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Depressive Symptoms among Caregivers of Children Living with HIV/AIDS in Northeast Ethiopia: A Multi-Centre Cross-sectional study of prevalence and associated factors

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Abstract

Background: Caregivers of children living with HIV frequently experience depressive symptoms, with prevalence ranging from 28% to 83% across Sub-Saharan Africa. However, the prevalence and associated factors of depressive symptoms among caregivers of children living with HIV in Ethiopia remain poorly documented. This study aimed to assess the prevalence and associated factors of depressive symptoms among caregivers of children living with HIV/AIDS in Northeast Ethiopia.

Methods: A multicentre cross-sectional study was conducted among consecutively selected caregivers at three comprehensive specialized hospitals in Northeast Ethiopia. Data were collected through chart reviews and interviewer-administered standardized questionnaires. Data were analyzed using RStudio, and multivariable binary logistic regression was performed to identify factors associated with depressive symptoms. Statistical significance was declared at $p < 0.05$, and associations were assessed using adjusted odds ratios (AORs) with 95% confidence intervals (CIs).

Results: A total of 412 caregivers participated, with a response rate of 98.10%. The prevalence of depressive symptoms was 44.90% (95% CI: 40.10–49.70). Factors associated with depressive symptoms included female sex (AOR = 2.34, 95% CI: 1.33–4.16); divorced (AOR: 3.18, 95% CI: 1.28–8.00), single (AOR: 4.99, 95% CI: 2.45–10.46), and widowed marital status (AOR: 2.75, 95% CI: 1.42–5.41); minimally poor (AOR: 2.36, 95% CI: 1.08–5.17), moderately poor (AOR: 2.89, 95% CI: 1.38–6.13), and highly poor poverty index categories (AOR: 4.59, 95% CI: 1.86–11.70); death in the family (AOR: 2.31, 95% CI: 1.34–4.02); parental stress (AOR: 1.76, 95% CI: 1.02–3.04); anxiety (AOR: 2.20, 95% CI: 1.27–3.83); moderate social support (AOR: 2.97, 95% CI: 1.11–8.09); and low adaptive coping (AOR: 1.77, 95% CI: 1.05–2.99).

Conclusion: Depressive symptoms were prevalent among caregivers of children living with HIV/AIDS in Northeast Ethiopia. Demographic characteristics, poverty, bereavement, parental stress, anxiety, social support, and adaptive coping were associated with depressive symptoms. Routine screening and psychosocial support are recommended, particularly for female and unmarried caregivers and those experiencing poverty, bereavement, parental stress, or anxiety.

Keywords: Caregivers, children, HIV/AIDS, depressive symptoms, prevalence, associated factors, Ethiopia.

Background

Depression is a common mental disorder characterised by low mood and/or loss of interest for at least two weeks, accompanied by five or more additional symptoms such as change in appetite, change in sleep, fatigue, poor concentration, psychomotor changes, feelings of guilt or hopelessness, and suicidal thoughts(1, 2). According to the Global, regional, and national burden of depression, 1990–2021, the global age-standardised incidence, prevalence, and daily rates of depression increased by 15.6 %, 11.3 %, and 13.4 %, compared to 1990, Depression is the single largest contributor to global disability and causes hundreds of thousands of suicide deaths annually (3).

Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) continue to be a major global public health challenge. Globally, in 2022, approximately 1.5 million children were living with HIV/AIDS (4), The majority live in Sub-Saharan Africa (SSA) (4-7).

Caring for children living with HIV places substantial emotional, physical, social, and financial demands on caregivers, increasing their vulnerability to depressive symptoms (8, 9). Depression among caregivers can compromise their physical and mental health, reduce life satisfaction and caregiving capacity, resulting in poorer quality of care, suboptimal treatment adherence, reduced viral suppression, increased loss to follow-up, and poorer health outcomes among children living with HIV/AIDS (10, 11).

Despite advances in Anti-Retroviral Therapy (ART), HIV-related stigma, limited social support, and ongoing caregiving responsibilities continue to negatively affect caregivers' mental health (12).

Studies have reported a high prevalence of depressive symptoms among caregivers of Children living with HIV, ranging from 39% in Cuba to 60% in China (13, 14). Across SSA, studies reported a prevalence rate ranging from 28% - 83% (9, 15-22). Factors such as female sex, unmarried status, caregiver HIV-positive status, low household income, poor HIV knowledge, perceived stigma, recent family bereavement, poor illness perception, and inadequate social support (9, 15, 16, 18, 20, 21).

In Ethiopia, in 2024, an estimated 27,903 children aged 0–14 years and 33,793 adolescents aged 10–19 years were living with HIV (23). Despite the recommendation by the World Health Organisation (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) to integrate mental health services into routine HIV care to improve treatment outcomes and quality of life (24), evidence to guide such interventions among caregivers remains scarce in Ethiopia. Available evidence is largely limited to qualitative studies describing caregiving burden, stigma, and emotional distress (8, 25, 26).

This study will provide evidence on the prevalence and associated factors of depressive symptoms among caregivers in three Comprehensive Specialised Hospitals (CSHs) in East Amhara Regional State, Ethiopia, to inform evidence-based psychosocial interventions, guide policy and resource allocation, and serve as a foundation for future research.

Methods

Study setting and period

This study was conducted at three public CSHs in the Northeast Ethiopia, East Amhara Regional State: Dessie Comprehensive Specialised Hospital (DCSH), Woldia Comprehensive Specialised Hospital (WCSH), and Debre Berhan Comprehensive Specialised Hospital (DBCSH). These hospitals were selected because they provide integrated medical and psychosocial services for children; including paediatric ART clinics, psychiatric services, and routine follow-up care. The study was conducted from April 21 to May 30, 2026.

Study design and population

A multi-centre cross-sectional study was conducted among caregivers of children living with HIV/AIDS who have ART follow-up at CSHs in Northeast, Ethiopia.

Eligibility criteria

Caregivers aged 18 years or older who were caregivers of children living with HIV/AIDS who were receiving follow-up care at one of the three selected public CSHs were eligible for inclusion in the study. Caregivers who had provided care for fewer than 6 months and had not provided informed consent were excluded from this study.

Sample size determination and sampling techniques

We used the single-population-proportion formula to calculate the minimum sample size for this study. We used the prevalence estimated from a study in Kenya, which reported a 54% prevalence of depressive symptoms among caregivers of children living with HIV/AIDS, (16) a 5% margin of error, and a 95% confidence level. This yielded 382. After accounting for a 10% non-response rate, the minimum sample size for this study was calculated to be 420.

To obtain the study participants, we first allocated the sample size proportionally across the three CSHs, yielding 292 participants for DCSH, 80 for WCSH, and 48 for DBCSH. Given the relatively small source population and the absence of a complete sampling frame, participants from each hospital were selected through consecutive sampling. Eligible caregivers were contacted immediately after receiving care, consent was obtained and they were interviewed in a private place within the hospitals. We also reviewed the children's medical records for additional child-related information.

Data collection tools and procedure

Eligible caregivers were identified at the ART clinics, informed about the study, and provided written informed consent before participation. Then three trained BSc nurses collected the data through face-to-face interview in a private setting under the supervision of three BSc nurse supervisors, three trained BSc nurses collected the data through face-to-face interviews

The primary outcome of this study is depressive symptoms. We used the Patient Health Questionnaire-9 (PHQ-9), a nine-item screening tool (27). The PHQ-9 is also validated in Amharic and has been widely used in Ethiopia. In this study, participants with a score of ≥5 were considered to have depressive symptoms (28). We further classified participants as follows: 0–4, minimal or no depression; 5–9, mild depression; 10–14, moderate depression; 15–19, moderately severe depression; 20–27, severe depression. We also measured the following exposure variables and collected data from the children's medical charts.

Socio-demographic characteristics: We assessed socio-demographic characteristics, including caregiver age, sex, religion, ethnicity, marital status, relationship to the child, educational level, presence of additional caregivers, number of HIV-positive family members, number of HIV-positive children, residence, occupation, child's age, and child's sex, using a structured questionnaire.

Household food insecurity: We assessed food insecurity using the Household Food Insecurity Access Scale (HFIAS), which was categorised into four levels: food secure, mildly food insecure, moderately food insecure, and severely food insecure (29).

The scale has nine items, each with a frequency response score from 1 to 3, yielding a total of 1-27. It was validated in Amharic and has good test-retest reliability, acceptable internal consistency (“Cronbach’s alpha of 0.76 and 0.73 at the two rounds”, respectively), and a two-factor structure(30).In the regression analysis, food security status was categorized into four groups: food secure, mildly food insecure, moderately food insecure, and severely food insecure.

Household socioeconomic status: We assessed socioeconomic status using the Ethiopia Demographic and Health Survey (EDHS) wealth index. These questionnaires have eight items about household assets, housing infrastructure, housing materials, livestock, and land. The tool was adapted from the full wealth index in the EDHS (31, 32). Items were recoded as

binary variables for principal component analysis (PCA). These categorical parameters were subsequently transformed into composite economic scores via PCA. This continuous score was then divided into distinct wealth quintiles (poorest, poor, middle, rich, and richest) using the EDHS cut-off for each quintile. For regression analysis, the variable is then dichotomised into high wealth status (rich and richest) and low household wealth status (poorest, poor, middle) (31).

Poverty level: We used the Afrobarometer Lived Poverty Index to determine the poverty level of the study participants. The tool has five items, each scored from 0 to 4, and the scores are averaged to produce a continuous lived poverty index (0 = no deprivation; 4 = chronic deprivation). Respondents are then classified into four poverty levels: Non-poor (lived poverty index = 0); minimally poor (0 < lived poverty index < 1); moderately poor (1 ≤ lived poverty index < 2); and highly poor (lived poverty index ≥ 2) (33).

Perceived stigma: Perceived stigma was assessed using the HIV stigma scale. The HIV stigma scale has 13 items, each to be scored from 1 to 5, with a total score ranging from 13 to 65. In caregivers, the tool was found to have high construct validity, with the strength and difficulty questionnaires, caregiver stigma items, and adherence and viral load (34). We consider perceived HIV stigma if caregivers have a score greater than 29 (the median for this study), as advised in the validation study (35).

Social support: We used the revised Multidimensional Scale of Perceived Social Support (MSPSS) to assess social support. The MSPSS has 12 items (3-factor structure: "family, friends, significant other"), each scored from 1 to 7. The tool has excellent internal consistency, with a reliability of the total scale of 0.88 (Cronbach's alpha coefficients of 0.91, 0.87, and 0.85 for the significant Other, family, and friend's subscales, respectively). The test-retest reliability for the significant other, family, and friends subscales was r = 0.72, 0.85, and 0.75, respectively and r = 0.85 for the whole scale (36). Those who score a mean MSPSS score < 3 have low social support, 3–5 have moderate social support, and > 5 have high social support. The tool was previously used in Ethiopia and found to be feasible to apply (37, 38).

Anxiety symptoms: Anxiety symptoms were assessed using the Generalised Anxiety Disorder-7 (GAD-7) scale. The GAD-7 scale has seven items, each scored from 0 to 3, with a total score ranging from 0 to 21. GAD-7 has a sensitivity of 89% and a specificity of 82% at a cut-point of 10 or greater (39). It is widely used in Ethiopia and has been validated in

Amharic (40). In this study, caregivers who scored ≥10 were considered to have anxiety symptoms and those who scored <10 were considered to have no anxiety symptoms (40).

HIV knowledge: HIV knowledge was assessed using the Brief HIV- knowledge Questionnire-18 (HIV-KQ-18). HIV-KQ-18 has 18 true/false items with a total score ranging from 1 to 18, with scores> 9 indicating good knowledge. The tool has acceptable internal consistency (α ranging from 0.75 to 0.89 across samples), high test-retest reliability (r = 0.76 to 0.94), and concurrent validity with a 45-item HIV knowledge tool sub-scale (r = 0.93–0.97)(41). The tool was previously used in Ethiopia and found to be feasible for use (42).

Parental stress: Parental stress was assessed using the Parental Stress Scale (PSS) questionnaire. PSS has 18 items, each to be scored from 1–5, with a total score ranging from 18 to 90. The tool has very good internal consistency (α of 0.83), test-retest reliability (r = 0.81), and convergent validity with the Parenting Stress Index (r = 0.41, p < 0.01) (43). Participants who scored above 51 (the median in this study) had parental stress, as defined in the validation study (43).

Physical abuse: physical abuse was assessed using the physical assault subscale of the Revised Conflict Tactics Scale, which has 12 items, each scored from 1- 4, with a total of 12–48 (44). The tool has acceptable internal consistency (α of -0.74-0.88) and high test-retest reliability over time (r= 0.69-0.76) (44). This tool was not validated in Amharic; as a result, we followed a standard forward-backwards translation with a pre-test.

Illness perception: assessed using the Brief Illness Perception Questionnaire (BIPQ). The BIPQ has 8 items; each scored 1-10, with a total score ranging from 8 to 80. Test–retest reliability of the original BIPQ was assessed using correlation coefficients for individual items, ranging from 0.48 to 0.70 over three weeks and from 0.42 to 0.75 over six weeks (45). higher total scores indicate a more threatening or negative perception of illness. No universally accepted cut-off point has been established (45).

Coping strategies: measured using the brief Coping Orientation to Problems Experienced Inventory (COPE) scale. The brief COPE Scale consists of 28 items grouped into 14 coping dimensions (each with two items), each scored from 1 (haven't been doing this at all) to 4 (have been doing this a lot). The 14 strategies can be grouped into three higher-order coping strategies: problem-focused, emotion-focused, and dysfunctional coping (46). The tool was

previously validated in Ethiopia and found to have acceptable internal consistency (α between 0.72 and 0.74 for each subscale) and a three-factor structure, consistent with the original (47). In this study, a participant who scored ≥ 44 on the adaptive coping class score (the median in this study) was considered to have high adaptive coping, and a participant who scored ≥ 18 on the maladaptive coping class score (the median in this study) was considered to have high maladaptive coping (47).

Medication adherence: assessed using the Adherence to Refills and Medications Scale (ARMS). ARMS has 14 items, each scored from 1 (none) to 4 (all the time), with a total score range of 14 to 56; lower scores indicate good medication adherence (48).

The original 14-item scale demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.816. Item–total correlations ranged from 0.153 to 0.589. Test–retest reliability was acceptable, with a Spearman correlation coefficient of 0.693 ($p < 0.001$). However, factor analysis did not clearly support the intended two-factor structure for the original 14-item scale. The instrument was originally evaluated among patients with coronary heart disease; therefore, its psychometric properties may not be directly generalizable to caregivers of children living with HIV. The internal consistency of the 14-item scale should also be assessed in the current study population (49).

Functional status: We used the 12-item World Health Organisation Disability Assessment Schedule (WHODAS-12 2.0) to assess participants' functional status. WHODAS-12 has 12 items, each scored from 0-4, with a total score ranging from 0-48 (50). It is validated in Amharic and found to have very good internal consistency (α between 0.82 and 0.99 for each sub-scale among caregivers), convergent validity with the brief psychiatric rating scale (r between 0.20 and 0.34 for each sub-scale among caregivers), and unidimensional structure (51).

Data Processing and Analysis

Before analysis, completed Kobo forms were reviewed for completeness and consistency. The data were then coded, cleaned, and exported to Excel and R 4.5.3 (RStudio 2026) for analysis. Descriptive statistics, such as frequencies and proportions, were computed. Graphs and tables were used to summarise and present the findings. A binary logistic regression was performed to assess the association between the outcome variable and the independent

variables. Variables with p-values < 0.25 in the bivariable binary logistic regression were selected for the multivariable analysis. A multivariable binary logistic regression model was constructed to explore the relationship between the independent variables and the dependent variable. In the final model, variables with p-values < 0.05 were reported as significantly associated with depressive symptoms. To assess the strength of the association, the adjusted odds ratio (AOR) with a 95% confidence interval (CI) was reported.

To assess the multicollinearity assumption, the variance inflation factor (VIF) was calculated. A cut-off score of >5 was used to declare multicollinearity. Model fit was evaluated using the Hosmer-Lemeshow goodness-of-fit test, and the explanatory power of the independent variables was assessed using pseudo-R2 (McFadden R^2 and Nagelkerke R^2) coefficient

Results

Description of the participant's characteristics

Among the 420 caregivers contacted, 412 participated in the study, yielding a response rate of 98.1%. The main reason for no respondents was time constraint.

Socio-demographic characteristics

The minimum and maximum ages of the caregiver were 20 and 60 years, respectively. The median age of the caregiver was 38 (IQR: 32.00-45.25) years; about 65.78% (n=271) were female, 50.24% (n=207) were housewives, and 58.25% (n=240) had no formal education. In terms of wealth status, nearly two-thirds were in the high-wealth category (59.47%, n=245), and 30.83% (n=127) reported sever food insecurity. Around 50.24 %(n=207) caregivers are non-poor. Seven in ten of the children given care (70.63%, n=291) were aged between 6 and 12 years, with a median age of 10 (8-12) years [Table 1].

Table 1: Socio-demographic and economic characteristics of caregivers of children living with HIV/AIDS who have follow-up at CSHs of East Amhara, Ethiopia, 2026 (n=412).

Variable	Characteristic	Frequency (n=412)	Per cent (%)
Caregiver age	18-34	142	34.47

	31-55	225	54.61
	>55	45	10.92
Caregiver sex	Female	271	65.78
Residence	Urban	223	54.13
Religion	Orthodox	231	56.07
	Muslim	164	39.80
	Protestant	17	4.13
Ethnicity	Amhara	328	79.61
	Tigray	42	10.19
	Oromo	35	8.50
	Afar	7	1.70
Occupation	Daily laborer	51	12.38
	Employed	39	9.47
	Farmer	32	7.77
	Housewife	207	50.24
	Merchant	66	16.02
	Student	17	4.12
Educational status	No formal education	240	58.25
	Primary education (1-8)	28	6.80
	Secondary education (9-12)	76	18.45
	College and above	68	16.50
Marital status	Married	181	43.93

	Single	85	20.63
	Divorced	42	10.19
	Widowed	104	25.25
Death of family member in the past 12 month	Yes	163	39.56
Relation to child	Parent	279	67.72
	Adoptive parent	8	1.94
	Aunt/Uncle	26	6.31
	Sibling	55	13.35
	Grandparent	44	10.68
No of HIV positive family member	>=2	326	79.13
No of children with HIV in the families	>=2	86	20.87
Presence of additional caregiver	Yes	182	44.17
Primary caregiver	Yes	392	95.15
Year of caregiving experience	>5 year	302	73.30
Child sex	Female	249	60.44
Child age in year	0–5	28	6.80
	6-12	291	70.63
	>12	93	22.57
Food insecurity	Food secured	212	51.46

	Mild food insecurity	46	11.16
	Moderate food insecurity	27	6.55
	Sever food insecurity	127	30.83
Wealth status	Lower wealth status	167	40.53
Lived poverty index	Non- poor	207	50.24
	Minimally -poor	59	14.32
	Moderately- poor	96	23.30
	Highly- poor	50	12.14

Caregiver and child clinical characteristics

Clinical characteristics

In this study, more than two-thirds of the caregivers (70.87 %, n= 292) knew their HIV positive status, and about 15.05 % (n= 62) had a comorbid health problem. Regarding functional disability, (38.11%, n= 157) caregivers of children living with HIV reported that they had functional disability, as measured by the WHO Disability Assessment Schedule 2.0. Nearly half of the caregivers (48.30%, n = 199) reported that health care workers were sometimes present on time, and more than half of the caregivers (57.28%, n = 236) experienced a waiting time of 30–60 minutes at the health facility. A substantial proportion of caregivers (56.55%, n = 233) reported that the cost of healthcare for their children posed a big problem (Table 2).

Table 2: Clinical and health service-related characteristics among caregivers of children living with HIV/AIDS who have follow-up at CSHs of East Amhara, Ethiopia, 2026 (n=412).

Variable	**Characteristic**	**Frequency (n=412)**	**Percent (%)**
Caregiver HIV status	HIV negative	110	26.70
	HIV positive	292	70.87
	Unknown	10	2.43
Caregiver years since knowing HIV+ status	>5 years	243	83.22
Partner HIV status	HIV negative	65	15.78
	HIV positive	146	35.43
	No partner	109	26.46
	Unknown	92	22.33
Partner year since know HIV + status	>5 years	116	79.45

Health problem	No	350	84.95
WHODAS 2.0 disability status	Not disabled	255	61.89
Health care worker present on time	Always	192	46.60
	Sometimes	199	48.30
	Rarely	21	5.10
Caregivers waiting time	<30 min	93	22.57
	30-60 min	236	57.28
	>60 min	83	20.15
Usual mode of transport	Public transport	321	77.91
	Private vehicle	23	5.58
	Walking	68	16.51
Transportation birr	<100 birr	90	21.84
	100-500 birr	296	71.85
	>500 birr	26	6.31
Child health care cost problem	Not a problem	113	27.43
	Small problem	66	16.02
	Big problem	233	56.55
Struggle to get money for transport	Not at all	108	26.21
	Somewhat	83	20.15
	I struggle alone	221	53.64
Time taken from home	≤30 min	188	45.63

to health facility	31–60 min	179	43.45
	>60 min	45	10.92

The median medication adherence score among children was 19 (IQR: 17-29), and the median viral load was 456 copies/mm3 (IQR: 96.00-1030.00 copies/mm3). Regarding HIV status, 41.02% (n= 169) of children knew their HIV status, and currently half of the children were on WHO-T stage I (50.24 % (n= 207)) (Table 3).

Table 3: Clinical characteristics of children living with HIV/AIDS who have follow-up at CSHs of East Amhara, Ethiopia, 2026 (n=412).

Variable	**Characteristic**	**Frequency (n=412)**	**Per cent (%)**
WHO stage (at start)	Stage I	118	28.64
	Stage II	209	50.73
	Stage III	85	20.63
Current WHO stage	T1	207	50.24
	T2	183	44.42
	T3	22	5.34
ART duration (year)	≤2 years	37	8.98
	3–5 years	128	31.07
	≥6 years	247	59.95
Disclosure status	Yes	169	41.02
	No	243	58.98
Current viral load	≥1000	117	28.40
ART regiment	First line	389	94.42

	Second line	23	5.58
Child Adherence	Good adherence	208	50.49

Psychosocial characteristics

In this study, the median score of social support was 66 (IQR: 26.00–77.00), and 56.80% (n = 234) of caregivers were classified as having high social support. The median perceived stigma score was 29 (IQR: 23.75–49.00), with 50.97% (n = 210) reporting high perceived stigma. Similarly, the median parental stress score was 51 (IQR: 37.00–56.00), and 51.21% (n = 211) had high parental stress. The median illness perception score was 39 (IQR: 36.00–47.00), while 49.27% (n = 203) had a negative illness perception. In addition, the median HIV knowledge score was 14 (IQR: 7.00–15.00), with 73.06% (n = 301) demonstrating good HIV knowledge. The median adaptive coping score was 44 (IQR: 38.00–49.00), and 51.94% (n = 214) had high adaptive coping, whereas the median maladaptive coping score was 28 (IQR: 25.00–33.00), with 56.31% (n = 232) having high maladaptive coping (Table 4).

Table 4: Psychosocial characteristics among the caregivers of children living with HIV/AIDS who have follow-up at CSHs of East Amhara, Ethiopia, 2026 (n=412).

Variable	**Characteristic**	**Frequency (n=412)**	**Per cent (%)**
Social support	High	234	56.80
	Moderate	32	7.76
	Low	146	35.44
Perceived stigma	Low	202	49.03
Physical abuse	No	305	74.03
Illness perception	Positive	209	50.73
Parental stress	High	211	51.21
Anxiety symptoms	No anxiety	179	53.45

HIV knowledge		poor	111	26.94
Coping	Adaptive- coping	High	214	51.94
	Maladaptive-coping	High	232	56.31

Prevalence of depressive symptoms

Nearly half of the caregivers (44.90% (95% CI: 40.10-49.70), n=185) had scored ≥ 5 in PHQ-9, and 55.10% (n=227) had scored <5. When we further classified those with depressive symptoms 22.09% (n=91) had mild depressive symptoms, 20.63% (n=85) had moderate depressive symptoms, 2.18% (n=9) had moderate-to-severe depressive symptoms. No caregiver had severe depressive symptoms. When we see the proportion by site DBCSH, DCSH, and WCSH, 52.17% (n = 24), 44.06% (n = 126), and 43.75% (n = 35) had depressive symptoms, respectively. A higher percentage of moderate-to-severe cases was reported at WCSH (3.75%, n = 3) (Figure 1).



Figure 1: Severity of depressive symptoms among caregivers of children living with HIV/AIDS by study site in East Amhara CSHs, April 21-May 30, 2026

Based on the cutoff point of 0-4, 55.10% (n=227) had minimal depressive symptoms, 5-9, 22.09% (n=91) had mild depressive symptoms, 10-14, 20.63% (n=85) had moderate depressive symptoms, and 15-19, 2.18% (n=9) had moderate-to-severe depressive symptoms. No caregiver had severe depressive symptoms. A higher percentage of moderate-to-severe cases was reported at WCSH (3.75%, n = 3) [Figure 1]. In terms of functional impairment, among caregivers with depressive symptoms, 57.30% (n = 106) were in a lot of trouble, 21.62% (n = 40) were in some trouble, and 21.08% (n = 39) had no trouble [Figure 2].

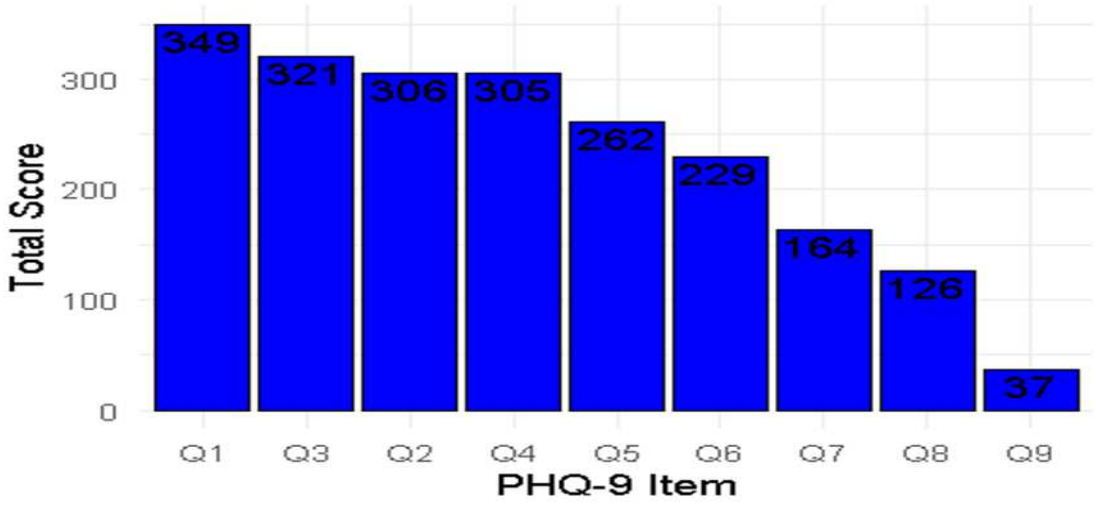


Figure 2: Score of each PHQ-9 item among caregivers of children with HIV/AIDS in East Amhara CSHs, April 21-May 30, 2026

Factors associated with caregivers' depressive symptoms

Multicollinearity was assessed using the generalized variance inflation factor (GVIF). The adjusted GVIF values ranged from 1.05 to 1.28 across the explanatory variables, indicating no evidence of problematic multicollinearity. Therefore, all variables were retained for the multivariable logistic regression analysis. The Hosmer–Lemeshow goodness-of-fit test indicated that the multivariable logistic regression model fit the data adequately ($\chi 2=3.97$, df = 8, p = 0.860), with no evidence of a statistically significant lack of fit.

In the bivariable logistic regression analysis, sixteen variables were associated with caregivers' depressive symptoms. After adjusting for potential confounders in the multivariable logistic regression model, only eight variables remained significantly associated with depressive symptoms: caregivers' sex, caregivers' marital status, lived poverty index,

caregivers' experience of family death in the past year, adaptive coping, anxiety symptoms, moderate social support and parental stress (Table 5).

Female caregivers had significantly higher odds of experiencing depressive symptoms than male caregivers (AOR = 2.34, 95% CI: 1.33–4.16). Compared with married caregivers, divorced caregivers had 3.18 times higher odds of depressive symptoms (AOR = 3.18, 95% CI: 1.28–8.00), widowed caregivers had 2.75 times higher odds (AOR = 2.75, 95% CI: 1.42–5.41), and single caregivers had 4.99 times higher odds (AOR = 4.99, 95% CI: 2.45–10.46).

Compared with non-poor caregivers, minimally poor caregivers had 2.36 times higher odds of depressive symptoms (AOR = 2.36, 95% CI: 1.08-5.17), moderately poor caregivers had 2.89 times higher odds (AOR = 2.89, 95% CI: 1.38-6.13), and highly poor caregivers had 4.59 times higher odds (AOR = 4.59, 95% CI: 1.86-11.70).

Caregivers with moderate social support had 2.97 times higher odds of depressive symptoms than those with high social support (AOR=2.97, 95% CI: 1.11-8.09).

Participant with anxiety symptoms had 2.20 times higher odds of experiencing depressive symptoms than those without anxiety symptoms (AOR = 2.20, 95% CI: 1.27-3.83). Caregivers with low adaptive coping had 1.77 times higher odds of depressive symptoms than those with high adaptive coping (AOR = 1.77, 95% CI: 1.05–2.99). Caregivers experiencing parental stress had 1.76 times higher odds of depressive symptoms than those without parental stress (AOR = 1.76, 95% CI: 1.02-3.04). Similarly, caregivers who had experienced the death of a family member during the previous 12 months had 2.31 times higher odds of depressive symptoms than those who had not experienced such a loss (AOR = 2.31, 95% CI: 1.34-4.02). Caregivers with moderate social support had 2.97 times higher odds of experiencing depressive symptoms compared with those in high social support (AOR = 2.97, 95% CI: 1.11–8.09) (Table 5).

Table 5: Multivariable binary logistic regression model for factors associated with depressive symptoms among caregivers of children with HIV/AIDS in East Amhara CSHs, 2026 (n=412)

Characteristic	Categories	No depressive symptoms (N=227)	Depressive symptom (N=185)	COR (95% CI)	AOR (95% CI)
Age of the caregivers	18-34	94	48	1	1
	35-55	117	118	1.94 (1.26–3.01)	1.88 (1.00-3.59)
	>55	16	19	2.45 (1.24-4.89)	2.25 (0.89-5.7)
Sex of the caregivers	Male	101	40	1	1
	Female	126	145	2.91 (1.89–4.53)	**2.34 (1.33-4.16)***
Marital status of the caregivers	Married	130	51	1	1
	Single	40	45	2.87 (1.68–4.92)	**4.99 (2.45-10.46)***
	Divorced	19	23	3.09 (1.55–6.20)	**3.18 (1.28-8.00)***
	Widowed	38	66	4.43 (2.67–7.46)	**2.75 (1.42-5.41)***
Death in the past 12 month	No	170	79	1	1
	Yes	57	106	4.00 (2.65–6.11)	**2.31 (1.34-4.02)***
Lived poverty index	Non-poor	153	54	1	1
	Minimally poor	30	29	2.74 (1.51–4.99)	**2.36 (1.08-5.17)***

	Moderately poor	29	67	6.55 (3.87–11.31)	**2.89 (1.38-6.13)***
	Highly poor	15	35	6.61 (3.41–13.37)	**4.59 (1.86-11.70)***
Food insecurity	Food secured	137	85	1	1
	Mild food insecurity	28	18	1.17(0.60–2.25)	0.77 (0.34-1.73)
	Moderate food insecurity	15	12	1.46 (0.64–3.28)	0.39 (0.12-1.24)
	Sever food insecurity	47	80	3.11 (1.98–4.94)	1.01 (0.51-1.95)
Recent child viral load	<1000	189	106	1	1
	≥1000	38	79	3.71 (2.37–5.88)	1.34 (0.69-2.55)
Number of HIV positive children in the household	1	188	138	1	1
	>=2	39	47	1.64 (1.02-2.66)	0.93 (0.49-1.77)
Child disclosure status	No	150	93	1	
	Yes	77	92	1.93 (1.30–2.88)	0.96 (0.55-1.64)
Physical abuse of caregiver	No	181	124	1	1
	Yes	46	61	1.94 (1.24–3.03)	0.94 (0.52-1.81)
Perceived stigma among caregiver	Low	131	71	1	1
	High	96	114	2.19 (1.48–3.27)	0.84 (0.45-1.57)
Social support among caregiver	High	154	80	1	1
	Moderate	14	18	2.48 (1.17–5.31)	**2.97 (1.11-8.09) ***
	Low	59	87	2.84 (1.86–4.37)	1.26 (0.63-2.51)
Adaptive coping mechanism of caregiver	High	143	71	1	1
	Low	84	114	2.73 (1.84–4.09)	**1.77 (1.05-2.99)***

Maladaptive coping mechanism of caregiver	High	114	118	1	1
	Low	113	67	0.57 (0.38–0.85)	0.73(0.43-1.22)
Parental stress	Low	139	62	1	1
	High	88	123	3.13 (2.10–4.72)	**1.76(1.02-3.04)***
Anxiety symptom among caregivers	No anxiety	134	45	1	1
	Present	93	140	4.48 (2.94–6.92)	**2.20(1.27-3.83)***

Note: * indicates significantly associated factors

Discussion

In this study the prevalence of depressive symptoms among caregivers of children with HIV/AIDS in Northeast Ethiopia was found to be 44.90% (95% CI: 40.10%–49.70%). Female sex, being single/widowed/divorced, poverty (minimal, moderate, or high), anxiety symptoms, recent family death, low adaptive coping, moderate social support and parental stress were independently associated with depressive symptoms.

The prevalence observed was comparable with studies conducted in Enugu, Nigeria (43.2% and 48.3%) (17, 22). This may be because of similar study settings, participant selection procedures, and use of validated tools. However, it was higher than studied done in Ghana (28%) (9) and Lesotho (25.7%) (18) and lower than findings from China (60%) (13), Kenya (54%) (16), Calabar, Nigeria (70.3%) (21), Namibia (83%) (19), and KwaZulu-Natal, South Africa (57%) (20). This might be due to the existence of differences in socioeconomic status, mental and psychosocial healthcare service quality, HIV stigma, study period, sample size, study population and measurement tools. Furthermore, the Northeastern region of Ethiopia is characterized by unstable socioeconomic circumstances, and this is known to increase levels of chronic stress among caregivers and thus contribute to a higher occurrence of depressive symptoms.

Among socio-demographic factors, female caregivers had higher odds of depressive symptoms than males. This finding is consistent with studies from Nigeria (21) and WHO reports indicating that depressive symptoms are more common among women (52, 53). This is due to women often bear greater caregiving responsibilities, household duties, financial stress, and gender-related inequalities, which may increase psychological burden. In the present study, nearly two-thirds of caregivers were women, supporting this explanation (52).

Single, widowed, and divorced caregivers also had higher odds of depressive symptoms compared with married caregivers. This agrees with a Kenyan study showing a protective effect of marriage (AOR = 0.13, 95% CI: 0.03–0.59) (16). Marriage may provide emotional support and shared caregiving responsibilities, whereas unmarried caregivers may experience greater social and economic stress.

Economic status was another significant factor. Caregivers who were minimally, moderately, or highly poor had higher odds of depressive symptoms than non-poor caregivers. Similar associations have been reported in China, Nigeria, and Ghana (9, 13, 21). Evidence consistently shows that people living in poverty are substantially more likely to experience depression and anxiety because of chronic financial stress, poor living conditions, and limited access to healthcare (54). This finding is consistent with the social drift hypothesis (also known as social selection), which proposes that depression not only results from socioeconomic disadvantage but also contributes to worsening poverty through reduced productivity, impaired functioning, loss of income, and increased healthcare costs. Together with social causation, these bidirectional processes create a self-reinforcing cycle in which poverty increases the risk of depression, and depression further deepens economic deprivation(55, 56).

Caregivers who experienced the death of a family member in the previous year had higher odds of depressive symptoms, consistent with findings from rural Lesotho (18). Bereavement may impair emotional functioning, increase caregiving burden, and reduce available family support. Among psychosocial factors, anxiety symptoms, low adaptive coping, and parental stress were significantly associated with depressive symptoms.

In this study, caregivers with moderate social support had higher odds of depressive symptoms than those with high social support (AOR = 2.97, 95% CI: 1.11–8.09). However, the association between low social support and depressive symptoms was not statistically significant after adjustment (AOR = 1.26, 95% CI: 0.63–2.51). This finding partially differs from studies conducted in Ghana and South Africa, where low social support was significantly associated with depressive symptoms among caregivers of children affected by HIV/AIDS (9, 20).

Caregivers with high parental stress had significantly higher odds of depressive symptoms than those with low parental stress (AOR = 1.76, 95% CI: 1.02–3.04). This finding is consistent with a study conducted in rural Lesotho, which reported a significant association between parenting stress and depressive symptoms among caregivers(18). The demands of caregiving, combined with socioeconomic difficulties, may increase psychological distress. These findings highlight the importance of integrating parental stress management and psychosocial support into pediatric HIV care services.

Moreover, caregivers with anxiety symptoms had higher odds of depression, consistent with studies from Kenya (57) and Ethiopia (58). Depression and anxiety frequently co-occur because they share symptoms such as fatigue, sleep disturbance, and impaired concentration (59). Similarly, caregivers with low adaptive coping had higher odds of depressive symptoms than those with high adaptive coping. Previous studies have shown that adaptive coping is associated with lower depressive symptoms, whereas dysfunctional coping is associated with higher depressive symptoms among caregivers (60, 61). Effective coping strategies may therefore protect against psychological distress.

These findings can be interpreted using interpersonal theories of depression. Poverty, parental stress, bereavement, and caregiving challenges represent chronic stressors, while being single, divorced, or widowed may indicate reduced interpersonal support. Interpersonal theories propose that loss of social connection and emotional support increases vulnerability to depression (62). The observed associations of anxiety and poor adaptive coping further suggest that caregivers' psychological responses to stress contribute to the development of depressive symptoms (62, 63)

This study has several strengths; however, it is not without limitations that should be considered when interpreting the findings. First, the cross-sectional design precludes establishing causal relationships between depressive symptoms and the associated factors identified. Second, depressive symptoms and other study variables were assessed using self-reported measures, which may be subject to recall bias and social desirability bias. Furthermore, depressive symptoms were assessed using screening tool rather than a diagnostic tool. Although the screening tool is useful for identifying individuals at risk, it cannot confirm a clinical diagnosis of depression.

The findings highlight the importance of integrating routine screening for depressive and anxiety symptoms into pediatric HIV care and strengthening access to psychosocial support services for caregivers. Incorporating caregiver mental health into HIV care programs and ensuring adequate resources for mental health screening and psychosocial interventions may improve the identification and management of psychological distress among caregivers.

The results further suggest the value of comprehensive psychosocial care, particularly for caregivers at greater risk of depressive symptoms, including women, those who are single, widowed, or divorced, economically disadvantaged caregivers, those experiencing parental

stress, those who had inadequate social support and those who have recently experienced the death of a family member. Integrating adaptive coping and stress management strategies into routine pediatric HIV services may help reduce caregiver psychological burden and enhance overall caregiver well-being.

These findings also indicate that promoting timely mental health support, participation in peer support programs, the use of adaptive coping strategies, and open communication with healthcare providers may strengthen caregiver resilience within pediatric HIV care settings.

Future longitudinal, qualitative, and intervention studies are needed to clarify causal relationships, evaluate the effectiveness of mental health interventions, and examine the implementation of integrated mental health services within pediatric HIV care.

Conclusions

The prevalence of depressive symptoms among caregivers of children living with HIV/AIDS in Northeast Ethiopia was high as compared to the general population. Female caregivers, those who were single, divorced, or widowed, those experiencing minimal, moderate, or severe poverty, those who had experienced the recent death of a family member, those with anxiety symptoms, those with low adaptive coping mechanisms, those with inadequate social support and those with high parental stress had significantly higher odds of experiencing depressive symptoms.

Declarations

Ethics approval and consent to participate

This study was conducted by the principles outlined in the Declaration of Helsinki. Ethical clearance was obtained from the Institutional Review Board (IRB) of Debre Berhan University (DBU), Asrat Woldeyes Health Science Campus with protocol number IRB-448. Written informed consent was obtained from the three facilities and from all study participants.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no conflicts of interest.

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Authors' contributions

AT, BG, and YG conceived the idea and participated in writing, supervising and validation of the study. ATA, involved in data collection, data collection supervision, and analysis. ATA drafted the manuscript and, BG and YG participated in manuscript preparation and revision. All authors read and approved the final version of the manuscript.

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List of abbreviations and acronyms

AIDS	Acquired Immunodeficiency Syndrome
AOR	Adjusted Odds Ratio
ARMS	Adherence to Refills and Medications Scale
ART	Antiretroviral Therapy
AWHSC	Asrat Woldeyes Health Science Campus
BIPQ	Brief Illness Perception Questionnaire
CI	Confidence Interval
COPE	Coping Orientation to Problems Experienced Inventory
CSHs	Comprehensive Specialised Hospitals
DBCSH	Debre Berhan Comprehensive Specialised Hospital
DCSH	Dessie Comprehensive Specialised Hospital
EDHS	Demographic and Health Survey
GAD-7	Generalised Anxiety Disorder-7
HFIAS	Household Food Insecurity Access Scale
HIV `	Human Immunodeficiency Virus
HIV-KQ-18	Brief HIV- knowledge Questionnire-18
MSPSS	Multidimensional Scale of Perceived Social Support
PCA	Principal Component Analysis
PHQ-9	Patient Health Questionnaire-9

PSS	Parental Stress Scale
SSA	Sub-Saharan Africa
UNAIDS	United Nations Program on HIV/AIDS
WCSH	Woldia Comprehensive Specialised Hospital
WHO	World Health Organisation
WHODAS	World Health Organisation Disability Assessment Schedule

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