV itself or conditions caused by HIV, low CD4 count, female gender, absent family support and HIV positive status of spouse [1,2,10,18]. In Sub-Saharan Africa and the United States of America, the commonest CMD was depression, unlike in Vietnam where HIV associated dementia was the most common CMD [17,19]. Globally, depressive disorders are considered the commonest cause of non-fatal health loss (7.5% of all Years Lived with Disability). It contributes 7.2% Years Lived with Disability (YLD) in South Africa [20]. Due to increased prevalence, this may be much higher in PLHIV.

Finally, a comorbidity of HIV and depression has been shown to worsen adherence, increase viral loads, reduce CD4 count, worsen quality of life and increase mortality [10].

1.2.3 Anxiety disorders and PLHIV

People living with HIV may experience symptoms of anxiety across the spectrum of anxiety disorders, and although these disorders are prevalent in PLHIV, there has been paucity of studies in this population [21]. Epidemiological survey shows that anxiety disorders has a lifetime prevalence of 33.7% among adults in the United States of America, which is quite different from the findings of the South African Stress and Health (SASH) study which found a lifetime prevalence of 15.8% for anxiety disorders. In the American study, specific phobias and social anxiety disorders are the most prevalent, followed by generalized anxiety disorder (GAD). This was comparable with the results of the SASH study [22,23]. In adults living with HIV however, the most prevalent anxiety disorders are panic disorder (PD), and GAD [21].

In PLHIV in high income countries, the prevalence of any anxiety disorder was 18 – 50%, GAD ranged between 3 - 15.8%, while PD had a prevalence of 5.4 – 13%. This wide variation in prevalence rate persisted in developing countries where the prevalence of any anxiety disorder, GAD or PD were 12.7 – 34.1%, 6.7 – 18.4% and 1 – 32.6%, respectively. The authors however noted that the wide variation in prevalence of anxiety disorders in these studies was due to the use of questionnaires, as opposed to, a diagnostic interview [21].

Using a questionnaire, Adeoti et al [24] compared the prevalence of anxiety disorders in PLHIV with those who were “HIV negative” in a Nigerian cohort, and found a prevalence of 32.6% and 28.7%, respectively. This study observed that factors associated with anxiety disorder in PLHIV include lower age, female gender, low income, and low CD4 count. Other factors associated with these disorders include

commencement of ART, stress, perceived social stigma, divorce, physical pain, and ART side effects [25,21]. Notably, these disorders are also associated with a higher incidence of, poor adherence, acquired immune-deficiency syndrome (AIDS), high-risk behavior and decreased quality of life in PLHIV [11,26].

1.2.4 Substance-use disorders and PLHIV

Studies have shown that substance use disorders have a lifetime prevalence of 13% in the general population, and these disorders negatively affect the physical, social and mental well-being of affected individuals and their families [12]. While, there are many studies evaluating the prevalence of substance use in PLHIV, there is also paucity of studies evaluating the prevalence and correlates of SUD. In a study on HIV infected adults in a primary care facility in the United States of America, over two-thirds of participants reported using one substance in the previous 3 months. Fifty-two percent tested positive for cannabis, while 28.6% and 24.4% tested positive for cocaine and benzodiazepines respectively [27]. In Spain, the prevalence of drug use was quite high, with 87% using alcohol, 55% tobacco and 27% using other substances [28]. Compared to these high prevalence of substance use, another study found that 12.4% of adults living with HIV had a diagnosable substance-use disorder [2]. In a meta-analysis reviewing the prevalence of alcohol-use disorder in PLHIV, the pooled prevalence was found to be 29.8%, and it was much higher for developed countries (42.1%) compared with developing counties (24.5%) [29].

In South Africa, 33% of PLHIV in a peri-urban primary care facility screened positive for alcohol-use disorder, and although alcohol is generally the major substance of abuse, the trend of use of other substances vary by provinces. Methamphetamine

misuse is relatively more common in the Western Cape, while cannabis was the most common substance of abuse in Gauteng followed by alcohol, heroin, cocaine and methcathinone [30,31]. These SUDs in PLHIV are associated with factors such as male gender, younger age, living in urban areas were associated with substance use [32]. While heroin and cocaine use were found to have a negative impact on adherence and retention-in-care, cannabis use was not found to have any adverse effect on ART adherence or viral failure in a Canadian study [29,33].

Substance use disorders are differentiated from Substance induced disorders (SIDs) in that while SUDs are the result of continued or frequent use of substances resulting in tolerance or addiction, SIDs occur due to intoxication or withdrawal from using the substance. The effects of SIDs may also be long lasting e.g alcohol induced sexual dysfunction or alcohol induced dementia [12].

1.3 Rationale:

There have been several studies determining the prevalence of depression and other CMDs in defined populations with chronic medical conditions. Some of these were conducted in tertiary hospitals or focused on the post-natal period. There is paucity of data evaluating the prevalence of these CMDs in PLHIV in primary healthcare in Ekurhuleni District, and no study was found that estimated the proportion of PLHIV screened for CMDs before or during ART in the district. These may result in reduced awareness of the problem among healthcare workers and managers, leading to poor management of PLHIV and poor outcomes.

Gaynes et al [34] showed that screening for depression and subsequent treatment resulted in improvements in immunologic and virologic responses, adherence, and

overall self-reported health, in a Cameroonian cohort. Therefore, identifying and treating persons with these CMDs may aid in achieving the third UNAIDS 90-90-90 target, which aims to ensure that 90% of persons on ART should be virally suppressed. In an era of limited resources, there is a need to for a targeted approach by focusing on and modifying variables associated with poorer outcomes, to reduce wastage and possibly improve outcomes.

Thus, this research work intends to evaluate the prevalence of CMDs and the factors that influence them.

1.4 Aims

This is to determine the prevalence and correlates of CMDs in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni district, South Africa.

1.5 Objectives

1) To ascertain the proportion of PLHIV in public primary healthcare facilities that were screened for CMDs in the eastern sub-district of Ekurhuleni district.
2) To evaluate the prevalence of depression in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni district.
3) To determine the prevalence of generalized anxiety disorder in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni district.
4) To ascertain the prevalence of substance-use disorders in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni district.
5) To determine the factors associated with CMDs in PLHIV in public primary healthcare facilities in the eastern sub-district of Ekurhuleni district.

2 Methodology

2.1 Design

This is a cross-sectional quantitative study.

2.2 Site of study

The study will take place in the Eastern sub-district (ESDR), which is one of the 3 sub-districts of Ekurhuleni. Clinics included must provide ART services, be public healthcare facilities and they must be primary healthcare facilities within the ESDR. The ESDR has 30 healthcare facilities meeting these criteria, and these were providing ART services to 85,251 adults as at the end of March 2020, based on data from the District Health Information System (DHIS). Three of these healthcare facilities are Community Health Centers (CHCs) and one is a 24-hour clinic. These are similar in that they provide a broad package of PHC services, including; preventive/promotive services such as immunisation, curative services such as antiretroviral therapy, and rehabilitative services such as psychology, physiotherapy and occupational therapy services. They also have a Community Psychiatrist and supporting Psychiatry Registrars that provide services at least once a week.

The population of patients at these facilities are mostly black, and the commonest language spoken is English and Isi-Zulu. About 24.8% of persons in the Ekurhuleni District have access to private medical care through medical insurance [35,36].

2.3 Study population

The study population includes all PLHIV aged 18 years and above, in public primary healthcare facilities in the Eastern Sub-district of Ekurhuleni (ESDR). There were

85,509 adults receiving ART from 30 primary healthcare facilities in the ESDR by 31st March, 2020.

2.4 Sample size

The sample size was calculated using Raosoft online sample size calculator. The sample size was found to be 383 using a confidence interval of 95%, a response distribution of 50% and a margin of error of 0.05. This was increased by 5% to account for missing variables, increasing to 402 participants.

2.5 Sampling

A stratified random sampling was applied to select facilities and participants from the ESDR. The facilities are stratified into two. Strata 1 facilities provide the full package of primary health care (PHC) services which span preventive and promotive; curative; and rehabilitative services, along with antiretroviral therapy, and provide 24-hour services. In contrast, strata 2 facilities do not provide the full package of PHC services or 24-hour services, but provide ART.

Strata 1 has four facilities, while strata 2 has twenty-six facilities. The ratio of facilities in strata 2 to strata 1 was therefore 6.5 to 1. This ratio was maintained when the facilities were sampled. Hence, one facility in strata 1 and six facilities in strata 2 are chosen by simple random sampling (SRS). The SRS method applied was by picking the required number of facilities from a box that contained all facilities in that strata. The facilities chosen include Phillip Moyo CHC from strata 1, and Simunye clinic, Daveyton East clinic, Tsakane clinic, Payneville clinic, Nigel clinic and Springs clinic, from strata 2. Among the sampled facilities, the Researcher only works in Phillip Moyo CHC occasionally.

The ratio of the population of strata one to strata two is 1 to 2.7, which is reflected in the sampling of individuals. Hence, 109 participants will be chosen from strata 1 and 293 from strata 2. Therefore, the sample of facilities and participants is proportionate to the population of the facilities and participants, respectively. The sampling frame for both strata is shown in Table 2.1 and 2.2 below.

Serial number	Strata 1 facility names	Population of Adults receiving ART at facility	Sample of Adults receiving ART at facility	Average number attending clinic per day	Target number sampled in clinic per day over 4 weeks
1	Daveyton Main Clinic	9,342			
2	Phillip Moyo CHC	4,676	109	38	7
3	Kwa-Thema CHC	3,789			
4	Nokuthela Ngwenya CHC	5,463			
	Total	23,270	109		

At each health facility, balloting method will be used to recruit the participants. All persons meeting the inclusion criteria and that give consent, will each be allowed to pick from a basket containing folded papers with equal number of “Yes” and “No”. Those that pick “Yes” will be included in the study. This will take place in all the sampled facilities until 402 participants are recruited.

Table 2.1: Strata 1 sampling frame

Table 2.2: Strata 2 sampling frame

Serial number	Strata 2 facility names	Population of Adults receiving ART at facility	Sample of Adults receiving ART at facility	Average number attending clinic per day	Target number sampled in clinic per day over 2 to 4 weeks
1	Barcelona Clinic	3,120			
2	Brakpan Clinic	2,621			
3	Calcot Dhlephu Clinic	2,328			
4	Daveyton East Clinic	4,404	69	28	10
5	Daveyton Ext Clinic	2,160			
6	Emaphupheni Clinic	2,814			
7	Geluksdal Clinic	1,927			
8	Joy Clinic	2,518			
9	Phuthanang Clinic	2,067			
10	Simunye Clinic (Brakpan)	2,734	43	25	10
11	Tsakane Clinic	3,766	59	34	10
12	Tsakane Ext 10 Clinic	2,307			
13	Alra Park Ext 3 Clinic	1,336			
14	Andries Raditsela Clinic	3,241			
15	Duduza Clinic	2,058			
16	Lucky Mkhwanazi Clinic	1,472			
17	Nigel Clinic	1,730	27	20	6
18	Payneville Clinic	2,288	36	25	10
19	Reedville Clinic	1,919			
20	Sead Clinic	1,946			
21	Selope Thema Clinic	2,381			
22	Slovo Park Clinic	1,193			
23	Sonto Thobela Clinic	1,956			
24	Springs Clinic	3,765	59	30	10
25	Thembelisha Clinic	1,675			
26	White City Clinic	2,255			
	Total	61,981	293		

2.5 Inclusion criteria:

All persons ≥ 18 years living with HIV in the public primary healthcare facilities in ESDR are included in the study.

2.6 Exclusion criteria

Persons unable to give consent, such as persons with intellectual disability, will be excluded from the study. Also, every patient presenting with a medical emergency will be excluded.

2.7 Measurement instrument

The researcher developed a questionnaire that incorporates other previously validated tools, such as the PHQ-9 and the GAD-7, to achieve the objectives of the study. This questionnaire will be validated. The content validity of the instrument will be ensured by having it reviewed by a Family Physician and a Psychiatrist. The instrument will also be administered to twenty persons living with HIV (5% of study sample size) to ensure it is clearly understood. This will ensure face validity. Also, the principal investigator and another healthcare worker will each administer ten questionnaires to the group of PLHIV. The Kappa statistic will then be calculated to determine the inter-rater reliability with a value ≥ 0.8 considered optimal [43]. A person fluent in Isi-Zulu and English language will assist in translation of the content of the instrument to participants during administration of the questionnaire. Both assistants have an obligation to confidentiality by means of their professional registrations and agreement forms which they will sign prior to the commencement of the study.

The questionnaire is divided into 5 parts. The first part contains sociodemographic and clinical variables of participants. The second part contains questions directed to the participant assessing if they have been screened for CMDS in the last two clinic visits. Notes on their files showing that they have been screened for CMDs will also be entered into the questionnaire. The third part contains the PHQ-9 score, while the

fourth part contains the GAD-7 score. The PHQ-9 and GAD-7 have been validated in primary care and in local South African languages, including Isi-Zulu [37,38,39,40]. Lastly, the 5th part will adopt a “Yes” or “No” response to each of the 11 DSM 5 criteria for the diagnosis of SUD, which is the gold standard for diagnosis. An affirmative response to 2 or 3 of the criteria indicates a mild SUD; four or five criteria indicate a moderate SUD, and 6 or more criteria indicate a severe SUD [12]. This will be administered for each substance used. The copyrights for the PHQ-9 and the GAD-7 is owned by Pfizer Inc, and both questionnaires are publicly available and free to use without permission [41,42]. Scores of ≥ 9 for PHQ-9, ≥ 8 for GAD-7, and the DSM 5 substance use disorder criteria (≥ 2) will be accepted as a positive screen for depression, generalised anxiety disorder and substance use disorder, respectively.

2.8 Data collection

The 5 facilities chosen will be visited at least once a week over a 6 month period, with the aim of recruiting 10 - 16 participants per day. The researcher will approach all PLHIV meeting the inclusion criteria, and those that give consent will be given the opportunity to be involved in the process of balloting, as described above. Those that pick “yes” will be recruited into the study. Each participant will separately be taken to a room with privacy, where the questionnaire will be administered.

2.9 Pilot study

A pilot study will be conducted to determine feasibility of study and potentially improve on its design. It will further expose potential logistical problems that may be encountered during the study, as well as, determine if the analytical techniques are adequate. It will also aid in determining the validity and reliability of the instrument. The

pilot sample will not be incorporated into the main research cohort but findings of the pilot study will be described in the final report. The pilot study will be conducted at Daveyton Main clinic; a similar PHC facility, not selected for the study.

2.10 Sources of bias

Possible sources of bias for this study a recall bias, where participants might be unable to recall the answers to some of the questions that are asked. Also, patients with severe symptoms of CMDs may not come to the clinic or may not give consent to participate in the study. This may result in an underestimation of the prevalence of these problems. Reducing this bias may require the investigator to explain the importance of the study in more detail. There may also be desirability bias where participants give responses they feel will be pleasing to the researcher. This will be reduced by asking non-leading questions. Translation bias will be reduced by ensuring only a person fluent in English and Isi-Zulu will assist with direct translations.

2.11 Limitations of study

The study may be limited by time and availability of resources to conduct a detailed mental health interview or laboratory investigations to exclude other medical conditions.

2.12 Data analysis

The data collected will be analyzed using the latest versions of Microsoft Excel and STATA software. The data will first be coded and entered into Microsoft Excel and imported into the STATA software to generate descriptive and inferential statistics, including determining the distribution of variables using Shapiro-wilk test. During data cleaning, duplicate entries will be identified and removed.

The proportion of those that have been screened for mental health problems will be calculated by determining the percentage of those who respond positively to questions probing if they have been screened for mental health problems in the last two clinic visits, in the questionnaire. The analytical methods are depicted in the table below.

Objective	Analytical methods	Example
1. Socio-demographic profile	• Continuous variables will be summarized as percentages, and means with standard deviations (where normally distributed), and interquartile range (IQR) if not normally distributed • Categorical variables will be summarized as frequencies and proportions	• Mean age • Proportion e.g Sex – percentage of male and females
2. Percentage screened for CMDs	• Those that respond yes to being screened for CMD over the last 2 clinic visits (X) divided by total sample (N), and multiplied by 100	• Percentage screened for CMDs using questionnaire = X/N x 100
3. Percentage with Depression	• Number that score ≥ 9 on PHQ-9 (X) divided by total sample size (N), and multiplied by 100	• Percentage with Depression = X/N x 100
4. Percentage with GAD	• Number with GAD score ≥ 8 (X) divided by total sample size (N), and multiplied by 100	• Percentage with GAD = X/N x 100
5. Percentage with SUD	• Number with DSM 5 SUD score ≥ 2 or mild (Xa), ≥ 4 or moderate (Xb) and ≥ 6 or severe (Xc) divided by total sample size, and multiplied by 100	• Percentage with SUD = Xa/N x 100 • Percentage with SUD = Xb/N x 100 • Percentage with SUD = Xc/N x 100
6. Factors associated with the presence of CMDs, Depression, GAD and SUD	• 2 Categorical variables (e.g: sex) versus percentage with better scores • 1 continuous (e.g age) and 1 categorical (percentage with better scores) –	• e.g sex versus percentage with better scores) – Chi-square or Fischer's exact to assess for association • Paired T-test (normal) or Wilcoxon signed rank test (non-normal)

	• Build a model using simple and multivariate logistic regression to further check for association. Those with p-values > 0.2 in the simple logistic regression will be included in the multivariate analysis. Adjusted and unadjusted ratios will be reported	

Estimates used will be a 95% confidence interval (CI), and a p-value of < 0.05 will be considered significant. The results will be summarised in the form of tables, graphs and charts.

2.13 Ethical considerations

2.13.1 Informed consent

The procedures for the study will be explained to each potential participant, and a signed informed consent will be obtained from each participant, with a clear explanation that they are free to withdraw from the study at any time during the study, and confidentiality will be maintained always. The informed consent form and participant information sheet is attached in the appendices.

2.13.2 Confidentiality

To ensure the confidentiality of participants are maintained, only coded patient identifiers will be entered into the questionnaire. The code will use the first 2 words of the patients name and surname, along with the age. An identifier record book linking the participants to the code and the completed questionnaire will be kept in a safety box only accessible to the researcher and supervisor. All responses provided by patients will be kept confidential from clinic staff and other third parties, so that participants may not be penalized on the basis of responses provided.

2.13.3 Beneficence and non-maleficence

All participants who screen positive for any of the CMDs, have suicidal ideation, intent, plans, or have a severe emotional response, will be referred appropriately for further treatment. This referral may be to the Family physician, Psychologist, Community Psychiatrist or their Registrars, Psychiatric Nurse or Social workers, responsible for the facility. These possible referrals will be discussed with facility managers and Unit leaders.

Research findings will be presented to the clinic management, if requested.

2.13.4 Permissions to conduct study and ethical clearance

Permission to conduct the study will be obtained from the Ekurhuleni Health District manager. The protocol will then be submitted to the Human Research Ethics Committee (HREC) of the Wits School of Health Sciences to obtain Ethical Certificate. Approval will then be obtained from the Gauteng Department of Health (GDoH) and the Ekurhuleni Health District Ethics Committee to conduct the study.

Research Plan

	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2020	Jan – Jun 2021	July 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021
Literature review												
Preparing protocol												
Protocol assessment												

Ethics application												
Collecting data												
Data analysis												
Writing up – thesis												
Writing up – paper												

Estimated budget

Item	Quantity	Unit Cost	Total Cost
Editing of Protocol	20 pages	R17	**R 340.00**
Editing of Thesis	60 pages	R17	**R 1,020.00**
Printing of Protocol	20 pages	R1	**R 20.00**
Printing of Thesis	60 pages	R1	**R 60.00**
Printing of Questionnaires	6 pages x 420 questionnaires	R1	**R 2,520.00**
Total			**R 3,960.00**

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