BMC Psychiatry

RESEARCH Open Access

Depressive symptoms and its determinants among people living with HIV in Africa: systematic review and meta-analysis

Gebresilassie Tadesse[1*], Gidey Rtbey[1], Techilo Tinsae[1], Fantahun Andualem[1], Mulualem Kelebie[1], Getasew Kibralew[1], Gebremariam Wulie Geremew[2], Asnake Tadesse Abate[3], Yilkal Abebaw Wassie[4], Tekletsadik Tekleslassie Alemayehu[5], Girum Nakie[1], Setegn Fentahun[1] and Girmaw Medfu Takelle[1]

Abstract

Background In Africa, depressive symptoms are prevalent among people living with HIV (PLHIV), significantly impacting their adherence and overall quality of life. The combined burden of HIV and depressive symptoms worsens health outcomes, leading to an increased risk of morbidity and mortality.

Objectives To estimate the pooled prevalence and identify the associated factors of depressive symptoms among people living with HIV in Africa.

Methods In this study, we reviewed articles that evaluated the prevalence of depressive symptoms and its contributing variables. The primary studies were searched using the following databases: African Journal Online, Science Direct, EMBASE, Google Scholar, and PubMed. A Microsoft Excel spreadsheet was employed to extract the data, which was then exported to STATA version 14 for further analysis. While publication bias was examined using a funnel plot and Egger's test, heterogeneity was tested using the I^2 test.

Results The estimated pooled prevalence of depressive symptoms among people living with HIV was determined to be 33.32%. Based on the sub-group analysis the higher prevalence of depressive symptoms was found in East Africa, and perinatal women. Furthermore, being female, experiencing stigma, having poor social support, a CD4 count < 200, and comorbid chronic illnesses were significant predictors of depressive symptoms.

Conclusion This review concluded that one-third of people living with HIV in Africa suffered from depressive symptoms. Additionally, individuals experiencing stigma, poor social support, a CD4 count < 200, and comorbid chronic illnesses, as well as females suffered more from depressive symptoms. Therefore, mental health assessments should address these factors.

PROSPERO registration number CRD42024516528.

Keywords Depressive symptoms, People living with HIV, Pooled prevalence, Associated factors, Africa

*Correspondence:
Gebresilassie Tadesse
gebrietadesse21@gmail.com

Full list of author information is available at the end of the article

Introduction

Human Immunodeficiency Virus (HIV) continues to pose a significant threat to global health, as it can lead to Acquired Immune Deficiency Syndrome (AIDS), a chronic and potentially fatal condition [1]. As per the joint United Nations program on Acquired Immune Deficiency Syndrome (UNAIDS) 2023 study, 39 million individuals worldwide were living with HIV in 2022, out of which 1.3 million were newly infected. Of them, 25.6 million, or two-thirds, reside in Africa [2]. Of all people living with HIV (PLHIV), 86% know their status, 76% receive antiretroviral therapy (ART), and 71% have suppressed viral loads [3]. These figures, reported by the WHO 2023 factsheet, represent regional and global estimates and may mask significant variations at the country level.

PLHIV continue to experience immunological dysregulation even with successful antiretroviral therapy (ART), which increases their risk of neuropsychiatric comorbidities [4]. Mental health disorders have received less attention than other non-communicable diseases among PLHIV on ART, especially in Africa, where most PLHIV reside and receive care [5]. Depressive symptoms among PLHIV result from a complex interplay of biological, psychological, and social factors. Biologically, HIV-related neuro-inflammation and immune activation disrupt neurotransmitter regulation, increasing vulnerability to depressive symptoms [4, 6]. Psychologically, the chronic nature of HIV, coupled with the emotional burden of diagnosis, contributes to significant mental distress [7, 8]. Socially, HIV-related stigma, economic instability, and a lack of support networks further exacerbate depressive symptoms [9, 10]. These factors not only elevate the risk of depression but also negatively affect adherence to ART [11, 12], thereby increasing the likelihood of poor health outcomes and mortality among PLHIV. Understanding these interactions is crucial for interpreting findings and developing targeted interventions.

The World Health Organization (WHO) estimates that over 280 million people suffer from depressive symptoms [13]. It is the leading cause of disability, impairing individuals' ability to function in daily life, work, and social interactions [14]. The seventeen-country World Mental Health Survey found that one in twenty respondents reported experiencing a depressive episode in the past year [15]. The meta-analysis indicated that, in the general population, the global point prevalence of self-reported depressive symptoms from 2001 to 2020 was 34%, while the point prevalence of major depressive disorder was 8% [16]. Additionally, the other systematic review and meta-analysis studies conducted from 2000 to 2018 found that point prevalence of depressive symptoms among PLHIV was 31% [17].

Previous studies indicate that psychiatric comorbidities are significantly more common among PLHIV, with depressive symptoms accounting for 20–40% of cases [18]. A recent global meta-analysis revealed that approximately one-third (31%) of PLHIV experienced depressive symptoms [19]. This study found the highest prevalence in South America at 44%, while Europe had the lowest at 22% [19]. In the Asia-Pacific region, the overall burden of depressive symptoms among PLHIV was found to be 19% (19), with more than half of PLHIV in China affected by depressive symptoms [20]. In Africa, depressive symptoms prevalence ranged from 5.9% in Nigeria [21] to 66.5% in Ethiopia [22]. A meta-analysis of studies in Africa reviewing articles published between 2000 and 2018 found the overall burden of depressive symptoms among PLHIV to be 36.5% [23].

Depressive symptoms among PLHIV in Africa are widely misunderstood, with awareness levels varying due to cultural beliefs, stigma, and healthcare accessibility. Many attribute depression to supernatural causes; in Ethiopia, a meta-analysis revealed that only 37.5% of PLHIV recognize it as a medical condition, while 42.7% attribute it to curses [24]. Similar findings have been reported in Kenya, where 40% of PLHIV associate depressive symptoms with witchcraft or spiritual punishment rather than a mental disorder [25]. In Tanzania, a study found that only 35% of PLHIV are aware that depression can be treated with therapy or medication, with many relying on traditional healers [26]. Furthermore, in Uganda, PLHIV often associate depressive symptoms with divine retribution rather than a treatable disorder [27].

A meta-analysis across Sub-Saharan Africa found that 45% of PLHIV with depressive symptoms do not recognize their condition, leading to delays in seeking help [23]. Cultural beliefs shape these perceptions, as seen in Nigeria, where many PLHIV view depressive symptoms as an inevitable consequence of HIV rather than a distinct illness [28]. Stigma further limits access to care, as seen in Zimbabwe, where 60% of PLHIV seek support from religious leaders rather than mental health professionals [29]. However, successful models such as Zimbabwe's Friendship Bench, which reduced depressive symptoms by 45% through lay health worker interventions [30], and Uganda's peer-led mental health support programs [31], which improved ART retention by 30%, highlight the benefits of integrated care approaches. Expanding culturally tailored programs across Africa is crucial for improving both mental health outcomes and ART adherence among PLHIV.

Depressive symptoms in PLHIV can significantly impact health outcomes, leading to increased suicidal thoughts, despondency, poor medication adherence, accelerated disease progression, drug resistance,

treatment failure [32, 33], and higher rates of virologic failure [34]. A systematic review and meta-analysis study in low- and middle-income countries found that PLHIV who had depressive symptoms were 42% less likely to adhere well to ART compared to those without depressive symptoms [35]. Another study showed that the odds of adhering to ART medication increased by 83% for individuals treated for depressive symptoms [12]. Additionally, depressive symptoms negatively affects the overall quality of life of PLHIV [36, 37].

A substantial body of research has shown that depressive symptoms frequency among PLHIV is significantly associated with various sociodemographic factors (such as sex, employment, and education) and clinical variables. Certain clinical characteristics, such as perceived HIV-related stigma [38, 39] and a compromised immune system (low CD4 levels) [40, 41], are especially relevant for PLHIV. According to several studies, people often distanced themselves from those PLHIV, perceiving them as less safe, more deserving of infection, and responsible for their condition [42].

Studies have shown that the prevalence of depressive symptoms among PLHIV is notably higher than in the general population, highlighting the need for focused attention on these mental health challenges [43–45]. In the past five years, several primary studies have examined the prevalence rates and significant factors associated with depressive symptoms among PLHIV in Africa. To our knowledge, no published study in Africa has yet synthesized findings on the prevalence and associated factors of depressive symptoms among people living with HIV, specifically from studies conducted within the past five years. Given the compounded impact of HIV/AIDS and depressive symptoms on this population, generating targeted insights into the prevalence and contributing factors of depressive symptoms among PLHIV in Africa is essential. Conducting systematic reviews and meta-analyses on depressive symptoms among PLHIV in Africa is essential for improving mental health outcomes, reducing stigma, informing policy decisions, and guiding future research for this population.

Objectives

This systematic review and meta-analysis aims to:

- Estimate the pooled prevalence of depressive symptoms among people living with HIV across Africa.
- Identify the factors significantly associated with depressive symptoms among PLHIV in Africa.

Methods

Registration protocol of the study

This study was conducted following the Preferred Reporting Items of Systematic Review and Meta-Analysis (PRISMA) guidelines [46] (Supplementary file 1). It was registered under the unique registration number CRD42024516528 in the International Prospective Registry of Systematic Review (PROSPERO). Both published and unpublished primary studies were included to assess the pooled prevalence and the factors significantly associated with depressive symptoms among PLHIV in Africa.

Search strategy

A search of research articles was conducted using the following databases and websites: PubMed, Science Direct, African Journals OnLine (AJOL), and EMBASE. Additional literature was identified by searching grey literature databases, including platforms like Google Scholar and Google, as well as consulting with subject-matter experts. We also reviewed the reference lists of the included studies to find further relevant research. The following key terms, along with their synonyms and Medical Subject Headings (MeSH) terms, were utilized in our database search: depressive symptoms, HIV, and Africa. These terms were combined to formulate the search algorithm (Supplementary file 2). The search was carried out from 22 February 2024 to 22 March 2024. Research articles published from January 1st, 2019 to March 22, 2024, were evaluated for eligibility and included in the meta-analysis based on predefined assessment criteria. Two authors (GM and GR) conducted an independent search to identify all relevant terms, using the Boolean operators "AND" and "OR" as appropriate. Duplicate articles were removed after importing the selected articles into the EndNote program.

Study setting

The systematic review and meta-analysis included studies conducted exclusively in Africa.

Participants

The study focused on PL HIV in African countries without age limitations, with particular emphasis on various demographic groups.

Types of interventions/exposures

Not applicable as this is an observational study, though the study focuses on psychological assessments of depressive symptoms and identification of associated factors.

Comparators

The study contrasts groups of people living with HIV by comparing various sociodemographic and clinical factors affecting depressive symptom rates.

Types of outcome measures

The primary outcomes are the pooled prevalence and associated factors of depressive symptoms among PLHIV in Africa.

Study designs

This study included cross-sectional and comparative cross-sectional studies that report on depressive symptoms among PLHIV in Africa.

Eligibility criteria

Inclusion criteria

This comprehensive systematic review and meta-analysis focused on the prevalence of depressive symptoms and its contributing factors among PLHIV in Africa. This study included primary studies on the prevalence and burden of depressive symptoms among PLHIV in African countries. Cross-sectional and comparative cross-sectional studies that reported the prevalence of depressive symptoms were considered in this review. Initially, we assessed the titles and abstracts of the articles to determine for eligibility. Subsequently, we thoroughly reviewed the entire paper to confirm if the study's findings were relevant to our review. Two authors (GM and GR) carefully reviewed each article considered for inclusion. Only original observational studies written in English and published online between January 1, 2019, and March 22, 2024, were included. Similarly, both published and unpublished papers were considered.

Exclusion criteria

Studies written in a language other than English, qualitative studies and interventional studies, observational studies that did not report the frequency or prevalence of depressive symptoms, and articles lacking an abstract or full text were excluded during the article selection process. Articles published before 2019, as well as systematic reviews, meta-analyses, expert opinions, case studies, case series, books, book chapters, brief reports, randomized controlled trials, and studies focused on therapy, follow-up, drug or clinical decision-making, or with difficulties calculating prevalence, were excluded.

Data extraction

Two experienced researchers, GM and GR, independently searched the same databases using identical search terms. After combining the articles from both searches in EndNote X20 software, duplicates were identified and removed. Two independent reviewers, SF and GT—both mental health professionals experienced in conducting reviews—assessed the titles and abstracts of the publications for eligibility based on predetermined criteria. In cases of disagreement regarding study inclusion or exclusion, SF consulted with GT, the content expert and Principal Investigator, who made the final decision. A predetermined abstraction form developed using Excel 2010 was utilized by two independent reviewers (GT and SF) to extract data (Supplementary file 3). The Cohen's kappa agreement between the reviewers was calculated, indicating substantial agreement (0.76). Any disagreements were resolved through discussion, and unresolved issues were escalated to the senior author (FA). The extracted data included the first author's name, publication year, study year, country, sample size, assessment tools, response rate, and the prevalence or epidemiology of depressive symptoms among PLHIV.

Outcome measurements

The primary objective of this study was to determine the overall prevalence of depressive symptoms among PLWH in Africa. The pooled prevalence of depressive symptoms was calculated by dividing the number of PLHIV with depressive symptoms by the total number of PLHIV in this review, then multiplying by 100. It also identified pooled estimates of the contributing factors to depressive symptoms, expressed as odds ratios (OR) with corresponding lower and upper confidence intervals. In the primary articles included, questionnaires to assess depressive symptoms were initially created in English, translated into the local languages by linguists, and then back-translated into English. This process, with measures first applied in the local language before being back-translated, ensured consistency.

Quality assessment

The quality of each included study was independently evaluated by two reviewers (SF and GT). A critical appraisal standard instrument known as the Joanna Briggs Institute (JBI) was utilized to evaluate the methodological quality of cross-sectional studies [47] (Supplementary file 4). The JBI appraisal checklist consisted of nine items and focused on several factors, including participant sampling, sample size, adequate response rates, well-described study populations and settings, appropriate data analysis, reliable measurements, suitable statistical analysis, and the use of valid methods for assessing depressive symptoms. Primary studies scoring 8 or higher were classified as high quality, those scoring between 5 and 7 as moderate quality, and studies scoring below 4 as low quality. Only studies of medium to high quality were included in this analysis.

Data synthesis and analysis

For each eligible article, the following information was recorded for this review: the first author's name, study year, publication year, country, study population, sampling methods, sample size, age group examined, prevalence of depressive symptoms, response rate, assessment tool used, and statistically significant factors associated with depressive symptoms. Data were then abstracted into a Microsoft Excel 2010 spreadsheet, and GT stored the articles in an EndNote X20 file. The findings of this review are presented through forest plots, tables, and text summaries. The summary table outlines the key outcomes and characteristics of the included studies. For analysis, the data were then exported to Stata version 14.

The funnel plot, Eager's test, associated factors, and the pooled prevalence of depressive symptoms were all calculated using STATA version 14. To assess heterogeneity, the I^2 test quantified the variability across studies, and a forest plot visually depicted individual study results and confidence intervals (CI). Subgroup analyses were conducted to identify potential sources of heterogeneity. Publication bias was evaluated using a two-step approach: first, a funnel plot provided a visual assessment of data distribution symmetry [48]; second, Egger's weighted regression test [49] was applied at a 5% significance level to statistically detect potential bias. Additional sensitivity analyses were performed to assess the robustness of the results and examine the influence of individual studies on the pooled estimates. The overall prevalence of depressive symptoms among PLHIV was determined by calculating the pooled prevalence estimate. Additionally, the factors significantly associated with depressive symptoms were calculated and expressed as Odds Ratios (OR) with a 95% CI, as illustrated in the funnel plot.

Results

Identification of searched primary articles

A search using multiple databases, including Science Direct, Google Scholar, PubMed, African Journal Online, and EMBASE, identified 1,913 primary studies and articles for this study (Fig. 1). After duplicate studies were eliminated, 541 publications were found after examining their abstracts and titles. Furthermore, 434 of these were removed for different reasons. The reasons for the 434 publications that were eliminated were studies that were not on this topic ($n = 226$), studies that were not conducted in Africa ($n = 174$), articles not written in English ($n = 9$), clinical trial studies ($n = 13$), and qualitative studies ($n = 12$). After that, 107 primary studies, after assessment of the titles and abstracts that met the qualifying conditions or would meet the requirements for publication, were then assessed. Then, forty-eight (48) articles were excluded based on the eligibility criteria. Finally, this study examined and reviewed fifty-nine ($n = 59$) primary papers.

Characteristics (features) of the reviewed articles

Altogether, a total of fifty-nine ($n = 59$) primary studies were included in this systematic review and meta-analysis. Out of a total of fifty-nine studies, fifty-seven were published, whereas only two were available online as preprints. The total sample size in this study was 20,157, with 12,715 (63.11%) females and 7,442 males. All the included primary studies were carried out through the cross-sectional study design. The reviewed articles were carried out from 2014 to 2023 and published from 2019 to 2023. The included and reviewed studies were conducted from 17 African countries. From those reviewed articles, most ($n = 26$) [50–75] studies were conducted in Ethiopia, followed by Nigeria ($n = 10$) [28, 76–84] and Uganda ($n = 5$) [27, 31, 85–87]. The remaining studies were carried out in Tanzania ($n = 2$) [26, 88], Botswana ($n = 2$) [89, 90], Ghana ($n = 2$ [91, 92]), South Africa ($n = 2$) [93, 94], Guinea [95], Mozambique [96], Lesotho [97], Namibia [98], Zimbabwe [29], Côte d'Ivoire and Senegal [99], Cameroon [100], Somalia [101], Kenya [102] and Malawi [103]. Out of the 59 studies included in this review, the majority were conducted in East ($n = 42$) and West Africa ($n = 14$), with a smaller representation from Southern ($n = 2$) and Central Africa ($n = 1$).

Concerning the study population, the majority ($n = 36$) of the reviewed studies were conducted among adults living with HIV, followed by eight studies carried out among perinatal, pregnant, and postnatal women, whereas six studies, four studies, three studies, and two studies, respectively, were carried out among adolescents, youths, both youths and adults, and old age (Table 1).

Characteristics of assessment tools and sampling techniques

Most studies ($n = 35$) used the Patient Health Questionnaire—9 items (PHQ-9) as their assessment tool, while five studies utilized the Center for Epidemiological Studies—Depression Scale (CES-D). The PHQ-9 is widely acknowledged as a reliable tool for assessing depressive symptoms, with a Cronbach's alpha of 0.89, alongside sensitivity and specificity rates of 88%, indicating strong reliability and accuracy [104]. Furthermore, in Ethiopia, the PHQ-9 has been validated for HIV/AIDS patients, showing high test-retest reliability and internal consistency, with an intra-class correlation coefficient of 0.92 and a Cronbach's alpha of 0.85 [105]. These metrics confirm its suitability for evaluating depressive symptoms within this population.

The Center for Epidemiologic Studies Depression Scale (CES-D) has demonstrated reliability and validity in assessing depressive symptoms among patients in

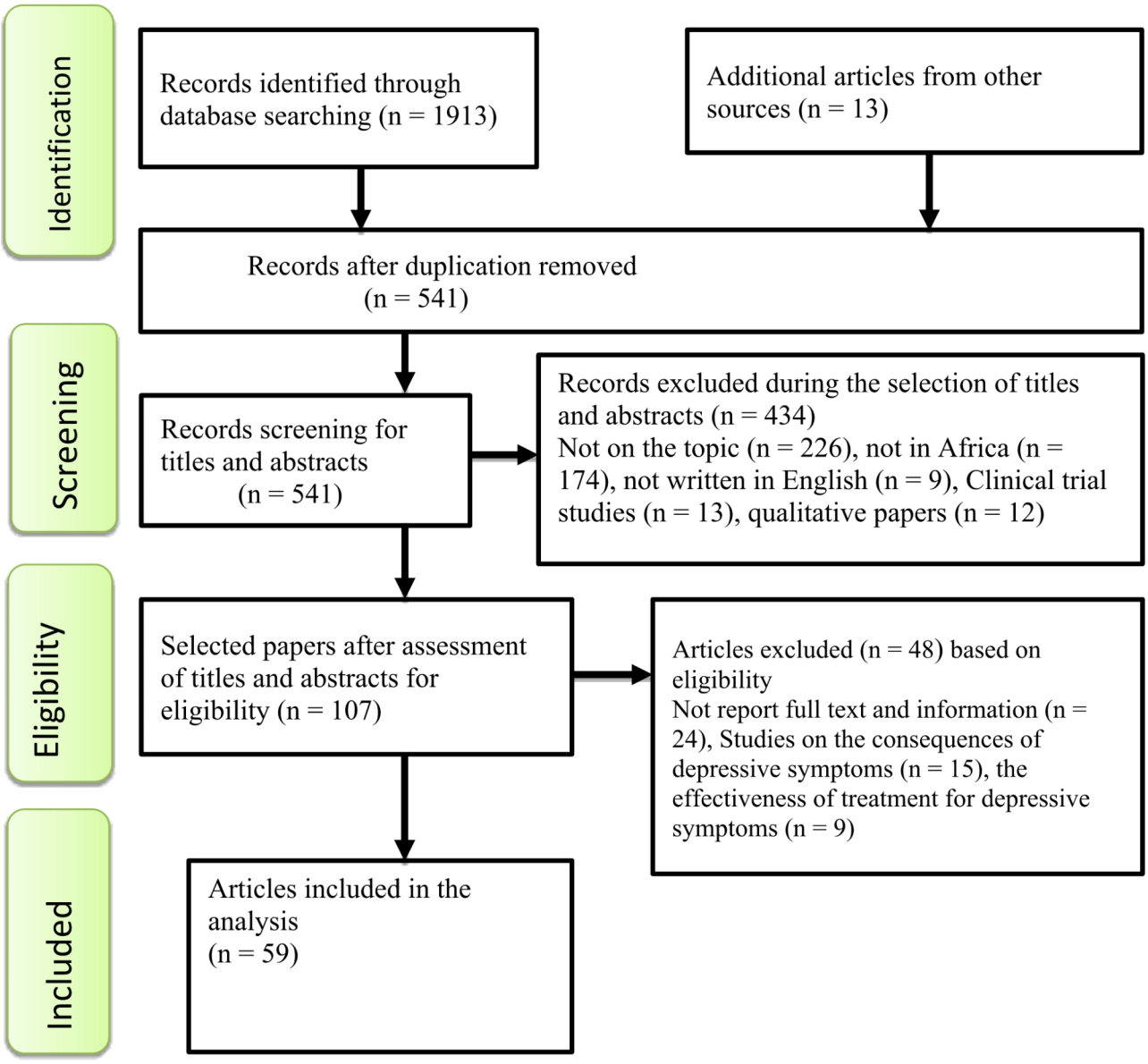

Fig. 1 Flow chart shows study selection for a meta-analysis of depressive symptoms among people living with HIV in Africa

various African contexts [106, 107]. It has been validated in various African contexts, including Uganda, where it demonstrated sensitivity of 72.7% and specificity of 78.5% [108]. This indicates that the CES-D is a reliable tool for assessing depressive symptoms in these settings. While some regions may require adjustments to cut-off points for specificity, the CES-D remains a widely used and accepted tool for depression screening in diverse African populations.

The remaining studies employed various tools, including Beck's Depression Inventory (BDI-II), Hospital Anxiety and Depression Scale (HADS), Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID), Edinburgh Postnatal Depression Scale (EPDS), Geriatric Depression Scale (GDS), and the WHO 20 items Self-Reporting Questionnaire (SRQ-20).

The Depression, Anxiety, and Stress Scale-21 (DASS-21) has not been specifically validated among patients in African contexts. However, it was effective in a study in Malawi [109] for screening postpartum women for common mental disorders, achieving a sensitivity of 69.2% and specificity of 75.5%. This indicates its potential reliability as a mental health assessment tool in clinical and research settings across Africa.

The Edinburgh Postnatal Depression Scale (EPDS) has been validated in several African countries, including Zimbabwe [110], South Africa [111], Nigeria [112], Ethiopia [113], Kenya [114], and Ghana [115], where it

Table 1 Characteristics of reviewed studies on depressive symptoms among people living with HIV in Africa

Author and pub year	Study year	Country	Population group	Sampling technique	Assessment tools and cut off point	Sample size	Response rate	Prevalence (%)
Nyamukoho et al. (2019)	2016	Zimbabwe	Pregnant women	Simple random	EPDS (>=13)	198	N/A	39.4
Oluka (2023)	N/A	Uganda	Adults	Simple random	PHQ-9 (>=5)	138	100	16.7
E. KEMIGISHA ET AL. (2019)	2017	Uganda	Adolescent	Simple random	CES-D (>=15)	336	99.4	45.8
Namagga et al. (2021)	2017	Uganda	Adults	Consecutive	BDI-I (>10)	393	100	27
Rukundo GZ et al. (2021)	2021	Uganda	Adults	Consecutive	PHQ-9 (>=5)	431	100	53.1
Yeboa et al. (2023)	2017	Uganda	Post-natal women	Consecutive	PHQ-9 (>=10)	290	100	15.9
Gamassa et al. (2023)	2021	Tanzania	Adolescent	Consecutive	PHQ-9 (>=5)	170	100	15.9
Madundo et al. (2023)	2020	Tanzania	Adults	Purposive	PHQ-9 (>=5)	272	100	41
E. Akahilem & B. Omole (2023)	2020–2021	South Africa	Adults	Consecutive	PHQ-9 (>=10)	404	98.5	25.8
Njajula and Okafor (2023)	2019	South Africa	Adults	Simple random	PHQ-9 (>=5)	150	100	41.3
Mohamud et al. (2023)	2022	Somalia	Adults	Systematic random	PHQ-9 (>=5)	331	100	33.5
Afolabi Oyapero et al. (2023)	2021–2022	Nigeria	Adults	Simple random	PHQ-9 (>=5)	370	100	37.5
Adedeji et al. (2023)	2020	Nigeria	Adults	Consecutive	PHQ-9 (>=5)	172	75	16.3
Adeyemo et al. (2020)	2016	Nigeria	Adolescent	Consecutive	MINI-KID (>=5 A1-A3 coded Yes and A4 coded yes)	201	100	16.9
RO et al. (2023)	2018	Nigeria	Adolescent	Consecutive	MINI-KID (N/R)	105	100	14.3
Aika, I.N. and Odili, V.U. (2019)	2017	Nigeria	Adults	Convenient	PHQ-9 (>=5)	305	100	24.6
Akinsolu et al. (2023)	2022	Nigeria	Peri-natal women	Convenient	EPDS (>=12)	402	100	63.9
Okeafor and Godstime (2023)	2021	Nigeria	Adolescent	Systematic random	DASS-21 (>=10)	140	100	14.2
Okwaraji et al (2023)	2023	Nigeria	Adults	Simple random	BDI-II (N/R)	480	100	46.3
E., OLUREMI (2021)	N/A	Nigeria	Adults	Systematic random	PHQ-9 (>=5)	279	N/A	24
Halima Mwuese Sule et al. (2019)	N/A	Nigeria	Adults	Systematic random	PHQ-9 (>=5)	386	N/A	32.6
Kalomo, Jun, Lee & Kaddu (2020)	2018	Namibia	Older	Convenient	(GDS-8) (>=3)	147	100	46.1
Machado. A.V et al. (2021)	2014–2016	Mozambique	Youths & adults	Convenient	CES-D (>=15)	626	100	43.8
Msefula, M.C.; Umar, E. (2023)	2021–2022	Malawi	Adolescents & youths	Convenient	PHQ-9 (>=5)	303	98	23
Mahlomaholo, P.M. et al. (2021)	2019	Lesotho	Adults	Convenient	PHQ-9 (>=5)	402	95.7	53
A. Tele et al. (2022)	2021	Kenya	Pregnant women	Purposive sampling	PHQ-9 (>=10)	153	100	43.1
A. Camara et al. (2020)	2017–2018	Guinea	Adults	Systematic random	HADS (>=8)	160	100	16.9
Nutor et al. (2023)	2021–2022	Ghana	Adults	Purposive sampling	CES-D (>=16)	159	100	23
OPOKU AGYEMANG ET AL. (2022)	2021	Ghana	Adults	Simple random	DASS-21 (>=10)	395	99	28.6
Abebe W et al. (2020)	2018	Ethiopia	Pregnant women	Convenient	PHQ-9 (>5)	368	92.7	47.6
Abebe H et al. (2019)	2016	Ethiopia	Youths	Systematic random	BDI-II (>=21)	507	94.4	35.5
Gebrezgiabher B.B et al. (2019)	2015	Ethiopia	Adults	Systematic random	PHQ-9 (>=10)	411	97.6	14.6
N. S. Tibebu et al. (2023)	2020–2021	Ethiopia	Pregnant women	Systematic random	DASS-21 (>=10)	423	100	37.6
Aman N et al. (2020)	2019	Ethiopia	youths and adults	Systematic random	PHQ-9 (>=5)	401	96	24.2
Desta et al. (2022)	2021	Ethiopia	Adults	Systematic random	PHQ-9 (>=10)	554	99.1	44.9
Zerihun A and Girma F (2023)	2022	Ethiopia	Adults	Systematic random	PHQ-9 (>=5)	420	100	52.4

Table 1 (continued)

Author and pub year	Study year	Country	Population group	Sampling technique	Assessment tools and cut off point	Sample size	Response rate	Prevalence (%)
Amha et al. (2022)	2019	Ethiopia	Adults	Systematic random	PHQ-9 (> = 5)	266	97.4	39.1
Getaye A et al. (2021)	2020	Ethiopia	Youths	Systematic random	BDI-II (> = 21)	431	97.9	26.2
Fatuma Seid Degu (2023)	2021	Ethiopia	Adults	Systematic random	HADS (> 8)	404	99	31.7
Damtie Y et al. (2021)	2019	Ethiopia	Adults	Systematic random	PHQ-9 (> = 5)	380	97.9	15.5
Asrat et al. (2020)	2019	Ethiopia	Adults	Systematic random	MINI-7 (N/R)	391	99.5	32.5
Abadiga (2019)	2018	Ethiopia	Adults	Simple random	PHQ-9 (> = 5)	393	97.3	41.7
Duko et al. (2019)	2018	Ethiopia	Adults	Systematic random	HADS (> 8)	363	98.1	32
Markos Hankebo et al. (2023)	2019	Ethiopia	Adults	Systematic random	PHQ-9 (> = 5)	392	100	37.8
Yousuf et al. (2020)	2019	Ethiopia	Adults	Systematic random	HADS (> = 8)	357	100	32.5
Metekiya et al. (2020)	2019	Ethiopia	Adults	Convenient	PHQ-9 (> = 5)	398	100	43.5
Girma D et al. (2021)	2020	Ethiopia	Youths	Systematic random	PHQ-9 (> = 10)	325	98.2	30.2
Beyene Dorsisa et al. (2020)	2018	Ethiopia	Adults	Simple random	PHQ-9 (> = 5)	303	100	31
Getaneh et al. (2019)	2016	Ethiopia	Adults	Simple random	PHQ-9 (> = 5)	400	94.8	66.5
Girma A et al. (2022)	2020	Ethiopia	Adults	Simple random	PHQ-9 (> = 5)	386	98	44.3
Abate et al. (2021)	2021	Ethiopia	Pregnant women	Census	PHQ-9 (> = 10)	291	96.04	28.7
Eba Abdisa et al. (2021)	2019	Ethiopia	Adults	Systematic random	PHQ-9 (> = 5)	384	90.14	42.96
Gelaw et al. (2020)	2018	Ethiopia	Peri-natal women	Simple random	SRQ-20 (> = 6)	414	98.1	38.4
Seid et al. (2020)	2019	Ethiopia	Adults	Systematic random	PHQ-9 (> = 5)	395	93.5	20
Tiki et al. (2020)	2020	Ethiopia	Youths and adults	Systematic random	PHQ-9 (> = 10)	429	100	47.3
Bernard et al. (2020)	2016–2017	Côte d'Ivoire & Senegal	Older	Convenient	CES-D (> = 17)	334	100	17.9
Parcesepe et al. (2023)	2019–2020	Cameroon	Adults	N/A	PHQ-9 (> = 10)	426	N/A	20.4
Vavani B et al. (2022)	2019	Botswana	Adults	Convenient	CES-D (> = 16)	291	95.1	43.4
Olashore et al. (2022)	2019–2021	Botswana	Adolescents	Convenient	MINI-KID (N/R)	622	N/A	23.6

has proven effective for assessing postpartum depression. Research across these diverse settings has shown that the EPDS is a reliable and valid screening tool for postnatal depression.

The Beck Depression Inventory-II (BDI-II) has been validated for use among people living with HIV (PLHIV) in various African settings. In Ethiopia [116], the sensitivity and specificity were 86% and 83%, respectively. In comparison, studies in South Africa [117] have shown the BDI-II to exhibit sensitivity and specificity rates of 67% each, supporting its reliability in assessing depressive symptoms in this context.

The Hospital Anxiety and Depression Scale (HADS) has demonstrated high psychometric qualities in studies across African contexts, with Cronbach's alpha values frequently exceeding 0.7, indicating strong reliability. Research in countries such as Ethiopia [118, 119], and Nigeria [120, 121] has confirmed that the HADS exhibits good internal consistency. The Geriatric Depression Scale (GDS) has been validated in Nigeria, demonstrating good internal consistency, with a Cronbach's alpha of 0.85 [122].

The Mini International Neuropsychiatric Interview for Kids (MINI-KID) is a pediatric version of the original MINI, designed specifically for assessing mental health disorders in children and adolescents. Developed by psychiatrists in the United States and Europe, the MINI-KID provides a structured diagnostic interview format that identifies Axis I mental disorders according to both the DSM-IV and ICD-10 classification systems [123].

SRQ-20 was used to assess perinatal depressive symptoms. This tool has demonstrated superior performance in various dimensions when compared to the Edinburgh Postnatal Depression Scale (EPDS) in low-income settings [124]. A cut-off score of six or above was used to indicate the presence of perinatal depressive symptoms. In a community survey of pregnant women, the SRQ-20 demonstrated high convergent validity as a dimensional measure for depressive symptoms, achieving a sensitivity of 85.7% and a specificity of 75.6%. This indicates its effectiveness in identifying perinatal depressive symptoms within this population.

According to the Joanna Briggs Institute (JBI) quality assessment tool, 83% of the included studies achieved high quality, while 17% attained moderate quality. Authors of the included studies employed various sampling techniques: systematic random sampling ($n = 23$), simple random sampling ($n = 12$), convenience sampling ($n = 11$), consecutive sampling ($n = 8$), purposive sampling ($n = 3$), and census ($n = 1$). One study did not report the sampling technique used.

The estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

This study resulted that the overall pooled prevalence of depressive symptoms among people living with HIV was 33.32%, with a 95% confidence interval of (CI: 30.00, 36.65) (Fig. 2).

The statistical heterogeneity and publication bias of the reviewed articles

We have used the statistics (I^2) test to evaluate the statistical heterogeneity of the reviewed articles. We confirmed that there is a significant heterogeneity ($I^2 = 96.5\%$, $p = 0.000$) between the included primary studies, as shown in Fig. 2. On the other hand, we employed the funnel plot and Egger's test to evaluate the publication bias of the included studies. The funnel plot shows a symmetric distribution of studies (Fig. 3). The Egger's test bias level shows insignificant (> 0.05) with p-value of 0.113 (Table 2). This evidenced that there is no publication bias in this systematic review and meta-analysis.

Sensitivity analysis of the reviewed articles

We also conducted a leave-one-out sensitivity analysis to assess the key studies that significantly affect the heterogeneity between studies. Each finding was concluded based on the estimated 95% confidence interval of the pooled estimated prevalence of the overall estimated prevalence of depressive symptoms. Thus, we conclude that, with the omission of one study, the pooled prevalence of depressive symptoms among people living with HIV/AIDS in Africa remained unchanged in this analysis (Table 3).

Sub-group analysis of the reviewed articles

To determine the level of heterogeneity between reviewed studies, we have employed a sub-group analysis using the location (region) of the countries in which the studies were conducted, the assessment tools of the outcome variable depressive symptoms, and the specific population that participated. Based on the findings of this study, the estimated pooled prevalence of depressive symptoms in East Africa was higher than in West Africa, with a prevalence of 35.73% and 26.99%, respectively. Furthermore, the overall estimated prevalence of depressive symptoms among perinatal women was found to be almost similar to studies that included both youth and adulthood, with a prevalence of 39.29% and 38.42%, respectively. In contrast, the lowest prevalence was shown among adolescents, with a prevalence of 21.85%. Additionally, the estimated pooled prevalence of depressive symptoms, which was assessed through the Edinburgh Postnatal Depression Scale (EPDS), was higher (51.78%), while the depressive symptoms assessed through the Mini International Neuropsychiatric

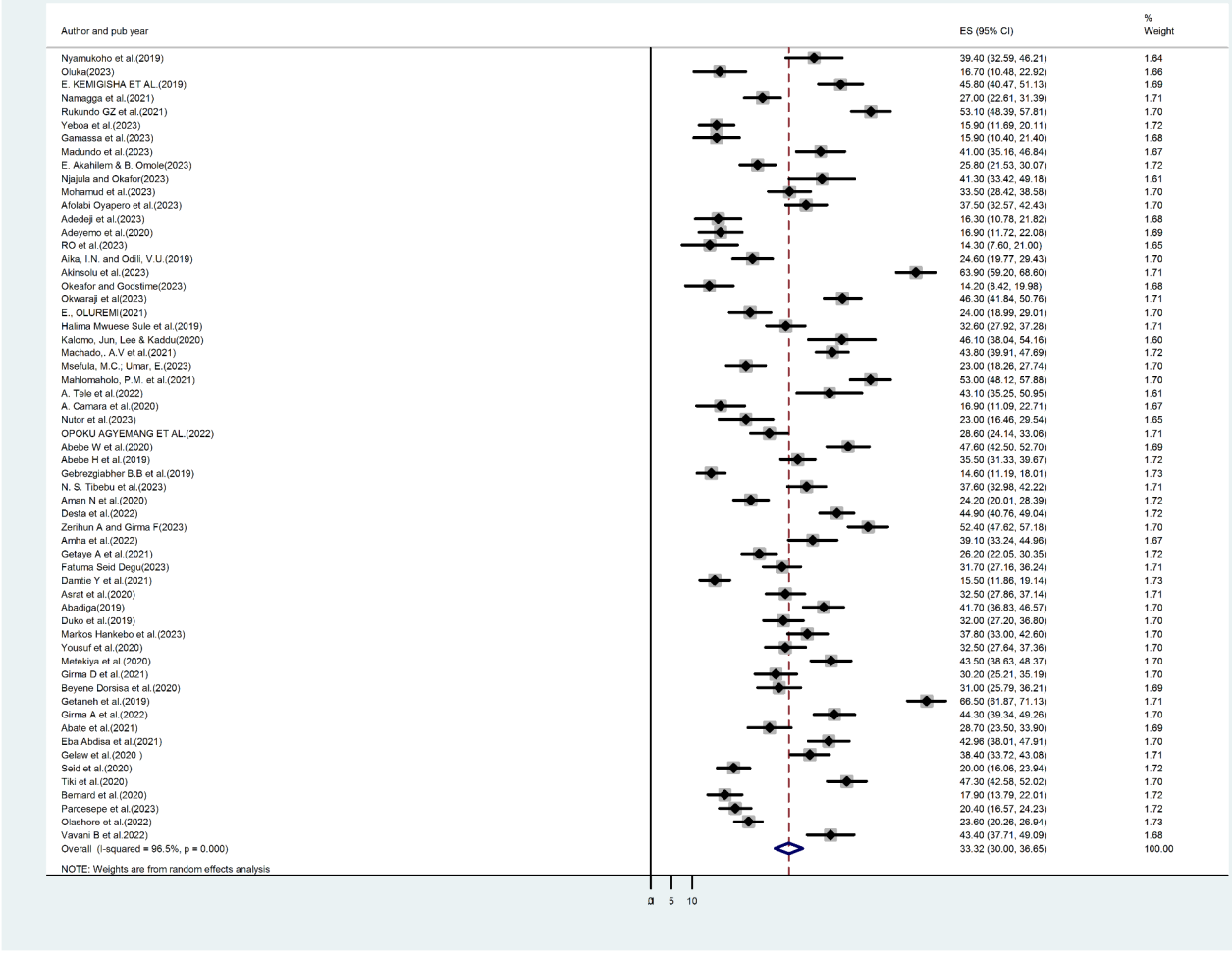

Fig. 2 The estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

Interview for Children and Adolescents (MINI) was lower (18.77%) than other assessment tools (Table 4).

Factors associated with depressive symptoms among people living with HIV in Africa

In this study, there are several factors that were significantly associated with depressive symptoms among people living with HIV in Africa. Sex (females), HIV-related perceived stigma, comorbid chronic medical illness, a CD4 cell count < 200, and poor social support are factors associated with depressive symptoms in the included primary articles. Being female (in eleven studies), HIV-related perceived stigma (in fifteen studies), poor social support (in ten studies), comorbid chronic medical illness (in five studies), and CD4 cell count < 200 (in five studies) are significantly associated with depressive symptoms.

The findings of this study indicated that female participants had 2.28 (CI: 1.92, 2.70) times higher odds of experiencing depressive symptoms compared to male participants. People living with HIV who had comorbid chronic medical illnesses and a CD4 cell count < 200 were 5.03 (CI: 3.04, 8.30) and 3.20 (2.00, 5.13) times more likely to suffer from depressive symptoms than their counterparts, respectively (Fig. 4). Those who had poor social support were 2.44 (CI: 1.59, 3.75) times more likely to suffer from depressive symptoms compared to participants who had high social support, whereas people living with HIV who had HIV-related perceived stigma had 3.59 (CI: 2.27, 5.23) times higher odds of experiencing depressive symptoms compared to participants without HIV-related perceived stigma (Fig. 5).

Discussion

The combined impact of depressive symptoms and HIV poses unique challenges across Africa due to diverse social, economic, and healthcare factors. Studies indicate that PLHIV in African countries have a higher risk of depressive symptoms, with prevalence estimates ranging from 20 to 40%. This elevated risk is attributed to factors, such as sociodemographic challenges, HIV-related

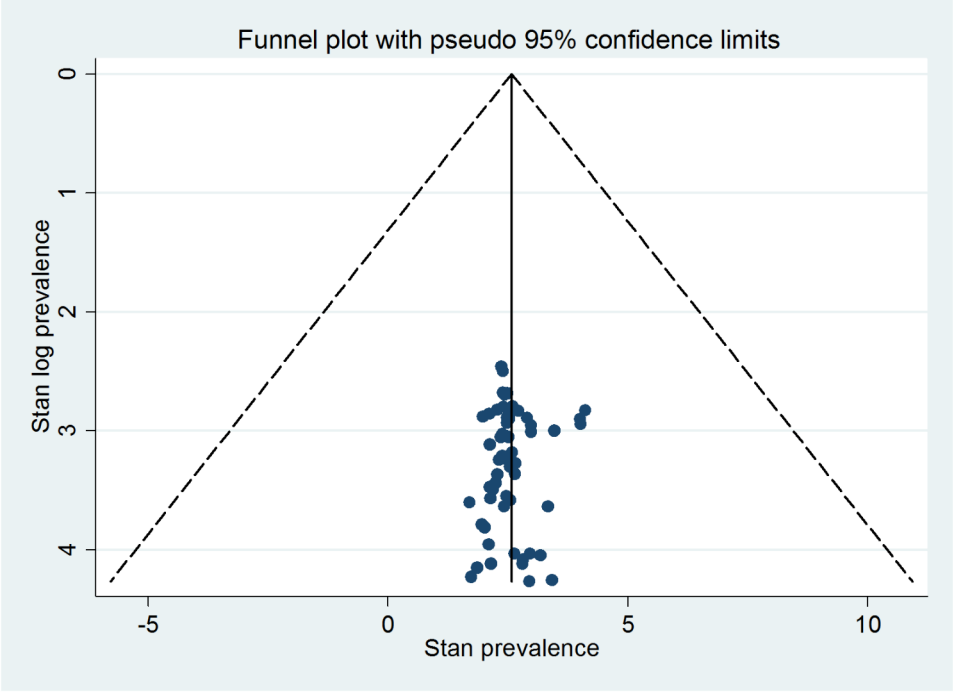

Fig. 3 Funnel plot of the included articles on the estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

Table 2 Egger's test of the included articles on the estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

Std_Eff	Coef.	Std. Err.	T	*P*>t	[95% Conf.Interval]
Slope	17.23444	9.635337	1.79	0.079	-2.059988, 36.52887
Bias	6.365301	3.954575	1.61	0.113	-1.553598, 14.2842

stigma, financial difficulties, and the chronic nature of HIV. Depression can reduce motivation to adhere to ART, impacting viral suppression and quality of life. Additionally, it has been linked to higher mortality rates in PLHIV, partly due to its effect on ART adherence and risky behaviors [125].

The systematic review and meta-analysis included 59 primary studies; all of which used a cross-sectional study design. The studies were conducted between 2014 and 2023, with publication dates ranging from 2019 to 2023. The studies were carried out across 17 African countries, highlighting a broad geographical range and the diverse conditions under which depressive symptoms among people living with HIV were examined. The highest number of studies came from Ethiopia ($n=26$), followed by Nigeria ($n=10$) and Uganda ($n=5$). The concentration of studies in specific countries may reflect stronger research capacity or a particular focus on HIV and mental health. The total sample included 20,157 participants, with a gender distribution of 63.1% female and 36.9% male. To ensure comprehensive data across all stages of life, studies were included on diverse groups: adolescents, youths, mixed youth and adults, adults, perinatal, pregnant, and postnatal women, as well as older adults.

The meta-analysis estimated a pooled prevalence of depressive symptoms among people living with HIV in Africa at 33.32% (95% CI: 30.00, 36.65), undergoing a substantial mental health burden in this population. Sensitivity analysis confirmed the robustness of this finding, showing that removing individual studies did not impact the overall prevalence. This finding is consistent with previous studies on depressive symptoms among African PLHIV [23] and aligns with global prevalence estimates for PLHIV [19]. However, it is lower than the prevalence reported in a review of studies on African PLHIV published between 2006 and 2017 [126]. Additionally, it falls below the estimates from a systematic review and meta-analysis that included studies from Russia, Uganda, and the USA [127], suggesting potential regional and contextual differences in depression prevalence among PLHIV.

The lower pooled prevalence of depressive symptoms among PLHIV in Africa may result from improved access to ART and greater community awareness of HIV. These factors have contributed to a reduction in stigma and discrimination associated with the disease, enhancing overall mental health outcomes [128, 129]. PLHIV now experience significantly better health outcomes and an improved quality of life, thanks to the greater accessibility and the wide spread availability of ART. Effective ART reduces viral load, thereby enhancing physical health and, subsequently, mental well-being [70]. Another possible reason for the lower prevalence of depressive symptoms

Table 3 Sensitivity analysis of the estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

Study omitted	Estimated prevalence (%)	[95% Conf. Interval]	
Nyamukoho et al. (2019)	33.22	29.86	36.588
Oluka (2023)	33.6	30.26	36.96
E. KEMIGISHA ET AL. (2019)	33.11	29.76	36.46
Namagga et al. (2021)	33.43	30.05	36.82
Rukundo GZ et al. (2021)	32.98	29.67	36.29
Yeboa et al. (2023)	33.63	30.3	36.96
Gamassa et al. (2023)	33.62	30.28	36.96
Madundo et al. (2023)	33.19	29.83	36.56
E. Akahilem & B. Omole (2023)	33.46	30.07	36.84
Njajula and Okafor (2023)	33.2	29.83	36.55
Mohamud et al. (2023)	33.32	29.94	36.7
Afolabi Oyapero et al. (2023)	33.25	29.87	36.63
Adedeji et al. (2023)	33.62	30.27	36.96
Adeyemoetal. (2020)	33.61	30.26	36.95
RO et al. (2023)	33.64	30.3	36.98
Aika, I.N. and Odili, V.U. (2019)	33.48	30.1	36.85
Akinsolu et al. (2023)	32.79	29.59	36.00
Okeafor and Godstime (2023)	33.65	30.32	36.98
Okwaraji et al (2023)	33.1	29.75	36.45
E., OLUREMI (2021)	33.49	30.12	36.85
Halima Mwuese Sule et al. (2019)	33.34	29.95	36.72
Kalomo, Jun, Lee & Kaddu (2020)	33.12	29.76	36.47
Machado,. A.V et al. (2021)	33.14	29.78	36.5
Msefula, M.C.; Umar, E. (2023)	33.5	30.13	36.87
Mahlomaholo, P.M. et al. (2021)	32.98	29.67	36.29
A. Tele et al. (2022)	33.16	29.8	36.52
A. Camara et al. (2020)	33.6	30.26	36.95
Nutor et al. (2023)	33.5	30.14	36.86
OPOKU AGYEMANG ET AL. (2022)	33.41	30.02	36.79
Abebe W et al. (2020)	33.1	29.73	36.42
Gebrezgiabher B.B et al. (2019)	33.65	30.36	36.95
N. S. Tibebu et al. (2023)	33.25	29.87	36.63
Aman N et al. (2020)	33.48	30.11	36.86
Desta et al. (2022)	33.12	29.76	36.48
Zerihun A and Girma F (2023)	32.99	29.68	36.31
Amha et al. (2022)	33.23	29.86	36.59
Getaye A et al. (2021)	33.45	30.06	36.83
Fatuma Seid Degu (2023)	33.35	29.97	36.74
Damtie Y et al. (2021)	33.64	30.32	36.95
Abebe H et al. (2019)	33.29	29.9	36.68
Asrat et al. (2020)	33.34	29.95	36.72
Abadiga (2019)	33.18	29.81	36.55
Duko et al. (2019)	33.35	29.96	36.73
Markos Hankebo et al. (2023)	33.25	29.87	36.63
Yousuf et al. (2020)	33.34	29.96	36.72
Metekiya et al. (2020)	33.15	29.79	36.51
Girma D et al. (2021)	33.38	30.00	36.76
Beyene Dorsisa et al. (2020)	33.36	30.00	36.74
Getaneh et al. (2019)	32.74	29.58	35.91
Girma A et al. (2022)	33.13	29.78	36.49
Abate et al. (2021)	33.4	30.03	36.78
Eba Abdisa et al. (2021)	33.16	29.79	36.52
Gelaw et al. (2020)	33.24	29.86	36.62

Table 3 (continued)

Study omitted	Estimated prevalence (%)	[95% Conf. Interval]	
Seid et al. (2020)	33.56	30.2	36.91
Tiki et al. (2020)	33.1	29.74	36.43
Bernard et al. (2020)	33.6	30.25	36.94
Parcesepe et al. (2023)	33.55	30.2	36.91
Vavani B et al.2022)	33.15	29.79	36.51
Olashore et al. (2022)	33.5	30.11	36.88
Combined	33.32	30.00	36.65

Table 4 Sub-group analysis of the estimated pooled prevalence of depressive symptoms among people living with HIV in Africa

Variables	Sub-groups	No of studies	Prevalence (95%CI)	I^2 (%)	*P*-value
Location of countries	East Africa	42	35.73(31.93, 39.54)	96.3	0.000
	West Africa	14	26.99(19.27, 34.72)	96.9	0.000
	Southern Africa	2	33.18(18.01, 48.35)	91.3	0.001
	Central Africa	1	20.4(16.57, 24.23)	N/A	N/A
	Overall	59	33.32(30.00, 36.65)	96.5	0.000
Population	Perinatal women	8	39.29(28.40, 50.188)	97.2	0.000
	Adulthood	36	34.1(29.85, 38.35)	96.5	0.000
	Adolescents	6	21.85(12.67, 31.02)	94.9	0.000
	Old age	2	31.78(4.15, 59.41)	97.3	0.000
	Both youths and adulthood	3	38.42(24.41, 52.43)	96.9	0.000
	Youths	4	28.76(23.34, 34.19)	82.8	0.001
	Overall	59	33.32(30.00, 36.65)	96.5	0.000
Assessment tools	PHQ-9	35	33.96(29.341, 38.59)	96.9	0.000
	CES-D	5	34.8(22.57, 47.02)	96.8	0.000
	BDI-II	4	33.74(24.74, 42.73)	94.3	0.000
	MINI-KID	3	18.77(12.88, 24.65)	76.4	0.015
	DASS-21	3	26.91(14.47, 39.35)	94.8	0.000
	HADS	4	28.45(21.8, 35.1)	86.0	0.000
	EPDS	2	51.78(27.77, 75.79)	97.0	0.000
	MINI-7	1	32.5(27.86, 37.14)	N/A	N/A
	SRQ-20	1	38.4(33.72, 43.1)	N/A	N/A
	Geriatric depressive symptoms scale	1	46.1(38.04, 54.16)	N/A	N/A
	Overall	59	33.32(30.00, 36.65)	96.5	0.000

among PLHIV may be the enhanced integration of mental health services, which has focused on providing holistic care for both physical and mental health needs [25, 130].

The pooled prevalence of depressive symptoms among PLHIV in the current review is significantly lower than the 50.8% reported in China [131]. This difference may be attributed to the timeframes of the included studies: the Chinese studies were conducted between 2004 and 2017, while the current review comprises data published after 2019. Over the years, there have been improvements in access to ART for better health outcomes and quality of life [70], as well as enhanced integration of mental health services and community awareness about HIV to reduce stigma and discrimination [128, 129].

In contrast, the current review's estimated pooled prevalence of depressive symptoms is higher than that reported in a study encompassing Africa, the USA, Thailand, and China [132]. The discrepancy may stem from difference in the age groups and socioeconomic factors of the study populations. While the current study included PLHIV of all age, comparison study focused on adolescents, who often show greater resilience, potentially protecting them against depressive symptoms [133]. Rutter (2013) discusses how adolescent resilience can mitigate the impact of chronic medical issues [134].

This systematic review and meta-analysis identified several significant predictors of depressive symptoms among PLHIV in Africa. Key factors include being female, experiencing HIV-related perceived stigma, having a CD4 cell count of less than 200, lacking social support, and suffering from comorbid chronic medical conditions.

Female participants living with HIV were more than twice as likely to experience depressive symptoms compared to their male counterparts. This significant gender disparity aligns with findings from studies conducted in Ethiopia [135] and globally [132]. Women often face

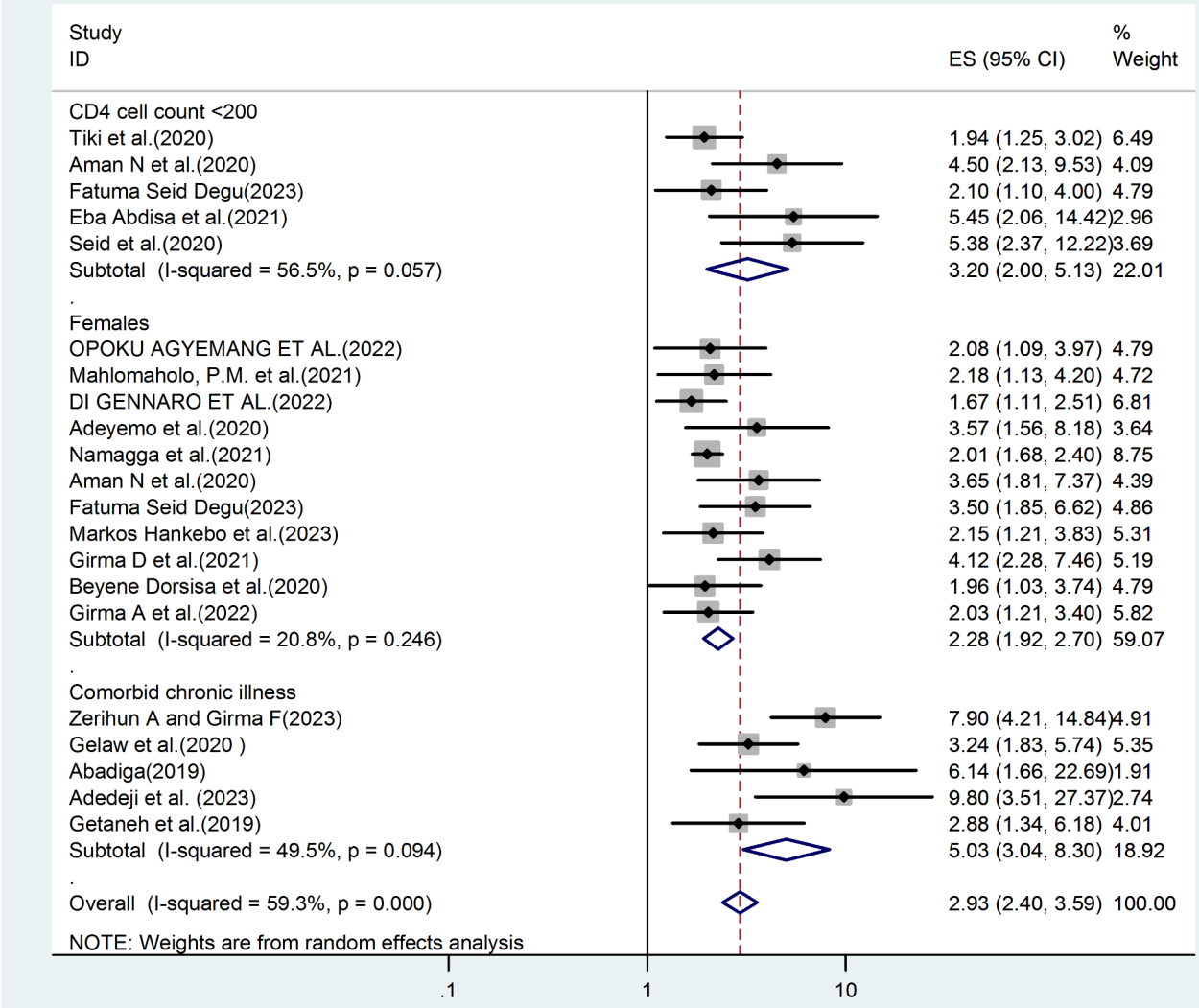

Fig. 4 Factors (female sex, comorbid chronic medical illness and CD4 count) significantly associated with depressive symptoms among people with HIV in Africa

higher social expectations and responsibilities [136], such as caring for children and family members, which can increase stress and elevate the risk of depressive symptoms. Women living with HIV often face compounded stigma due to their gender and health status, leading to increased feelings of loneliness and sadness [137]. Additionally, biological factors, such as hormonal changes from menstruation, pregnancy, and menopause, may make women more susceptible to depressive symptoms [138].

PLHIV who also have comorbid chronic medical illnesses are five times more likely to experience depressive symptoms compared to those without such conditions. This heightened risk is likely due to the added stress of managing multiple chronic non-communicable diseases, which complicates the already difficult task of managing HIV. The presence of comorbid chronic medical illnesses can exacerbate health challenges, increase medication burden, hinder nutritional intake, worsen chronic pain, and disrupt sleep patterns [139]. These factors collectively heighten the risk of developing depressive symptoms and other mental health issues [140].

PLHIV with a CD4 cell count of less than 200/mm^3 are three times more likely to experience depressive symptoms compared to those with higher counts. This finding aligns with research conducted in Ethiopia, which highlights the significant relationship between low CD4 counts and mental health issues [135]. A lower CD4 count often indicates advanced HIV infection, leading to greater illness severity and heightened vulnerability

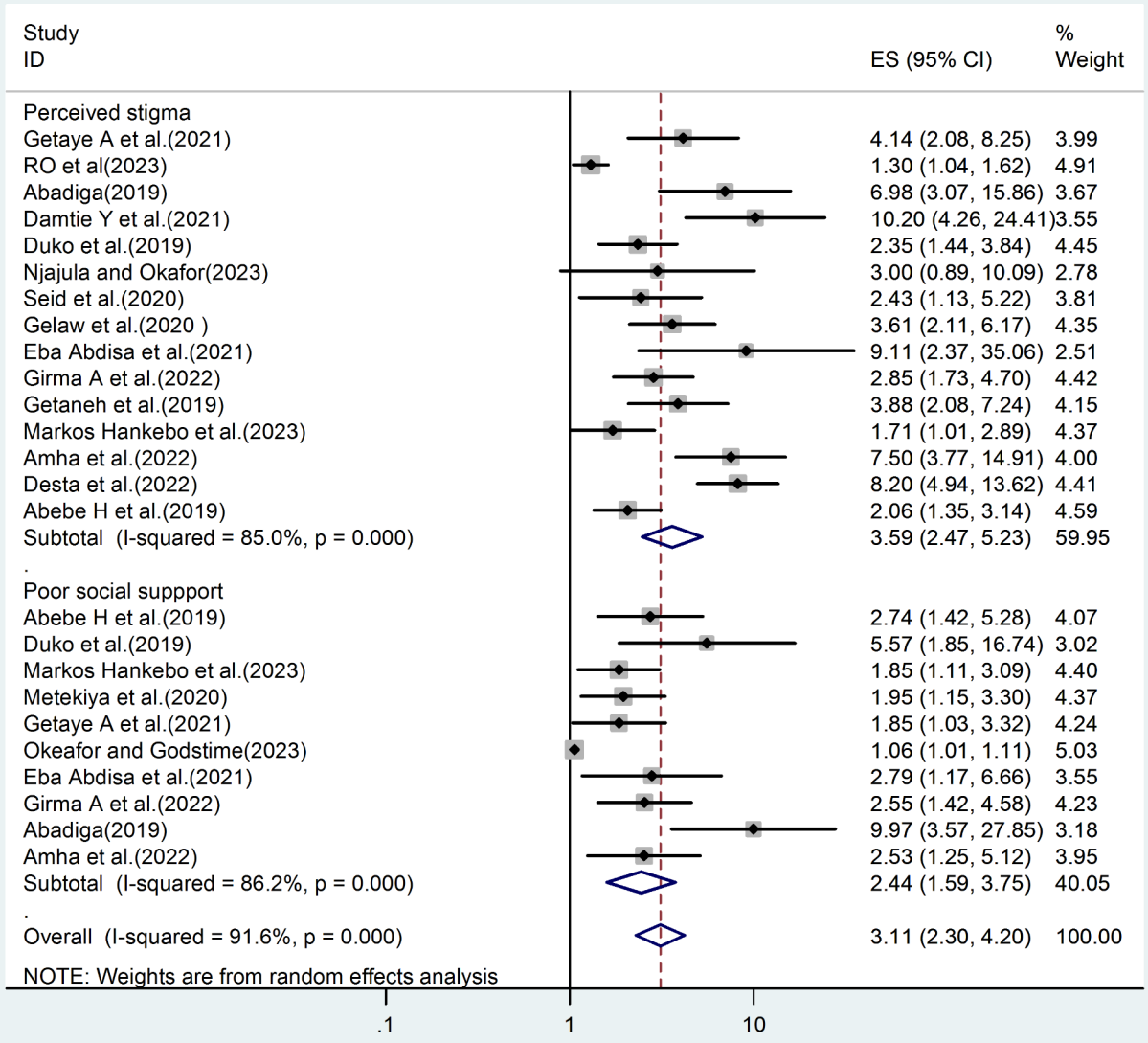

Fig. 5 Factors (social support and HIV-related perceived stigma) significantly associated with depressive symptoms among people with HIV in Africa

to opportunistic infections. The stress of managing such severe health complications can exacerbate feelings of helplessness and anxiety, contributing to depressive symptoms. Additionally, HIV's direct impact on the brain can alter neurotransmitter levels, further influencing mood disorders. Those with low CD4 counts may also face socioeconomic challenges, such as financial instability and limited access to healthcare, which can negatively affect mental health.

Individuals with poor social support are over twice as likely to experience depressive symptoms compared to those with high social support. The correlation is supported by a study in Ethiopia [141] and is likely due to factors such as illness- related debilitation [142], food insecurity [143], isolation, and lack of education [144]. Social support enhances mental health act as a protective barrier against life stressors, improving overall wellbeing for PLHIV [145]. It provides crucial social integration, emotional, practical, and informational supports, which can significantly reduce depressive symptoms and enhance quality of life [146]. The relationship between social support and depression is complex and bidirectional. While inadequate social support has been associated with poor ART adherence, leading to worsening health outcomes, depression itself may contribute to social withdrawal, reduced motivation for self-care, and poor adherence, creating a reinforcing cycle of negative health effects.

This study found that participants experiencing HIV-related perceived stigma were nearly four times more likely to suffer from depressive symptoms compared to those participants without perceived stigma, a finding consistent with studies from Ethiopia [135], East Africa [141, 147], and China [148]. The belief signifies a moral failing or a death sentence likely contributed to this association between stigma and depressive symptoms [149, 150]. Perceived stigma can negatively impact mental health by leading to stress, social isolation, internalized stigma, avoidance of healthcare, reduced social support, and maladaptive coping mechanisms [151–153].

Strengths and limitations of the study

In this systematic review and meta-analysis, multiple studies ($n = 59$) were included, which allowed for a thorough and reliable assessment of the prevalence of depressive symptoms among PLHIV in various African countries and demographic groupings. The review's coverage of 17 African countries provided a wide geographic perspective on the problem. The review carried out in-depth sub-group analyses according to demographic data, area, and assessment tools, offering comprehensive insights into variables affecting the prevalence of depressive symptoms. The results are more reliable because Egger's test, funnel plot, and leave-one-out sensitivity analysis were employed to account for publication bias.

Although this study provides valuable insights on the incidence and factors associated with depressive symptoms among people living with HIV/AIDS in Africa, it should be considered constrained in particular aspects. The reviewed studies were conducted through a cross-sectional study design, which allows them to detect correlations but not causality. Despite our attempts to demonstrate publication bias using Egger's test and funnel plots, we have confirmed the presence of significant heterogeneity across the evaluated articles. Due to this bias, prevalence estimates may be skewed, giving rise to an inaccurate representation of the true burden of depressive symptoms among PLHIV. Because each depressive symptoms assessment method may have variable sensitivity and specificity, using multiple tools across studies may result in inconsistent prevalence estimates. We acknowledge the methodological challenges involved and have conducted subgroup analyses to account for differences in assessment tools. Although this study synthesizes data from 17 African countries, certain regions—particularly Central Africa and Northern Africa—are underrepresented. This may reflect disparities in research infrastructure, funding, and publication trends rather than an absence of depressive symptoms among PLHIV in these regions. Despite this limitation, our findings provide valuable insights into the burden of depressive symptoms among PLHIV across Africa, reinforcing the need for more geographically inclusive research.

Conclusion and recommendations

The meta-analysis and systematic review provide a comprehensive overview of depressive symptom prevalence among PLHIV in Africa, revealing that one-third experience depressive symptoms, with notable regional and demographic variation. The findings highlight an urgent need for targeted mental health interventions. Key predictors of depressive symptoms identified include being female, experiencing HIV-related perceived stigma, having comorbid chronic illnesses, having a CD4 cell count less than 200, and lacking social support. Based on the findings, it is recommended that mental health interventions be integrated into HIV care across Africa to address depressive symptoms effectively. Interventions should focus on high-risk groups, including women, individuals with low social support, those experiencing HIV-related stigma, and people with low CD4 counts or chronic comorbidities. Enhancing social support systems, reducing stigma, and improving accessibility to antiretroviral and mental health services are crucial steps toward improving the quality of life for PLHIV. Future studies should address this gap to provide a more comprehensive representation of mental health challenges across all African regions, particularly Central and Northern African countries. Additionally, they should prioritize culturally validated depression screening measures to enhance comparability across diverse African contexts.

Implications of the study

Pooling data from multiple studies provides a more comprehensive estimate of depressive symptoms among PLHIV in Africa, despite variations in assessment tools and study settings. While individual studies provide valuable insights, meta-analysis helps identify broader trends and informs regional mental health policies. The findings highlight the critical link between mental health and HIV care in Africa, revealing that depressive symptoms are prevalent among PLHIV and significantly influenced by gender, social support, stigma, and health factors like low CD4 counts and comorbidities. This underscores the need for a mental health perspective in HIV care, advocating for integrated, holistic models that address both physical and mental health. For policymakers, the findings support calls for mental health resources within HIV services, as addressing mental health can improve HIV outcomes. For practice, integrating mental health screenings and targeted interventions in HIV care settings is essential for addressing depressive symptoms, particularly in high-risk groups. Finally, the results highlight gaps in understanding region-specific predictors of depression among PLHIV, suggesting the need for

diverse, longitudinal studies across African populations to inform culturally responsive interventions.

Abbreviations

HIV/AIDS	Human Immune Virus/Acquired Immune Deficiency Syndrome
N/A	Not Applicable
PHQ-9	Patient Health Questionnaire—9 items
CES-D	Center for Epidemiological Studies—Depression Scale
BDI-II	Beck's Depression Inventory
HADS	Hospital Anxiety and Depression Scale
JBI	Joanna Briggs Institute
MINI-KID	Mini International Neuropsychiatric Interview for Children and Adolescents
EPDS	Edinburgh Postnatal Depression Scale
GDS	Geriatric Depression Scale
UNAIDS	The joint United Nations program on Acquired Immune Deficiency Syndrome
and SRQ-2	The WHO 20 items self-reporting questionnaire (SRQ-20)

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12888-025-06766-8.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

Acknowledgements
The authors express their gratitude to the University of Gondar for accessing internet service and office during the whole time of the study.

Author contributions
Writing– original draft: GT, SF, TT, GR, YAW, GMT, and GK. Writing– review & editing: GT, ATA, FA, GN, MK, TTA, and GWG. Conceptualization: GT, and TT. Data curation: GT, SF, and FA. Formal analysis: GT, GMT, and GR. Investigation: GT, TTA, GN and GMT. Methodology: GT, and GWG. Resources: GWG, MK and GK. Software: GT, ATA, and GR. Supervision: SF, YAW, and GMT.

Funding
No funding.

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Not applicable.

Human ethics and consent to participate
Not applicable.

Competing interests
The authors declare no competing interests.

Clinical trial number
Not applicable.

Author details
[1]Department of Psychiatry, School of Medicine, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[2]Department of Clinical Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[3]Department of Pediatrics and Neonatal Nursing, School of nursing, College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia
[4]Department of Medical Nursing, School of nursing, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia
[5]Department of Social and administrative pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia

Received: 27 May 2024 / Accepted: 24 March 2025
Published online: 02 April 2025

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