

# BMJ Open Depressive symptoms among people with HIV/AIDS in Northwest Ethiopia: comparative study

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**To cite:** Mekonen T, Belete H, Fekadu W. Depressive symptoms among people with HIV/AIDS in Northwest Ethiopia: comparative study. *BMJ Open* 2021;**11**:e048931. doi:10.1136/bmjopen-2021-048931

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-048931>).

Received 12 January 2021

Accepted 16 June 2021

## ABSTRACT

**Objectives** The objective of this study was to compare depressive symptoms among people with HIV/AIDS and the general population sample. We also assessed the factors associated with depressive symptoms.

**Design** A comparative cross-sectional study was conducted.

**Settings** Antiretroviral therapy clinics in three primary healthcare facilities and semi-urban area in Northwest Ethiopia.

**Participants** A total of 1115 participants (558 people with HIV/AIDS and 557 comparison group) aged 18 years and above were recruited. A total of 1026 participants (530 people with HIV/AIDS and 496 comparison group) completed the interview. We excluded people with known HIV-positive status from the comparison group.

**Outcome measure** Patient Health Questionnaire (PHQ-9) was used to assess depressive symptoms. The proportion of depressive symptoms was compared between samples of the general population and people with HIV/AIDS using  $\chi^2$  statistics. Multivariable logistic regression analysis was done to examine the associated factors.

**Results** The overall prevalence of depressive symptoms was 13.3% (11.2%–15.4%). The prevalence was significantly higher in people with HIV/AIDS compared with the community sample (16.6% vs 12.3%),  $p=0.001$ . The difference was also significant in the multivariable logistic regression (OR 1.7). For the overall sample, depressive symptoms were significantly associated with older age, being single, divorced/widowed marital status, and poor social support.

**Conclusions** Depressive symptoms were higher in people with HIV/AIDS compared with the general population. It is necessary to include mental healthcare and screening for depression in routine HIV/AIDS care.

## INTRODUCTION

HIV/AIDS continues to be a global public health threat with more than 75 million infections and 32 million AIDS-related deaths since the start of the epidemic.<sup>1,2</sup> On the other hand, depression is also a major public health issue and has been considered as a global crisis because of its high contribution to the disease burden, high comorbidities with other medical conditions and associated disabilities.<sup>3,4</sup> The comorbidity of depression and HIV/AIDS is common that ranged between

## Strengths and limitations of this study

- Having a comparison group is one of the strengths of this study.
- Matching of variables between the study and comparison group was not employed.
- We were not able to exclude those who are HIV positive but who did not know their status in the comparison group.
- Due to the cross-sectional nature of the study, we cannot report causal relationships.

12% and 63%.<sup>5–7</sup> This was more pronounced in low resource settings, particularly in sub-Saharan Africa.<sup>8,9</sup> A global systematic review and meta-analysis also reported that 31% of people with HIV/AIDS had depression.<sup>10</sup> The prevalence of depression in people with HIV/AIDS has been reported as at least twice that of the general population.<sup>5,11</sup> The comorbidity between depression and HIV/AIDS has significant consequences in reducing antiretroviral therapy (ART) response that leads to poor quality of life.<sup>12–14</sup>

The magnitude of depression among HIV/AIDS patients is disproportionately high and its effect is mostly associated with poor disease progress and poor quality of life. This comorbidity is associated with multiple factors including sociodemographic, psychosocial and clinical factors.<sup>15–18</sup> For instance, people living with HIV who received ART without HIV counselling and testing services are more likely to develop depression.<sup>19</sup> Female gender and recent negative life events are also known contributors to depression in patients with HIV/AIDS.<sup>20</sup> However, depression remains underdiagnosed in people with HIV/AIDS.<sup>21</sup>

Depression can be prevented and treated with available resources at the primary care level. This can be achieved by early detection of depression and identifying important factors associated with depression. To prevent and manage depression in HIV/AIDS, the most important contributing factors need to



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be explored. Despite the high prevalence and negative consequences of depression among HIV-positive individuals, there is substandard care for depression in most low-income countries' HIV care programmes.<sup>22–24</sup>

In Ethiopia, the prevalence of depression was reported 14.6%–48.6% among people living with HIV/AIDS<sup>25–27</sup> and 9.1% in the general population.<sup>16</sup> However, there was no study that compares depression in HIV-positive people and general population. It is important to see if there is any significant difference in prevalence and possible modifiable factors of depressive symptoms between HIV-positive people and the general population. Therefore, the objectives of this study were:

1. To assess the level of depressive symptoms among HIV-positive individuals in the ART clinic compared with the general population.
2. To identify factors associated with depressive symptoms in HIV-positive people and the general population.

## METHODS AND MATERIALS

### Study design and setting

A comparative cross-sectional study was conducted in Mecha Demographic Surveillance and Field Research Center (MDSFRC). The site is located in Mecha district, Northwest Ethiopia, which is 540 km away from Addis Ababa. MDSFRC is one of the newly established research centres in Bahir Dar University. We recruited people with HIV/AIDS from the adult ART clinics in the district and the comparisons from the general population.

### Participants

People living with HIV/AIDS aged 18 years and above (69.8% female) in the adult ART clinics of the district were included in the study group. For the general population comparison group, adult residents of Merawi town (a town in Mecha district) aged 18 years and above (48.4% female) who resided for at least 6 months were included. In the comparison group, individuals with known HIV-positive status were excluded.

### Data collection and procedures

Data collection was conducted through face-to-face interviews by trained data collectors in March 2018. Clinical data were retrieved from the participants' medical records. Participants were assured of confidentiality and the anonymity of the questionnaire. Supervisors and data collectors counterchecked the questionnaire every day for its completeness. Sample size was calculated using Epi Info by considering 80% power, 95% CI, 9.1% depression in the general population,<sup>16</sup> 14.9% depression in HIV-positive people,<sup>28</sup> 10% non-response rate, and 1:1 ratio of the study and comparative groups to detect 1.7 odds of depression in the study group. The final sample size was 1115 (558 people with HIV/AIDS and 557 comparison group).

In the community comparison group, we selected administrative villages from Merawi town by multi-stage sampling method. We randomly selected the households

from the administrative villages using the registration of MDSFRC. We selected one participant using lottery method for those households with more than one eligible participant. For the study group, around 1200 individuals were estimated to attend their ART follow-up during the data collection period. We used a systematic random sampling method to select participants in every two individuals based on their appointment from the ART clinic registration logbook.

### Variables and measurements

We measured depressive symptoms by Patient Health Questionnaire-9 (PHQ-9). PHQ-9 is a tool with nine items and validated in the Ethiopian population with good psychometric properties (86% sensitivity and 67% specificity at cut-off point 10).<sup>29</sup> Severity of depressive symptoms were also described based on PHQ-9 score (0–4=no depressive symptoms, 5–9=mild depressive symptoms, 10–14=moderate depressive symptoms, 15–19=moderately severe symptoms, 20+=severe depressive symptoms).<sup>30</sup> The tool also had good reliability in the current study (Cronbach's alpha=0.79). We have used PHQ-9 at cut-off score of 10 to identify depressive symptoms that require clinical intervention (moderate to severe depressive symptoms).

The independent variables were:

- ▶ Sociodemographic variables: sex, age, marital status, educational status and perceived relative income.
- ▶ Psychosocial variables: social support, problematic alcohol use and khat chewing
- ▶ HIV-related variables: CD4 level, duration of HIV-positive status and ART use, ART regimen, and presence of opportunistic infections

Social support was assessed using Oslo Social Support Scale (OSSS-3), a three-item scale which has a sum score that ranges from 3 to 14 (poor social support=3–8, intermediate social support=9–11, strong social support=12–14).<sup>31</sup> Perceived general quality of life was assessed by asking the participants to rate their quality of life, adapted from WHO's quality of life assessment tool.<sup>32</sup> Relative wealth of the participants was assessed by asking what they perceived about their wealth in relation to others in their neighbourhood.<sup>33</sup> Problematic alcohol use was assessed by Alcohol Use Disorder Identification Test–Consumption (AUDIT–C) which is a three-item scale with 72% specificity and 86% sensitivity for men, and 94% specificity and 66% sensitivity for women.<sup>34 35</sup>

### Analysis

Data entry was done with Epi Info V.7 and analysis was done with SPSS V.21. Chi-squared test was used to compare simple frequencies in between groups. We ran univariate logistic regression for each variable to select variables ( $p < 0.2$ ) for the final model.<sup>36</sup> Multivariable logistic regression analysis was done to identify the associated variables. The strength of associations was indicated by OR with a 95% CI. Variables with  $p$  values  $< 0.05$  were considered as statistically significant.

**Table 1** Sociodemographic characteristics of the respondents (N=1026)

Variables		Sample type			P value ( $\chi^2$ )
		Community sample n (%)	ART clinic sample n (%)	Overall N (%)	
Sex	Male	256 (51.6)	160 (30.2)	416 (40.5)	<0.001
	Female	240 (48.4)	370 (69.8)	610 (59.5)	
Age	<25 years	109 (22)	22 (4.1)	131 (12.8)	<0.001
	25–44 years	305 (61.5)	382 (72.1)	687 (66.9)	
	Above 44 years	82 (16.5)	126 (23.8)	208 (20.3)	
Family size	One (alone)	100 (20.2)	124 (23.4)	224 (21.8)	0.29
	Two to five	352 (70.9)	369 (69.6)	721 (70.3)	
	More than five	44 (8.9)	37 (7)	81 (7.9)	
Family income compared with others	Better	20 (4)	13 (2.5)	33 (3.2)	<0.001
	Average	257 (51.8)	138 (26)	395 (38.5)	
	Poor	219 (44.2)	379 (71.5)	598 (58.3)	
Marital status	Married	276 (55.6)	235 (44.3)	511 (49.8)	<0.001
	Single	155 (31.3)	47 (8.9)	202 (19.7)	
	Divorced	47 (9.5)	188 (35.5)	235 (22.9)	
	Widowed	18 (3.6)	60 (11.3)	78 (7.6)	
Education	Unable to read and write	138 (27.8)	165 (31.1)	303 (29.5)	0.2
	Informal education	61 (12.3)	79 (14.9)	140 (13.6)	
	Elementary school	99 (20)	103 (19.4)	202 (19.7)	
	Secondary school	126 (25.4)	106 (20)	232 (22.6)	
	College and above	72 (14.5)	77 (14.5)	149 (14.5)	

ART, antiretroviral therapy.

## RESULTS

### Socio-demographic characteristics of the participants

From the total of 1115 participants, 1026 (496 from the general population and 530 from the ART clinics) agreed to participate in the study. The reasons for non-response were lack of time to complete the interview (n=47), no interest to participate (n=23) and withdrew from the interview without giving reason (n=19). The mean age of participants was 38.85 years (SD  $\pm$ 10.72) and most of them were in the age group of 25–44 years. The overall divorce and widow rates were 22.9% and 7.6%, respectively. This is significantly higher in the HIV-positive sample (35.5% and 11.3%) as compared with the community sample (9.5% and 3.6%),  $p < 0.001$  (table 1).

### Psychosocial and related characteristics

Khat (*Catha edulis*, evergreen, psychoactive leaf which is commonly cultivated in East Africa) was chewed by 6% of participants (9.5% in the community sample and 2.8% in the HIV sample);  $p < 0.001$ . The HIV-positive participants reported relatively good social support as compared with the community participants (table 2).

### HIV and other related characteristics of HIV-positive participants

The median duration since HIV status determined was 84 months (IQR 60 months) with a minimum of 2 months and a maximum of 159 months. The median duration since ART started was 60 months (IQR 60 months) with a minimum of 1 month and a maximum of 144 months. The commonly prescribed ART regimens were 1e and 1c, and opportunistic infections in the last 1 month prior to the data collection time were reported by 12 (2.3%) of participants (table 3).

### Prevalence and associated factors of depressive symptoms

The overall prevalence of depressive symptoms was 13.3% (11.2%–15.4%). The prevalence was significantly higher in people with HIV/AIDS, 16.6% (13.4%–19.8%) as compared with the community sample, 9.7% (7.1%–12.3%),  $p = 0.001$ . Variables significantly associated with depressive symptoms were older age (adjusted OR (AOR) 2.3, 95% CI 1.1 to 5.1), HIV-positive sample (AOR 1.7, 95% CI 1.1 to 2.6), being single (AOR 1.9, 95% CI 1.1 to 3.5), divorced/widowed (AOR 2.3, 95% CI 1.5 to 3.5) and poor social support (AOR 3.9, 95% CI 1.7 to 9.8) (table 4).

**Table 2** Psychosocial factors of the participants (N=1026)

Variables		Sample type			P value ( $\chi^2$ )
		Community sample n (%)	ART clinic sample n (%)	Overall N (%)	
Khat chewing	Never	449 (90.5)	515 (97.2)	964 (94)	<0.001
	Yes	47 (9.5)	15 (2.8)	62 (6)	
Problematic alcohol use	No	427 (86.1)	501 (94.5)	928 (90.4)	<0.001
	Yes	69 (13.9)	29 (5.5)	98 (9.6)	
Social support	Poor support	259 (52.2)	215 (40.6)	474 (46.2)	<0.001
	Intermediate support	201 (40.5)	246 (46.4)	447 (43.6)	
	Strong support	36 (7.3)	69 (13)	105 (10.2)	
Depressive symptoms	None/mild	448 (90.3)	442 (83.4)	890 (86.7)	0.001
	Moderate	23 (4.6)	62 (11.7)	85 (8.3)	
	Moderately severe	21 (4.2)	24 (4.5)	45 (4.4)	
	Severe	4 (0.8)	2 (0.4)	6 (0.6)	

ART, antiretroviral therapy.

## DISCUSSION

This study reported that the prevalence of moderate to severe depressive symptoms is significantly higher in HIV-positive participants (16.6%) compared with the general population sample (9.7%). This variation was also indicated in the multivariable logistic regression analysis where the odds of depressive symptoms in people with HIV/AIDS was 1.7 times higher than the community sample. The additional burdens in HIV-positive participants including opportunistic infections, ART drug side effects and lower level of CD4 count (54.5% of HIV-positive participants have less than 500 CD4) may contribute to this increased prevalence of depressive symptoms in the HIV-positive sample. The finding is

in line with the Chinese study (18.33%),<sup>37</sup> higher than Ugandan (8.1%) and US (12.2%)<sup>38 39</sup> studies, and lower than the Cameroon study (26.7%) and other sub-Saharan countries (26%–28%).<sup>40–42</sup>

Multiple conditions including HIV-related stigma,<sup>43–45</sup> poor adherence to antiretroviral therapy<sup>46–48</sup> and the direct effect of the virus<sup>49</sup> are possible reasons for the excess odds of depressive symptoms in HIV-positive individuals. New perspectives towards non-medical services and resource allocation,<sup>50</sup> and interventions focusing on reduction of risk behaviour and social stigma would decrease the prevalence of depressive symptoms in HIV-positive individuals.<sup>51</sup> The advancements in HIV prevention and treatment are becoming promising in ending

**Table 3** HIV-related factors of the ART clinic participants (n=530)

Variables		Depressive symptoms		P value ( $\chi^2$ )
		No n (%)	Yes n (%)	
Duration since knowing HIV status	Less than 5 years	132 (24.9)	19 (3.6)	0.1
	5 years and above	310 (58.5)	69 (13)	
Duration of ART	Less than 5 years	191 (36)	33 (6.2)	0.3
	5 years and above	251 (47.4)	55 (10.4)	
ART drug regimen	1c	166 (31.3)	35 (6.6)	0.8
	1d	54 (10.2)	13 (2.4)	
	1e	197 (37.2)	36 (6.8)	
	1f	25 (4.7)	4 (0.8)	
Opportunistic infections	Yes	4 (0.8)	8 (1.5)	<0.001
	No	438 (82.6)	80 (15.1)	
CD4 level	Less than 500	228 (43)	61 (11.5)	0.002
	500 and above	214 (40.4)	27 (5.1)	

1c=zidovudine (AZT)+lamivudine (3TC)+nevirapine (NVP); 1d=AZT+3TC+efavirenz (EFV); 1e=tenofovir (TDF)+3TC+EFV; 1f=TDF+3TC+NVP. ART, antiretroviral therapy.

**Table 4** Factors associated with depressive symptoms (N=1026)

Variables		Depressive symptoms		AOR (95% CI)	P value
		No	Yes		
Sample type	Community sample	448	48	1	0.01
	ART clinic sample	442	88	<b>1.7 (1.1 to 2.6)</b>	
Sex	Male	370	46	1	0.84
	Female	520	90	0.9 (0.6 to 1.5)	
Age	Less than 25 years	117	14	1	0.87
	25–44 years	609	78	1.1 (0.5 to 2.1)	
	45 years and above	164	44	<b>2.3 (1.1 to 5.1)</b>	
Khat chewing	Never	835	129	1	0.84
	Yes	55	7	0.9 (0.4 to 2.1)	
Marital status	Married	467	44	1	0.03
	Single	177	25	<b>1.9 (1.1 to 3.5)</b>	
	Divorced/widowed	246	67	<b>2.3 (1.5 to 3.5)</b>	
Problematic alcohol use	No	805	123	1	0.59
	Yes	85	13	1.2 (0.6 to 2.3)	
Social support	Poor support	393	81	<b>3.9 (1.7 to 9.6)</b>	0.002
	Intermediate support	398	49	2.4 (0.96 to 5.7)	
	High support	99	6	1	
Perceived quality of life compared with others	Poor	443	90	1.4 (0.8 to 2.4)	0.19
	Not good–not bad	13	21	1.8 (0.9 to 3.3)	
	Good	316	25	1	

Bold values indicate statistically significant association. AOR, adjusted OR; ART, antiretroviral therapy.

the HIV epidemic. However, this might be difficult to achieve without addressing depression and other mental health issues in HIV/AIDS care.

Marital status, age and social support were important factors associated with depressive symptoms in the overall sample of this study. The odds of depressive symptoms in single and divorced/widowed participants was nearly twofold as compared with their married counterparts. Marital tragedies are the most stressful events<sup>52</sup> that can lead to a sense of insecurity and hopelessness. The odds of having depressive symptoms at the age of 45 years and above was more than twofold as compared with those with younger age (25 years and below). Poor social support is also strongly and positively associated with depressive symptoms in which participants with poor social support were about four times more likely to have depressive symptoms compared with participants with high social support. Social interaction between family members and the family's ability to react positively to life changes are important to reassuring individuals and maintaining social cohesion.<sup>53</sup> On the other hand, if this social connectedness gets loose, the individual might feel lonely and depressed. This finding is supported by the study in Ethiopia and other sub-Saharan countries.<sup>41 54</sup>

In general, this study provided evidence about depressive symptoms in patients with HIV/AIDS by comparing it

with the general population. In the current study, gender, perceived quality of life compared with others, and substance use (khat chewing and alcohol do not involve intravenous administration) were not statistically significant. However, recent finding indicates HIV-positive individuals with drug injection were more likely to have depression.<sup>55</sup>

### Limitations

The study has some limitations to take into consideration in interpretations of the result. The first limitation is with matching. It would have been better if we did a matching of important variables for depression such as sex and age in both groups. The other potential limitation is that we did not conduct HIV testing in the general population comparison group to exclude those with positive HIV test results. Although we excluded those who reported their HIV-positive status in the comparison group, we were not able to exclude those who are HIV positive but who did not know their status.

### CONCLUSIONS

Depressive symptoms are significantly higher in people with HIV/AIDS compared with the general population. The higher prevalence of depressive symptoms in people

with HIV/AIDS is an important public health issue that urges the incorporation of mental healthcare and depression screening in routine HIV/AIDS care.

**Acknowledgements** We are very thankful to the study participants for their volunteer participation and Bahir Dar University for the financial support.

**Contributors** All authors (TM, HB and WF) equally contributed from the conception to the completion of this project.

**Funding** This research was supported by Bahir Dar University via Mecha Demographic Surveillance and Field Research Centre, grant number (not applicable).

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not required.

**Ethics approval** Ethical clearance was obtained from the College of Medicine and Health Sciences ethical review committee of Bahir Dar University. Formal permission letter was obtained from the University and local administration. Participants were informed about the purpose of the study, confidentiality and their rights to withdraw from the interview at any time they want. Informed consent was obtained from each participant. To maintain confidentiality, the questionnaire was anonymous, and the data were kept in a secure place.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** The data related to this research will be available on reasonable request.

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