

**KEYWORDS:** prevalence; Anxiety; COVID-19; Systematic review; Meta-analysis; Ethiopia.

## PREVALENCE OF ANXIETY DURING PANDEMIC OF COVID-19 IN ETHIOPIA: A SYSTEMATIC REVIEW AND META-ANALYSIS



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### ABSTRACT

#### Introduction:

The Coronavirus Disease-19 pandemic has halted critical mental health services in many countries worldwide while the demand for mental health is increasing. This article sought to systematically review and meta-analysis-based studies on anxiety conducted during the COVID-19 pandemic in Ethiopia.

#### Methods:

Pub Med, Web of Science, Scopus, Google Scholar, African Journals Online, and Cochrane Library were searched. The data were extracted using Microsoft Excel and analyzed by using STATA version 14. Publication bias was checked by funnel plot, contour-enhanced funnel plots, trim and fills analysis, and more objectively through Begg and Egger's regression test, with  $P < 0.05$  considered to indicating potential publication bias. The heterogeneity of studies was checked using I<sup>2</sup> statistics. Pooled analysis was conducted using a weighted inverse variance random-effects model. Subgroup analysis was done by region. A sensitivity analysis was employed.

#### Results:

A total of eleven studies were included in the systematic review and Meta-analysis. The pooled prevalence of anxiety during the COVID-19 pandemic in Ethiopia was 35.88% (95% CI 26.01, 44.72) with significant heterogeneity between studies ( $I^2 = 98.3\%$ ;  $P\text{-value} \leq 0.001$ ). The subgroup analysis based on the region revealed that the prevalence of depression during the COVID-19 pandemic in Ethiopia was found to be 42.79% in Amhara, 36.86% in Oromia, 35.44% in South, and 30.77% in Addis Ababa.

#### Conclusions:

This study revealed that the pooled prevalence of anxiety during the COVID-19 pandemic in Ethiopia was high. Moreover, the prevalence of anxiety differed by region. Therefore, It is important to address mental health during the COVID-19 pandemic should be placed into the national mental public health policies to improve population mental health during this crisis.

#### Introduction

The Novel Coronavirus Disease-19 (COVID-19) pandemic started in China is becoming a global health threat (1). The Virus is registered as the prevalent outbreak of atypical pneumonia since the Severe

Acute Respiratory Syndrome (SARS) outbreak in 2003(2). According to a new WHO survey 2020, the COVID-19 pandemic has halted critical mental health services in 93% of countries worldwide while the demand for mental health is increasing. This world survey provides the first global data presenting the overwhelming impact of COVID-19 on access to mental health services and underscores the urgent need for increased funding (3).

From experience, epidemic or pandemic viral diseases such as Ebola, Swine Flu (H1N1 subtype), Middle East Respiratory Syndrome (MERS), and SARS were the cause of huge health emergencies in the World. These diseases had overwhelmed people and caused massive morbidity and mortality and also expansively increased profound psychological disorders; depression, and anxiety (4). Similarly, COVID-19 is known to cause serious physical disorders, like cardiovascular and respiratory disorder (5), it attacks multi-organ systems frequently affects mental health(6) and the psychological well-being of the population (7) in which people with background medical diseases were at high risk(8). The pandemic is influencing mental health and causing psychological stress in the population with underlying medical problems, especially those who have chronic diseases (9).

In Ethiopia, approximately 1.7 % of the national health expenditure was spent on mental health services. Hence, the government of Ethiopia has now launched a national mental health strategy that would serve to deliver a comprehensive and integrated service to the mental health needs of Ethiopians (10).

There are a variety of ways the pandemic has likely affected mental health, particularly with widespread social isolation resulting from necessary safety measures. Loss of varied daily routines, less physical activity, and social contacts may have led to boredom and frustrations. These changes have been regarded as the foremost precipitators of psychological problems during the lockdown (11).

After the COVID-19 pandemic outbreak, prevention and control measures like quarantining, closing and suspension of transportations, closing schools, avoiding public meetings, and even refraining from different important public and family events may rescue the general population from psychological distress due to reduced autonomy and issues like income, job, security and safety issues(12).

Meanwhile, COVID-19 itself can lead to mental complications such

as anxiety and depression, in certain subsets of the population (13). Social isolation, in general, has been linked to both physical and mental illness (14). A study of psychological effects in selected quarantined people found that reports of negative mental effects were common. These included symptoms of post-traumatic stress disorder, confusion, anger, and (15).

No systematic review is assessing the prevalence of anxiety during the COVID-19 pandemic in Ethiopia. Given the increasing number of articles addressing anxiety published in Ethiopia, we conducted a systematic review and meta-analysis of available studies to understand the prevalence of anxiety in Ethiopia during the pandemic of COVID-19 to obtain more evidence.

### Significance for public health

Because of the pandemic of COVID-19, many COVID-19-related problems have been occurring that affect the mental health status of individuals. Preventive measures like quarantine, social distancing, and suspension of transport are predisposing factors for mental health issues. Further, it affects people's income has adversely affected many people's mental health, and created new obstacles for people already suffering from mental illness. This review is an effort to show that secure mental health among the population during the COVID-19 Crisis in Ethiopia.

### Design and Methods

#### Search strategy and information sources

An extensive data search was performed on Pub Med, Web of Science, Scopus, Google Scholar, Cochrane library and African Journals Online (AJOL) databases were used to get the research articles. The search strategy made in PubMed was: Search ((((((anxiety [tw] OR anxiety "[MeSH Terms] psychological disorder [tw] OR mental health crisis [tw] OR mental health problem [tw] OR mental)) OR psychological disorder "[MeSH Terms]) OR mental health crisis [tw] OR mental health problem [tw] OR mental)) AND (Anxiety disorder [tw] or anxiety [tw])) OR emotional response [tw] OR psychological distress [tw])) AND (COVID-19 [tw] OR new corona virus [tw] OR Severe Acute Respiratory Syndrome Coronavirus 2 [tw])) OR ("COVID-19"[MeSH Terms] OR "COVID-19 Vaccines"[MeSH Terms])) AND Ethiopia

We've conducted the systematic review per the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines 2009 (16).

### Inclusion and exclusion criteria

Studies were included if: reported an observational study on the prevalence of anxiety during the COVID-19 outbreak in Ethiopia; they described the methods used to assess or diagnose depression; the full-text was available; a study conducted on all populations; articles published in the English language were considered.

Studies were excluded if: unrelated research works; studies without sufficient data; duplicate sources; pieces of research with unclear methods; Interventional studies; case reports; articles that their full text was not available: an attempt was made to contact the corresponding author; Review article.

### Study selection and Data extraction

Retrieved articles were exported to the reference manager software; endnote software was used to remove duplicate studies. Three independent reviewers screened the title and abstract. The disagreement was handled based on one established article selection criteria. Data were extracted using a standardized data extraction format prepared in Microsoft Excel by five independent authors. Any difference during extraction was solved through discussion. The name of the first author, study area and region, the study design, year of publication, study population, sample size, and prevalence of anxiety was collected.

Two independent authors appraised the quality of the studies. The Joanna Briggs Institute (JBI) quality appraisal checklist was used (17). When there is any disagreement all the three authors discussed and resolved it. The critical appraisal checklist has 8 parameters with yes, no, unclear, and not an applicable option. The parameter involves the following questions: (1) Where the criteria for inclusion in the sample clearly defined?, (2) Were the study subjects and the setting described in detail?, (3) Was the exposure measured validly and reliably?, (4) Were objective, standard criteria used for measurement of the condition?, (5) Were confounding factors identified?, (6) Were strategies to deal with confounding factors stated?, (7) Were the outcomes measured validly and reliably?, and (8) Was appropriate statistical analysis used?. Studies were considered low risk when they scored 50% and above of the quality assessment indicators.

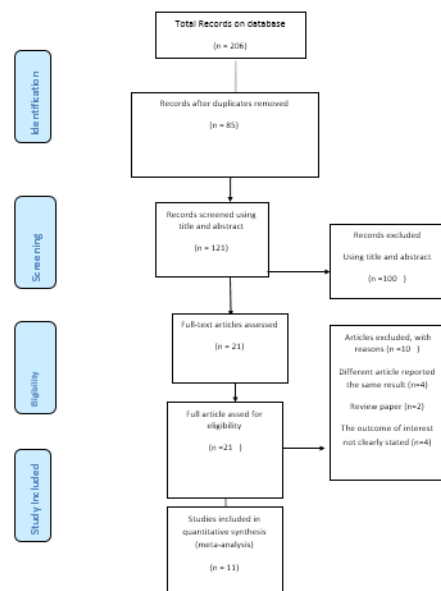
### Statistical analysis

The data were extracted using Microsoft Excel and analyzed by using STATA version 14 statistical software. Publication bias was checked by funnel plot and more objectively through Begg and Egger's regression tests, with  $P < 0.05$  considered to indicating potential publication bias (18, 19). A trim and fill analysis was done to see the effect of publication bias (20). It adds studies to make the distribution symmetrical. The presence of significant between-study heterogeneity was assessed using Cochrane Q statistic. I<sup>2</sup> was used to quantify between-study heterogeneity, in which a value of 0, 25, 50, and 75% represented no, low, medium, and in-creased heterogeneity, respectively (21). A forest plot was used to visualize the presence of heterogeneity. Since we found a high level of heterogeneity, we used a random-effect model for analysis to estimate the pooled effect (22). Subgroup analysis was done by region. A leave-one-out sensitivity analysis was employed to see the effect of a single study on the overall meta-analysis estimate. The result was presented in the form of text, tables, and figures.

## Result

### Selection of included studies

Database search resulted in a total of 206 research articles. Among these studies, 85 duplicate studies were removed, and 100 studies were excluded after reviewing their titles and abstracts. At the eligibility evaluation phase, out of the remaining 21 studies, 10 articles were removed after the examination of their full text, and similarly by considering the inclusion and exclusion criteria. Finally, 11 studies (22-30) with 4,482 participants were included in the analysis. All studies were cross-sectional studies and reported the prevalence of anxiety during the COVID-19 pandemic (Fig. 1)



### Quality assessment

**Figure 1: PRISMA diagram showing studies used for Systematic Review and Meta-analysis of the prevalence of Anxiety COVID-18 during the pandemic in Ethiopia.**

**Description of included studies**

The characteristics of all included studies were presented in Table 1. The author's name, publication year, study design, sample size, region, and the percentage of depression. Of these 11 studies, 4 were conducted in Addis Ababa (23, 25, 29, and 32), 2 of which were conducted in the Amhara region (28, 30, and 31), 3 studies were conducted in Oromia (24, and 26), 2 study was conducted in South region (27, and 33). All selected studies were evaluated for methodological quality based on The Joanna Briggs Institute (JBI) cross-sectional quality assessment method. None of the studies were excluded based on the quality assessment criteria (Table 1).

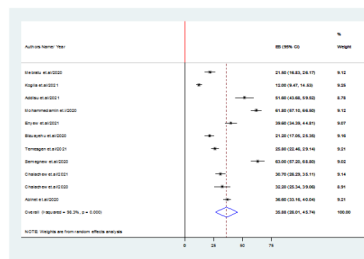
**Table 1; Descriptions of the studies used in the systematic review and meta-analysis for the prevalence of anxiety during the COVID pandemic in Ethiopia.**

Authors Name/ Year	study setting	Region	Study design	sample Size	Prevalence	Study Quality
Mebratu et.al/2020(22)	Addis Ababa	Addis Ababa	Cross-sectional	297	70.7	Low risk
Kogila et.al/2021(23)	Kelem Wollega	Oromia	Cross-sectional	634	15.8	Low risk
Addisu et.al/2021(24)	Addis Ababa	Addis Ababa	Cross-sectional	153	51	Low risk
Mohammedamin et.l/2020(25)	Metu Karl referral hospital	Oromia	Cross-sectional	411	55.7	Low risk
Chalachew et.al/2020(26)	Dilla University Referral Hospital	South	Cross-sectional	178	32.2	Low risk
Enyew et.al/2021(27)	University of Gondar	Amhara	Cross-sectional	338	40.2	Low risk
Bizuayehu et.al/2020(28)	St.peter Specialized Hospital	Addis Ababa	Cross-sectional	373	36.5	Low risk
Temesgen et.al/2021(29)	Gondar town	Amhara	Cross-sectional	660	32	Low risk
Tesfaye et.al/2020(30)	Eastern Hararghe Zone	Oromia	Cross-sectional	265	66.4	Low risk
Chalachew et.al/2021(32)	Addis Ababa	Addis Ababa	Cross-sectional	420	30.7	Low risk
Abinet et.al/2020(33)	Gamo Gofa, Konso and South Omo zone	South	Cross-sectional	752	36.6	Low risk

**Prevalence of anxiety during COVID-19 pandemic in Ethiopia**

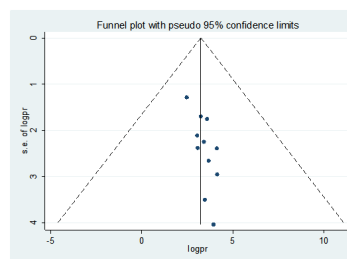
The prevalence of anxiety using the included studies ranged from 12 to 61.8 % ( 24 and 26). The pooled prevalence of anxiety during COVID-19 in Ethiopia was 35.88% (95% CI 26.01, 45.72) (Figure b). The random-effect model was used to analyze the pooled prevalence, however, a high and significant heterogeneity among the included studies ( $I^2 = 98.3\%$ ;  $P\text{-value} \leq 0.001$ ) was observed (Fig. 2). Based on the subgroup analysis by study region, the highest prevalence of anxiety was in the Amhara region 42.79% (95% CI 21.57, 63.83) and the lowest was in Addis Ababa 30.77% (95% CI 20.34, 41.29). However, there was significant heterogeneity in the included studies (Figure 2).

**Figure 2; Forest plot of the prevalence with corresponding 95% CIs of the nine studies on anxiety during COVID-19 pandemic.**



**Publication bias**

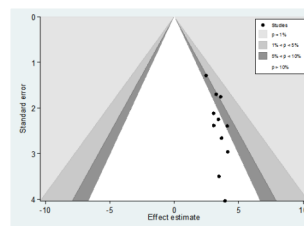
The presence of publication bias was assessed using a funnel plot, Egger, and Begg regression test at a 5% significant level. There was statistical evidence of publication bias. A funnel plot showed some asymmetrical distribution, the Begg and Egger tests were statistically significant with a p-value = 0.0001 and p-value = 0.014 respectively (Fig 3).



**Figure 3: Funnel plots for publication bias of prevalence of anxiety during COVID-19 pandemic in Ethiopia**

**Counter-enhanced funnel plot**

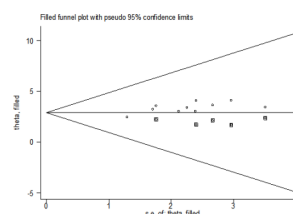
The funnel plot was asymmetric and showed a small-study effect. The counter-enhanced funnel plot makes a difference in us recognizing between publication bias and other causes of asymmetry. It showed that small studies were found not only in the area of statistical significance (shaded area) but also in the areas of non-statistical significance (white area). So the asymmetry may have been caused by several factors and not exclusively by publication bias (Figure 4).



**Figure 4; Contour-enhanced funnel plots publication bias of prevalence of anxiety during COVID-19 pandemic in Ethiopia.**

**Trim and fill analysis**

Begg and Egger's regression test p-value of the study were <0.001 and 0.014 respectively, which showed the presence of publication bias. Also, asymmetric distribution was observed in the funnel plot (Figure c). The trim and fill analysis showed the presence of four unpublished studies (figure 5).



**Figure 5; Filled funnel plots for publication bias of prevalence of anxiety during COVID-19 pandemic in Ethiopia**

### A leave-out-one sensitivity analysis

A leave-out-one sensitivity analysis was done to evaluate the effect of each study on the pooled prevalence of anxiety during the COVID-19 pandemic by excluding each study step-by-step. The result showed that the excluded study didn't bring significant change to the estimated prevalence of anxiety during the COVID-19 pandemic (Table 2).

**Table 2 A-leave-out -one sensitivity analysis for the prevalence of anxiety COVID-19 during the pandemic in Ethiopia**

Study omitted	Pooled Estimate	95% CI
Mebratu et.al/2020 (22)	37.33	26.61-48.05
Kogila et.al/2021  (23)	38.29	29.21-47.37
Addisu et.al/2021  (24)	34.36	24.14-44.59
Mohammedamin et.l/2020 (25)	33.23	24.37-42.08
Enyew et.al/2021  (26)	35.51	24.91-46.11
Bizuayehu et.al/2020 (27)	37.37	26.56-48.18
Temesgen et.al/2021 (28)	36.99	25.68-48.15
Semegnew et.al/2020 (29)	33.17	23.89-42.53
Chalachew et.al/2020(32)	36.24	25.68-46.80
Chalachew et.al/2021 (30)	36.41	25.52-47.30
Abinet et.al/2020(33)	35.82	24.77-46.87

### Subgroup analysis

The subgroup analysis based on the region revealed that the prevalence of anxiety during the COVID-19 pandemic in Ethiopia was found to be 42.79 % in Amhara, 36.86% in Oromia, 35.44% in South, and 30.77% in Addis Ababa (Table 3).

**Table 3; the pooled prevalence of anxiety, 95% CI, and heterogeneity estimate with a p-value for subgroup analysis**

Variable	Characteristics	The pooled prevalence of depression 95%(CI)	I2(p-value)
Variable	Addis Ababa	30.77(20.34-41.29)	94.3%(≤0.0001)
	Amhara	42.79(21.57-63.83)	98.6% (≤0.0001)
	Oromia	36.86(-11.94-85.66)	99.8%(≤0.0001)
	South	35.44(31.65-39.24)	20.7%(=0.26)

### Discussion

To the best of the researchers' knowledge, this is the first systematic review of all available studies on the prevalence of anxiety during the COVID-19 pandemic in Ethiopia. Systematic review and Meta-analysis confers greater power than individual studies to estimate a more accurate prevalence of anxiety. In this study, we estimated the pool prevalence of anxiety during the COVID-19 pandemic outbreak by taking eleven studies done in Ethiopia. Considering this, anxiety prevalence was ranged from 12% % to 61.8 % (24, and 26). In this systematic review and meta-analysis, the overall prevalence of anxiety during the COVID-19 pandemic was found to be 35.88% (95% CI 26.01, 45.72).

In this systematic review and meta-analysis, eleven studies suggest that the pooled prevalence of anxiety in the Ethiopian population during the COVID-19 outbreak is 35.88% (95% CI 26.01, 45.72). The highest prevalence of anxiety was reported in the Amhara region and the smallest prevalence was reported in Addis Ababa. The finding of this study was consistent with a survey conducted in Saudi Arabia among COVID-19 pandemic outbreaks which were 30.4% (34).

The finding was higher than research conducted in the United State of America among Healthcare Workers (35). The finding of this study was lower than compared to a finding from in America which was 56.7% (36). However, the finding was higher than those studies

conducted in the United Arab Emirates at 28.0% and Pakistan at 21.8% (37, 38). The result was slightly similar to the finding in Canada among women during the COVID-19 pandemic outbreak which was 31.39% (39).

The World Health Organization estimated that 3.6 % of the global population was living with anxiety disorder in 2015. In low- and middle-income countries, the burden of disease caused by common mental illness, such as depression, stress, and anxiety, and chronic medical disease, such as diabetes, Asthma, Hypertension, is high (40). Our finding shows that the prevalence of depression during the COVID-19 pandemic in Ethiopia might be 10 times higher than the previous data. This implies a significant impact of the existing pandemic situation on mental health that individual and population-level strategies should be targeted. This developing situation requires joint efforts from the scientific community to contribute to the population surveillance during quarantine and the COVID-19 outbreak in Ethiopia.

### Strength and Limitation of the study

We searched articles systematically and included studies using clearly defined criteria to minimize selection bias. It is possible, we missed some relevant literature as only articles in English and some databases were not searched (e.g. EMBASE, HINARI, etc.). Additionally, we included preprint articles, not yet peer-reviewed, and results from these studies may change in the future and methodological biases may be present.

### Conclusion

This systematic review and meta-analyses revealed that the pooled prevalence of anxiety during the COVID-19 pandemic in Ethiopia was high. Moreover, the prevalence of anxiety differed by region. Therefore, it is important to address mental health during the COVID-19 pandemic should be placed into the national mental public health policies to improve population mental health during this crisis.

### Declaration

#### Ethical approval

Not Applicable.

#### Consent for publication

Not applicable.

### Availability of data and materials

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

### Conflict of interest statement

We declared that we have no conflict of interest.

### Funding

Not Applicable.

### Author's contribution

KA, EA, and MM initiated the research, conceptualized, searched articles, and screened based on the eligibility criteria, and did the statistical analysis of this manuscript. KA and NA participated in data extraction and screening. KA and EA contributed to statistical analysis and writing-up of the manuscript draft. KA finalized the manuscript and communicated with the journal. All authors read and approved the final draft of the manuscript.

### Research registration number

Not applicable.

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