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Research Article

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Abstract

Background: The ongoing Coronavirus disease 2019 (COVID-19) pandemic has significantly impacted the physical and mental health of the general population worldwide, with healthcare workers (HCWs) at particular risk. The pandemic's effect on healthcare workers' mental well-being has been severe and characterized by depression, anxiety, work-related Stress, sleep disturbances, and post-traumatic stress disorders (PTSD). Therefore, protecting the mental well-being of HCWs is a significant priority. This review is to determine identifiable risk factors for adverse mental health outcomes and any protective or coping measures to mitigate the adverse effects of the COVID-19 crisis among HCWs in sub-Saharan Africa.

Methods: We performed a literature search using PubMed, Google Scholar, Cochrane Library, and Embase for relevant materials. We obtained all articles published between March 2020 and April 2022 relevant to the review subject and met pre-defined eligibility criteria. We selected twenty-three articles for the initial screening, and we included twelve papers for the final review.

Result: A total of 5,323 participants in twelve studies predominantly from Ethiopia (08 studies), one from Uganda, Cameroon, Mali, and Togo fulfilled the eligibility criteria. Investigators found that 16.3–71.9% of HCWs with depressive symptoms, 21.9-73.5% with anxiety symptoms, 15.5-63.7% experienced work-related stress symptoms, 12.4-77% experienced sleep disturbances, and 51.6-56.8% reported PTSD symptoms. Healthcare workers, especially those working in emergency, intensive care units, infectious disease wards, pharmacies, and laboratories, were at higher risk of developing adverse mental health impacts.

HCWs had profound fear, were very anxious and stressed with the high transmission rate of the virus and high death rates among their patients and lived in constant fear of infecting their families and themselves. Other sources of fear and work-related Stress were the lack of standardized PPEs and available treatment and vaccines to protect themselves against the virus. HCWs faced stigma, abuse, financial problems, and lack of support.

Conclusion: The prevalence of depression, anxiety, insomnia, and PTSD in HCWs in sub-Saharan Africa during the COVID-19 pandemic has been high. Several organizational, community, and work-related challenges and interventions were identified, including improvement of workplace infrastructures, adoption of correct and shared infection control measures, provision of standardized personal protective equipment (PPE), social support, and the implementation of resilience training programs. Setting up permanent multidisciplinary mental health teams at regional and national levels to deal with mental health issues and providing psychological support to patients and HCWs, supported with long-term surveillance and sufficient budgetary allocation, is recommended.

1.0 Introduction

When the coronavirus disease 2019 (COVID-19) pandemic was declared in March 2020 [1], healthcare workers (HCWs) globally and in sub-Saharan Africa (SSA) were unprepared for the scale of the physical
and mental devastation that was to follow [1]. The impact of the COVID-19 pandemic on healthcare workers has been profound, characterized by death, disability, and an untenable burden on mental health and well-being [2]. Factors impacting their mental health include high risks of exposure and infection, financial insecurity, separation from loved ones, a stressful work environment due to overcrowding, scarcity of supplies including personal protective equipment (PPEs), traumatic experiences due to regular witnessing of deaths, among patients and colleagues [2, 3]. Healthcare workers (HCWs) experienced exhaustion, difficult triage decisions, isolation and separation from families, stigma, and the pain of losing patients and colleagues [3]. Greenberg et al. [4] observed that the COVID-19 pandemic put healthcare professionals across the world in an unprecedented situation, having to make impossible decisions to provide care for many severely ill patients with constrained or inadequate resources [4].

World Health Organization data indicate that infection rates among healthcare workers are higher than the general population in almost all WHO regions [5]. The end of the pandemic is not yet in sight, and neither are we sure about the virulence of the following variant when it appears as caseloads are still rising with more than 376,478,355 infections and 5,666,064 deaths reported worldwide by 8th February 2022 [6]; driven by the newer omicron variants. Meanwhile, previous studies found high levels of depression, anxiety, and PTSD in survivors among the general population and healthcare workers (HCWs) 1–3 years after the control of the SARS pandemic [7] and Ebola epidemics in West Africa [8].

In addition, recent surveys [9, 10, 11–14], reviews, and meta-analyses [15–18] are pointing to early evidence suggesting a considerable proportion of healthcare workers have experienced Stress, anxiety, depression, and sleep disturbances during the pandemic, raising concerns about risks to their long-term mental health. Studies coming from the global North countries [19, 20], UK [21], USA [22], India [23], and China [24, 25] have shed light on the vulnerability that characterizes front-line healthcare workers during this pandemic, especially regarding their mental health and well-being. However, the evidence in the context of sub-Saharan Africa is scant, and the pattern and prevalence are not fully understood.

Evidence from a systematic review conducted by Pappa S et al. [26] among 33,062 Chinese HCWs in April 2020 found the pooled prevalence of mental health problems among the respondents to be anxiety 23.2%, depression, 22.8%, and insomnia 38.9%. In Singapore, Tan et al. [27] revealed that 14.5% of HCWs screened positive for anxiety, 8.9% for depression, 6.6% for Stress, and 7.7% for clinical concerns of PTSD [27]. Li et al. [28] conducted a review across 65 studies involving 97,333 healthcare workers in 21 countries has identified a high prevalence of moderate depression (21.7%), anxiety (22.1%), and PTSD (21.5%) among them during the COVID-19 pandemic [28]. In the UK, a British Medical Association survey conducted in May 2020 showed that 45% of UK doctors were suffering from depression, anxiety, Stress, burnout, or other mental health conditions relating to, or made worse by, the COVID-19 crisis [29]. Similarly, a Chinese study [30] found that a considerable proportion of participants reported symptoms of anxiety (44.6%), moderate to severe depression (50.4%), insomnia (34%), and moderate to severe psychological distress (71.5%) [30].
Since the beginning of the pandemic, only one systematic review [31] involving 919 front-line HCWs, 3928 general HCWs, and 2979 medical students was in Africa from December 2019 to April 2020. Chen J et al. [31] reported a high prevalence of depression, anxiety, and insomnia in front-line HCWs in SSA to be 45%, 51%, and 28%, respectively. In comparison, the prevalence of depression, anxiety, and insomnia among the general population were much lower at 30%, 31%, and 24%, respectively [31].

Previous studies in the African continent have identified several risk factors, but some are still contentious. In addition, few studies investigated protective and coping measures [32], given many uncertainties surrounding the evolution of the COVID-19 pandemic [32]. There is a need to review the available evidence on protective and coping measures in the sub-Saharan African context. These data are needed to equip HCWs on the front-line and healthcare managers in sub-Saharan Africa with the appropriate tools to mitigate the medium-and long-term adverse effects of dealing with the COVID-19 pandemic [33].

This review aimed to answer three questions (1) What has been the psychological impact of the COVID-19 pandemic on HCWs in Sub-Saharan Africa based on available data?

(2) What were the associated risk factors identified by the researchers during the crises?

(3) Based on (2) above, what interventions (mitigating and coping strategies) were protective and supported the mental health and well-being of HCWs during the ongoing crises and after the pandemic?

Finally, to use the updated evidence base to provide broad recommendations for mental health support for HCWs in sub-Saharan Africa and Uganda. Given the rapidly evolving nature of the evidence, we provide an update on the current evidence base on HCW mental health in sub-Saharan. We reviewed evidence from original studies which met our inclusion criteria from Uganda, Ethiopia, Togo, Cameroon, and Mali.

2.0 Methodology

2.1. Search methodology and article selection: The current article is a narrative review of existing literature on mental health disorders, risk factors, and interventions relevant to the COVID-19 pandemic in HCWs in sub-Saharan. A search on the PubMed electronic database was undertaken using the search terms "novel coronavirus", "COVID-19", "nCoV", "mental health", "psychiatry", "psychology", "anxiety", "depression" and "stress" in various permutations and combinations.

2.2 Search Processes: We conducted a comprehensive literature search on original articles published from March 2020 to 30th April 2022 in electronic databases of Embase, PubMed, Google Scholar, and the daily updated WHO COVID-19 database. Our search terms included but were not limited to ('COVID-19'/exp OR COVID-19 OR 'coronavirus'/exp OR coronavirus) AND ('psychological'/exp OR psychological OR 'mental'/exp OR mental OR 'stress'/exp OR stress OR 'anxiety' OR anxiety OR 'depression' OR
depression OR 'post-traumatic' OR 'post-traumatic'/exp OR 'trauma' OR 'trauma'/exp) OR Health care workers, medical workers of health care professionals, Sub-Saharan Africa, for Embase. ("COVID-19" [All Fields] OR "coronavirus" [All Fields]) AND ("Stress, Psychological" [Mesh] OR "mental" OR "anxiety" OR "depression" OR "stress" OR "post-traumatic" OR "trauma") for PubMed, for the WHO COVID-19 database, and ("COVID-19" OR "coronavirus") AND ("Psychological" OR "mental" OR "anxiety" OR "depression" OR "stress" OR "post-traumatic" OR "trauma") for Google Scholar. On reviewing the above citations, only 12 articles were found relevant for this review and are in Table 1 below. All these 12 studies were cross-sectional, with one qualitative and the rest quantitative observational in design.

2.3 Eligibility Criteria: We included original cross-sectional research on qualitative and quantitative studies examining the psychological distress of COVID-19 among healthcare workers (HCWs) in Sub-Saharan Africa during the COVID-19 pandemic.

We excluded studies if they were.

(1) Irrelevant to the exposure (COVID-19) or the outcome (psychological impact, mental impact on healthcare workers).

(2) Animal studies, experimental studies, or genetic studies.

(3) Therapeutic or prevention studies.

(4) Healthcare management studies.

(5) Did not use validated instruments to measure the psychological impact.

(6) Not in the English language.

(7) Not informative.

(8) Duplications

FWDO performed the search and reviewed by DLK and involved screening of the titles of the articles, followed by an examination of the abstracts of the relevant research articles. The potential articles identified were further reviewed in full text to examine their eligibility.

2.4 Data extraction and appraisal of the study: We extracted information from each study, including author, study population, year of publication, country, socio-demographic characteristics, sample size, response rate, gender proportion, age, and study time, areas assessed, the validated instrument used and prevalence. The appraisal involved assessment of the research design, recruitment of respondents, inclusion and exclusion criteria, response rate, reliability of outcome determination, statistical analyses, ethical compliance, strengths, limitations, and clinical implications of the included articles.

Our review protocol was not on PROSPERO because of significant variation in methodology, and the results reported precluded the use of a meta-analytic approach and made a narrative review of results
most suitable for this work. The GRADE method from the Cochrane Collaboration did not assess the quality of evidence of outcomes included in this narrative review.

2.5 Definition of Healthcare worker (HCW): For this narrative review, we adhered to the Centre for Disease Control and Prevention (CDC) definition of HCWs, which includes physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists, hospital volunteers, and administrative staff [34].

3.0 Result

3.1 Search Results: The search found 23 studies of interest for our review; we assessed the full texts of potentially relevant studies for eligibility, and 12 published studies met the inclusion criteria for the review.

3.2 Study characteristics: The 12 studies included in this review consisted of 11 cross-sectional quantitative and 01 qualitative studies. The most typical mental health conditions assessed in the literature were: depression, anxiety, perceived Stress, post-traumatic stress disorders (PTSD), coping strategy, perceived health status, health distress (including burnout), insomnia, and perceived stigma [35, 36].

The total number of respondents in these studies was 5,323. The qualitative study had the least 50 respondents [37], while the most significant number of participants, 422, was recorded in one of the studies from Ethiopia [38]. The response rates varied between 90%-100%, with most studies dominated by male respondents, 51.9%-69.2%. Nurses were the commonest study population, followed by doctors, pharmacists, and laboratory technicians, and no study involved non-HCWs of the health facilities. Most papers utilized probability sampling procedures, and 04 of the quantitative studies used non-random sampling procedures limiting the generalizability of their findings and increasing the risk of selection bias. Eight studies were from Ethiopia, and one from Cameroon, Uganda, Mali, and Togo, respectively. Most studies were from urban Tertiary Public Hospitals, University teaching hospitals, and rural and urban General Hospitals, including primary care facilities operated by Non-Governmental Organizations (NGOs) in Mali [39]. Several validated tools measured and assessed depression, anxiety, insomnia, Stress, and PTSD.

Table 1 provides an overview of the studies included and the validated instruments used to measure psychological disorders.

Table 2 provides comparisons with studies conducted outside of sub-Saharan Africa.

3.3 Risks of biases and confounding factors: Most cross-sectional studies employed probability sampling procedures which minimized selection biases, but many of them also used self-administered structured questionnaires, including online self-administered questionnaires, which increased bias due to social desirability. It was also unclear how confounding variables in several papers reviewed were controlled and thus led to excessive and inappropriate associations.
3.4 Socio-demographic factors

3.4.1 Age: In this review, the mean age of the respondents ranged from 23–35 years, and they were predominantly males. Age was associated with anxiety and stress symptoms in 06 (50%) of the studies reviewed [35, 37, 40, 41, 42, 44]. Age of over 40 years was associated with moderate to severe symptoms of PTSD. Two studies concluded that respondents aged over 40 years were more likely to develop PTSD symptoms than their younger counterparts [37, 41].

3.4.2 Gender: Female gender was significantly associated with depression, anxiety, and stress symptoms among HCWs in 07 of the studies reviewed [36–38, 41–43]. Studies found that being female, married, and Nurse were independent predictors of stress symptoms. Moreover, sex, age, marital status, type of profession, and working environment were significant factors for PTSD symptoms [37, 41]. However, one study in Ethiopia found that the odds of depression were twice as high among male healthcare providers than among female healthcare providers [35].

3.5 Psychological impact on healthcare workers.

Most studies reviewed directly assessed the prevalence of depression, anxiety, Stress, insomnia, and PTSD in HCWs. Common causes of anxiety, fear, or psychological distress that health professionals reported were: lack of access to PPEs and other equipment, being exposed to COVID-19 at work and taking the infection home to their families, uncertainties that their organization will support/take care of their personal and family needs if they developed an infection, long working hours, death of colleagues, lack of social support, stigmatization, high rates of transmission and poor income [34–45]. The prevalence of mental health symptoms exhibited great variations. Depressive symptoms were examined in nine studies [34, 35, 36, 39, 42–45], the depressive symptoms were found to vary from 16.3%-71.9% among HCWs [38, 39].

Another nine studies reported the prevalence of anxiety symptoms among HCWs [34, 35, 36, 39, 42–45], the prevalence was found to vary from 21.9%-73.5% [36, 39]. Five studies investigated HCWs' perceived Stress during the pandemic; 15.5%-63.7% of HCWs reported high levels of work-related Stress [34, 35, 36, 42, 44]. Three studies reported that 12.4–77% of HCWs experienced sleep disturbances during the COVID-19 pandemic [36, 38, 39].

Post-traumatic stress disorders (PTSD) were in three studies [37, 40, 41]. The prevalence of PTSD-like symptoms varied from 51.6–56.8% in HCWs [37, 40]. The prevalence of PTSD in this review did not show a great variation among HCWs ranging from 51.6%-56.8% [40, 37]. The only qualitative study from Uganda [34] reported high symptoms of depression, anxiety, and PTSD among HCWs [34]. Factors that increased the risk of PTSD symptoms were working in emergency units. Studies found that front-line HCWs had increased symptoms of mental disorders and that being a front-line worker was an independent risk factor for depression, anxiety, and PTSD [35–38, 39–45].

3.6 Risk factors associated with adverse mental health outcomes.
The qualitative study from Uganda reported risk factors associated with the mental disorder symptoms among HCWs these were: long working hours, lack of equipment (PPEs, testing kits), lack of sleep, exhaustion, high death rates, death of colleagues, and a high rate of transmission among HCWs [35]. Lack of equipment (PPEs, ventilators, and testing kits), overwork, and logistic support were in the studies from Ethiopia [36, 37, 38, 39–42, 44].

Most studies identified several risk factors for adverse mental health outcomes among the respondents. Those with a medical illness, mental illness, contact with confirmed COVID-19 patients, and poor social support showed a statistically significant association with depression [41, 42]. Other factors identified were females, nurses, married, front-line workers, ICU, Emergency units, living alone, and lack of social support [34, 36–44].

Participants with families with chronic illnesses had contacts with confirmed COVID-19 cases, and poor social support had a statistically significant association with anxiety. Other risk factors associated with anxiety identified include exhaustion, long working hours, front-line workers, emergency, patients, Nurse, pharmacists, laboratory technicians, married, older age, younger age, living alone, being a female, working at General and Referral hospitals and perceived stigma. Participants with families with chronic illnesses had contact with confirmed COVID-19 cases, and those participants with poor social support were predictors of Stress during the COVID-19 pandemic [36, 37, 39, 40, 41, 42, 44].

Other factors for stress symptoms included having a medical illness, having a mental illness, being a front-line worker, married, Nurse, female, pharmacists, laboratory technicians, physician, older age, lack of standardized PPE supply, low incomes and living with a family [35, 36, 39–44]. Healthcare providers who had low monthly incomes were significantly more likely to develop Stress than healthcare providers who had high monthly incomes [38]. In this review, living alone, living with the family, and being married were the associated symptoms of psychological disorders among HCWs [35, 36, 37, 44]. The risk factors are in three thematic areas (i) occupational, (ii) psychosocial, and (iii) environmental aspects.

3.7 Occupational factors: Most studies showed that front-line HCWs, nurses, doctors, pharmacists, and laboratory technicians had significantly higher levels of mental health risks compared to non-frontline HCWs [34–37, 39, 41, 42, 44]. They experienced higher insomnia, anxiety, depression, and somatization levels than non-frontline medical HCWs. In contrast, Mali [39] and Cameroon [46] studies found a very high prevalence of depression, anxiety, and PTSD in non-frontline HCWs [39, 46]. Physicians were 20% less likely to develop mental disorders than nurses, pharmacists, and laboratory technicians [38]. Those healthcare workers with low monthly incomes had higher symptoms of depression, anxiety, Stress, and insomnia [36].

3.8 Healthcare groups: Five studies found that being a nurse was associated with worse mental disorders than doctors [35, 37, 40, 44, 45].

3.9 Frontline staff/direct contact with COVID-19: Most papers reviewed found that being in a ‘front-line’ position or having direct contact with COVID-19 patients was associated with higher levels of psychological distress [34–37, 39, 41, 42, 44]. In addition, studies found that contact with COVID-19
patients was independently associated with an increased risk of sleep disturbances [39, 45]. Moreover, HCWs who had contact with confirmed COVID-19 cases were more likely to develop depression, anxiety, and stress symptoms than those who had no contact with COVID-19 patients [35, 36, 37, 42, 44].

3.10 Personal Protective Equipment (PPEs): Most of the studies reported that the lack of PPEs was associated with higher symptoms of depression, anxiety, Stress, and insomnia, while the availability of standardized PPEs was associated with fewer mental disorder symptoms [34–45]. In Mali, health workers from centers that provided facemasks were 51% less likely to suffer from depression, 62% less likely to develop anxiety, and 45% less likely to develop insomnia [39]. In Ethiopia, the odds of developing post-traumatic stress disorder among health care providers were much higher among those participants who did not receive standardized PPEs supplies than those who had received standardized PPE supplies [37, 40, 41]. The lack of PPEs was associated with depression, anxiety, and PTSD in Uganda [35].

3.11 Heavy workload: Longer working hours, increased work intensity, increased patient load, and exhaustion was risk factors in Uganda [35] and Ethiopia [36].

3.12 Psychosocial factors (fear of infection): The qualitative study from Uganda reported the fear of COVID-19 infection [35] and eight cross-sectional studies from Ethiopia [36, 38, 40–43]. Poor social support was associated with PTSD symptoms and depression, anxiety, and Stress [35, 36, 37, 41, 42]. Two studies reported that HCWs perceived as stigmatized were more likely to suffer depression, anxiety, Stress, and PTSD [36, 41].

3.12.1 family concern: This was one of the main stress risk factors in almost all studies, especially among those HCWs in direct contact with confirmed COVID-19 cases [34–37, 39–44]. Having a family member suffering from COVID-19 was also associated with poor mental health outcomes in HCWs [35, 36].

3.12.2 Underlying illnesses: We found three studies with an underlying medical or mental illness as independent risk factors for poor psychological outcomes [41, 42, 44].

3.13 Protective factors against adverse mental health outcomes: The review identified protective factors against adverse mental health outcomes during COVID-19. The qualitative study from Uganda and four quantitative cross-sectional studies from Ethiopia identified some protective factors [35, 38, 40, 41, 45]. The protective factors are in three thematic areas (i) occupational, (ii) psychosocial, and (iii) environmental aspects.

The qualitative study identified various social coping strategies among the respondents, including family networks, community networks, help from family, responsibility to society, assistance from community members, availability of assistance from strangers, and symbiotic nature of assistance in the community [35].

3.14 Occupational factors.

3.14.1 Experience: Studies suggest that physicians suffered fewer mental health disorders partly because of their experience with previous epidemics [36, 41, 45].
3.14.2 Trainings: Good hospital guidance and ongoing training of front-line HCWs are some of the critical coping measures suggested [41, 45].

3.14.3 Adequate supply of PPEs: As mentioned above, PPE was a protective factor when adequate and a risk factor for poor mental health outcomes when deemed inadequate [35, 37, 41, 42].

3.15 Psychosocial factors: Two studies suggested that reducing perceived stigma can be achieved by sensitization of communities about COVID-19 [36, 41] and solid social support in four studies [35, 36, 41, 42].

3.16 Safety of family: Safety of family had the most significant impact on reducing Stress. Safety from infection with COVID-19 and financial protection of families were essential coping strategies that employers could put in place [35].
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<th>s/n</th>
<th>Authors &amp; Country</th>
<th>Study design</th>
<th>Sampling Procedure/Sample Size (n)</th>
<th>Instrument Applied</th>
<th>Main outcome measures</th>
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</table>
**Risks:** long working hours, lack of equipment, PPEs and testing kits, lack of sleep, exhaustion, high death rates, death of colleagues, and high rates of transmission  
**Coping strategies:** Family and community networks, help from family, responsibility to society, and assistance from community members, availability of assistance from strangers, and symbiotic nature of assistance in community. |
| 2.  | Sagaon Teyssier, et al., July 2020, Mali | Cross-sectional. Non-frontline HCWs, involved in HIV care | Non-Probability sampling n = 135(60.7% male, mean age 40yrs). | PHQ-9, (20–27) GAD-7, (0–21), 7 ISI (0–28) | Depression in 71.9%, Anxiety in 73.5%, and Insomnia in 77%  
**Risk factors:** female, lack of PPEs, lack of Nurses. 21.5% had severe depression. Depression in 60% more likely in females than males. |
<p>| 3.  | GebrEyesus FA, et al., Dec. 2020 Northwest Ethiopia | Cross-sectional, Self-administered Questionnaires | Probability sampling. Public hospital n = 322, Response rate 96.5% Males 51.9% | PHQ-9, PSS-10 | Depression in 25.8%, Anxiety in 36%, and Stress in 31.4%. Overall prevalence of MHD was 36%. <strong>Risk factors:</strong> age, gender, education, low income, presence of infected member of family, living with family and occupation |</p>
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<td>5.</td>
<td>Ayalew Mohammed Biset, et al. Oct. 2020, Southern Ethiopia</td>
<td>Cross-sectional. Self-administered questionnaires</td>
<td>Probability sampling, Frontline &amp; Non-frontline HCWs 04 Public Hospitals, n = 387, response rate 91.7% Males 58.7%,</td>
<td>IES-R</td>
<td>PTSD in 56.8%. <strong>Significant risk factors were</strong> age, working environment, professions, female, married, and Nurse. In-patients, workers, emergency workers, and ICU. <strong>The independent predictors were</strong> females, married and nurses.</td>
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<td>7.</td>
<td>Chekole YA., et al., 2020, Ethiopia</td>
<td>Cross-sectional Self-administered questionnaires</td>
<td>Probability Sampling, Institutional HCPs n = 244 response rate 100%, Males 66%</td>
<td>PSS-10</td>
<td>PTSD Prevalence in 51.6%. <strong>Risk factors</strong> were age, educational qualifications. Age and profession were independent predictors of stress. Frontline HCWs was strongly statistically associated with stress, nurses, pharmacists, frontlines, and master’s degree holders.</td>
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<td>8.</td>
<td>Asnakew, Sintayehu <em>et al.</em>, 2020</td>
<td>Cross-sectional, Multicentre self-administered questionnaire with hospital workers</td>
<td>Probability sampling, n = 396 response rate 93.6%. Males 69.2% females 30.8%</td>
<td>IES-R-22</td>
<td>PTSD in 55.1%, lack of standard PPEs, age &gt; 40, medical illness, females, perceive stigma, history of mental illness, poor social support, and being a physician</td>
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| 9.  | Asnakew, Sintayehu *et al.*, 2020 Nov. in South Gondar Northwest Ethiopia | Cross-Sectional. Self-administered questionnaire at Multi-centre in 08 Public Hospitals | Probability Sampling, n = 419 response rate 99.1% males 69%, females 31%. Nurses 52% (218). | DASS-21 | Depression in 58.2%, anxiety in 64.7%, and Stress in 63.7%  
**Risk factors:** Frontliners, chronic medical illness, mental Illness, contact with COVID-19 case, poor social support, and females |
**Risk factors:** Anxiety, frontline, in-patient, HCWs, ICU, nurses, emergency workers, OPD, laboratory technicians, pharmacists, older age, females, and married.  
**Risks of depression:** female, married, living alone, nurses, and inpatient workers,  
**Risks of stress:** females, nurses, inpatients, living alone, and married. |
**Risk factors:** profession, workstation, women, and medical illness |
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<td>12.</td>
<td>Keubo et al., 2020</td>
<td>Cross-sectional. Self-administered. Hospital based, NGO Institutions</td>
<td>Non-Probability- n = 292 females 54.5%</td>
<td>HADS</td>
<td>Depression in 43.5%, anxiety in 42.2%. The fear of infection, fear of death, profession, gender, and department were not associated with depression &amp; anxiety. Assistant nurses had the highest prevalence of depression &amp; anxiety</td>
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<td>2.</td>
<td>Pappa S, et al.</td>
<td>Systematic Review/Meta-</td>
<td>HCWs, 33,062</td>
<td>17 April 2020</td>
<td>Anxiety in 23.2%, depression in 22.8%, and Insomnia in 38.9%</td>
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<td>China</td>
<td>analysis</td>
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<td>3.</td>
<td>Li Y, et al.</td>
<td>Systematic Review/Meta-</td>
<td>HCWs 33,062</td>
<td>17 April 2020</td>
<td>Anxiety in 22.1%, depression in 21.7%, and PTSD 21.5%</td>
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<td>4.</td>
<td>Basreeqa SB, et</td>
<td>Systematic Review/Meta-</td>
<td>General Pop.</td>
<td>First 6 months of 2020</td>
<td>Anxiety in 48.1%, depression in 26.9%, and Stress in 48.1%</td>
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<td>al. China</td>
<td>analysis</td>
<td>Frontline/General HCWs. 62,382</td>
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<td>5.</td>
<td>Preti E, et al.</td>
<td>Rapid Review</td>
<td>HCWs.</td>
<td>March 2020</td>
<td>Anxiety in 45%, depression in 27.5–50.7%, Stress in 18.1–80.1%, Insomnia in 34–36%, and PTSD in 11-73.4%</td>
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<tr>
<td></td>
<td>Asia, Middle East, Europe, USA</td>
<td></td>
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</tr>
<tr>
<td>6.</td>
<td>Lai J. China</td>
<td>Cross-sectional</td>
<td>HCW</td>
<td>1st 6 months of 2020</td>
<td>Anxiety in 44.6%, depression in 50.4%, distress in 71.5%, and Insomnia in 34%</td>
</tr>
<tr>
<td>7.</td>
<td>Tan BYQ, Singapore</td>
<td>Cross-sectional</td>
<td>General pop. /HCWs</td>
<td>1st 6 months of 2020</td>
<td>Anxiety in 14.5%, depression in 8.9%, Stress in 6.6%, and PTSD in 7.7%</td>
</tr>
<tr>
<td>8.</td>
<td>Consolo U, et al.,</td>
<td>Cross-sectional</td>
<td>HCWs</td>
<td>1st 6 months of 2020</td>
<td>Anxiety in 46.4%, depression in 70.2%, and stress in 42.4%.</td>
</tr>
</tbody>
</table>
Table 2 shows the studies conducted worldwide on the psychological impact of the COVID-19 on the general population and health workers.

**Discussions**

The COVID-19 pandemic has been an ongoing global public health emergency that has placed a heavy burden on healthcare workers' physical and mental well-being (HCWs) [1, 5]. Our review confirms the magnitude of the mental health impact of COVID-19 on health care workers in sub-Saharan Africa; it has been extensive, with significant levels of depression, anxiety, distress, and insomnia, with those working directly with COVID-19 patients at particular risk [34–37, 39–45]. Out of the 12 articles reviewed, most studies, 08 (66%), came from Ethiopia; this has implications for our results. The finding indicates that there is scanty research published on the psychological impact of the pandemic on the mental health of HCWs in sub-Saharan Africa, a sub-region in which COVID-19 has severely impacted the health workers' mental to date.

The studies included in this review were predominantly concerned with hospital settings. We found only one study relating to primary healthcare workers or facilities [38]. This finding is of concern as there is increasing evidence that many non-frontline HCWs continue to suffer psychological symptoms long after the conclusion of infectious disease pandemics [7, 8]. In addition, significant mortality due to COVID-19 was due to excess mortality, some of which could have occurred from primary care facilities. Given that this study is the first narrative review in sub-Saharan Africa, it would be helpful to briefly compare our findings with some published reviews and surveys from other regions (Table 2). Mainly, investigators in
our review found (that 16.3–71.9%) of HCWs with depressive symptoms, (21.9–73.5%) had anxiety symptoms, (15.5–63.7%) experienced work-related stress symptoms, (12.4–77%) experienced sleep disturbances, and (51.6–56.8%) reported PTSD symptoms [35–41, 42–45].

This high prevalence of the mental health symptoms among HCWs in our review is consistent with previous reviews conducted early in the pandemic in sub-Saharan Africa [31], Asia [17, 18, 26, 28], the USA & Europe [15, 16], supported by a slew of cross-sectional studies across the globe [11–14, 19, 27, 30]. The results have mixed significant variations within and among regions and countries, as depicted in Tables 1 and 2.

Studies established that HCWs responding to the COVID-19 pandemic in sub-Saharan Africa were exposed to long working hours, overworking, exhaustion, a high risk of infection, and a shortage of personal protective equipment.

In addition, HCWs had profound fear, were anxious and stressed with the high transmission rate of the virus among themselves, high death rates among themselves and their patients, and lived under constant fear of infecting themselves and their families with obvious consequences [35–45]. Some HCWs were deeply worried about the lack of standardized PPEs, and the lack of known and available treatment and vaccines to protect against the virus. Many health workers feared financial problems and a lack of support for themselves and their families from their employers; if they contracted the virus [34–37, 39–42, 44]. An additional source of fear and anxiety among HCWs was the perceived stigma attached to being infected with COVID-19 by the public [36, 41].

Studies found that HCWs, especially those working in emergency, intensive care units, infectious disease wards, pharmacies, and laboratories, were at higher risk of developing adverse mental health impacts [34–37, 39–44].

This is supported by previous reviews [15, 16, 17, 18, 26, 28] and cross-sectional studies [10–14, 20, 21, 23, 25, 30].

Findings were contradictory for front-line health workers, with ten studies [35, 36, 37, 39–42, 44, 45] suggesting that they are at higher risks than peers and two studies finding no significant difference in psychological disorders concerning the departments [38, 43]. The study from Mali was conducted exclusively in primary care facilities not involved in treating COVID-19 cases but still registered a very high prevalence of depression 71.9%, anxiety 73.6%, and insomnia 77% among HCWs [39]. In contrast, two studies conducted at COVID-19 treatment facilities in Ethiopia [36, 38] registered much lower prevalence of depression 20.2%, anxiety 21.0% and insomnia 12.4% [36], and 16.3%, 30.7% and 15.9%, respectively among their respondents [38].

These findings show that front-line HCWs experience mental health disorders during this pandemic and highlight the need for direct interventions for all HCWs regardless of occupation or workstation during this and future pandemics. The significant disparity could be due to structural, occupational, and
environmental challenges faced by Mali's healthcare systems, characterized by acute shortages of equipment, including PPEs, shortage of human resources, lack of trained and experienced HCWs, and ongoing nationwide insecurity and terrorism compared to Ethiopia. Therefore, local context also needs to be considered as contributing factor to mental health disorders among HCWs.

Tan et al. found a higher prevalence of anxiety among 470 non-medical HCWs in Singapore [27]. The prevalence of poor psychological outcomes varied between countries. Compared to sub-Saharan Africa and China, data from India [23] and Singapore [27] revealed an overall lower prevalence of anxiety and depression than similar cross-sectional data from sub-Saharan Africa [35–45] or China [9, 25, 30]. This finding suggests that different contexts and cultures may reveal different findings. It is possible that being at different points in their respective countries outbreak curve may have played a part, as there was evidence that this may be influential.

Tan et al. postulated that the medical HCWs in Singapore had experienced a SARS outbreak and thus were well prepared for COVID-19 psychologically and in their infection, control measures [27]. From the study, findings are that context and cultural factors are likely to play a role, not just the cadre or role of healthcare workers [16]. It also highlights the importance of reviewing the evidence regularly as more data emerge from other countries.

One hospital in Ethiopia found that the thought of resignation was associated with high mental health disorders and that pharmacists and laboratory technicians who did not receive training exhibited high symptoms of mental health disorders [36]. Work shift arrangements, considering the dangerous atmosphere presented by working in COVID-19 wards, were identified as one which exacerbated or relieved mental health symptoms among HCWs, with shorter exposure periods being most beneficial [36].

Meanwhile, studies found that financial worries caused by severe lockdowns and erratic payment of salaries and allowances were also major stressors [35]. This finding among the health workers in sub-Saharan Africa agrees with studies from Pakistan [13] and China [30, 32].

In this review, HCWs who had contact with confirmed COVID-19 patients were more affected by depression, anxiety, and Stress, than their counterparts who did not [35–37, 40, 41, 43, 45]. This review finding agrees with previous reviews [15–18, 26, 28, 31] and cross-sectional studies [9–14, 21, 23, 24, 25, 27, 30], which reported higher symptoms of depression, anxiety, and psychological distress in HCWs who were in direct contact with confirmed or suspected COVID-19 patients.

Studies in Pakistan revealed that 80% of participants expected provision of PPE from the authority [13], 86% of the respondents in Pakistan were anxious, and some respondents alluded to forced deployment. In contrast with the Mali study [39], 73.3% of the respondents were anxious, with the majority worrying about shortages of nurses. Also, health workers' fears came from the prospect of being deployed at a workstation where there was no proper training or orientation. In the sub-Saharan African context, this scenario could be like what HCWs involved in an internship must endure during their training, although no study examined this group separately. Tan et al. found that junior doctors were more stressed than nurses
in Singapore [27]. Almost all the studies in our review suggest that socio-demographic variables like age, gender, marital status, and living alone or with families could have contributed to the high mental disorder symptoms reported in our review [35–37, 39–44]. These mental health findings on health workers were influenced by confounding variables that many investigators did not correctly control. The findings should be treated cautiously in the context of the sub-Saharan situation.

An alternative explanation for this study’s findings may be the more significant risks of front-line exposures amongst women and junior HCWs in the lower status roles, many of whom lack experience and appropriate training within healthcare globally. It is also important to note that respondents to all studies, when disaggregated by gender and age, were predominantly younger or female, which may have impacted findings [16]. The consistently higher mortality rates and risk of severe COVID-19 disease amongst men would suggest that the whole picture regarding gender and mental health during this pandemic is still incomplete [16]; moreover, in several studies, both younger and older age groups were equally affected by mental health symptoms but for different reasons. Cai H et al., in a Chinese study of HCWs, observed that irrespective of age, the safety of colleagues, the safety of self and families, and the lack of treatment for COVID-19 were factors that induced Stress in all HCWs [32]. Similarly, in our review, the lack of PPEs, high transmission rates, high death rates among HCWs, and the fear of infecting their families were the factors that induced Stress in all HCWs [34–37, 39–45].

We advise that paying close attention to the above concerns of HCWs by their organizations/employers would greatly relieve some of the stressors and contribute to the increased mental well-being of the respondents.

In comparison with physicians, our review has indicated that nurses were more likely to suffer from depression, anxiety, insomnia, PTSD, and Stress than doctors [35, 37, 39–41, 44, 45]. Workloads and night shifts in healthcare facilities, as well as contact with hazardous patients, enhance nurses’ mental distress risks [15–18, 26–28]. In addition, the nursing staff has more extended physical contact and closer interactions with patients than other professionals, providing round-the-clock care required by patients with COVID-19 [15].

We postulate that most senior Physicians are experienced and always keep abreast with emerging medical emergencies. In addition, the majority actively protect themselves from infections through constant scientific literature updates compared to their junior counterparts. Senior physicians also spend less time in emergency wards unless there is a need to conduct specific procedures not undertaken by Senior Housemen or General Medical officers. Cai H et al. concluded that it is crucial to have a high level of training and professional experience for healthcare workers engaging in public health emergencies, especially for the new staff [32].

As a result, these findings highlight the importance of focusing on all the front-line HCWs sacrificed to contain the COVID-19 pandemic.
There is a need to continue monitoring the highly at-risk groups, including the nursing staff, interns, support staff, and all deployed to emergency wards. These high-risk categories must be encouraged to present themselves for screening and treatment to avoid the medium- and long-term consequences of such epidemics. [15, 16, 35, 37, 40, 44].

The effect of social support and coping measures is in the qualitative study [35] and three other quantitative studies [36, 41, 42], concluding that respondents with good social support were less likely to suffer from severe depression, anxiety, and work-related Stress and PTSD. The qualitative study identified several coping measures, including community and organizational support, family, and community networks, help from family, responsibility to society, and assistance from community members and strangers, including the symbiotic nature of assistance in the community [35]. Other measures include providing accommodation and food to the employees [35].

No study examined the association of resilience and self-efficacy with sleep quality, degrees of anxiety, depression, PTSD, and Stress. In a Chinese study, Cai H et al. suggested that the social support given to HCWs caused anxiety reduction and stress levels and increased their self-efficacy [32]. In contrast, Xiao et al. found no relationship between social support and sleep quality [46].

Only two studies examined the effects of stigma on the mental health of HCWs [36, 41] and found that HCWs who perceived stigma were more likely to be depressed, anxious, stressed, and prone to have poor sleep quality [36, 41]. We suggest better community sensitization to create public awareness involving appropriate local community structures and networks. The broader community in sub-Saharan Africa may have suffered severely from infodemics with severe consequences for their mental health, especially during the hard lockdowns.

Removing discrimination/inequalities at the workplace based on race and other social standings could have a powerful influence on the mental health outcomes of HCWs.

Although emotional exhaustion is associated with depression, anxiety, and sleep disturbances, none of the studies in our review examined burnout as a vital component of mental health disorders in HCWs in sub-Saharan Africa. Future studies on mental health and other critical areas like suicidality, suicidal ideations, and substance abuse during the COVID-19 pandemic among health workers are very much required.

The disparities observed within and among countries could be due to differences in sample sizes, assessment tools, cut-off values used to categorize outcomes, the time of research during the pandemic, the level of development of health services, cultural contexts, and structural contexts.

Prior experience with comparable pandemics and training of health workers are beneficial coping strategies for healthcare workers during this pandemic. However, local social structures and geopolitical conditions appear to determine the pattern and evolution of mental health symptoms among HCWs [15, 16, 27, 28, 31, 32, 46]. In our case, the high prevalence of all mental health symptoms in non-frontline...
primary health care facilities in Mali [39], with instability and weak healthcare systems before the pandemic, appears to be a case in point.

We posit that the patterns of mental health issues could be unique in Africa or at least vary across geographical regions [31]. This finding was in many studies; however, further investigations using rigorous research designs are needed [31].

**Protective and coping measures**

Despite the high prevalence of mental health disorders among HCWs, many overlook their psychological health. Some potential beneficial measures are suggested, including effective communication, tangible support from the administration/seniors, mental health problem online screening, and interventional facilities, making quarantine/isolation less restrictive. Others include ensuring interpersonal communication through the various digital platforms, proactively curtailing the misinformation/rumors spread by the media and strict legal measures against violence/ill-treatment of HCWs [8, 16, 19, 32, 34, 36, 41, 42, 43].

Several studies identified environmental factors as a protective theme, including support and recognition from the healthcare team, government, and community. Social support, flexible work-shift arrangements, standardized infection control measures, and regulations to support HCWs during infectious disease epidemics were critical. Provision of restrooms, accommodation and good meals, online consultation with psychologists/psychiatrists, protection from financial hardships, access to social amenities, and religious activities are some essential coping strategies [34, 35, 37, 41, 44].

Shenafelt et al. observed that health care workers want unambiguous assurance that their organization/employers will support them and their families [47]. This finding includes the organization/employers listening to their concerns, doing all that is possible to protect them and prevent them from acquiring COVID-19 infection, and assuring them that if they do become infected, the employers will support them and their families on all fronts, both medically and socially [47]. Other interventions are a high level of training and professional experience; moreover, resilience and social support are necessary for healthcare workers who are required to manage public health emergencies for the first time [15, 16, 32, 46]. In addition, it is also essential to understand and address the sources of anxiety among healthcare professionals during this COVID-19 pandemic, as this has been one of the most experienced mental health symptoms [48].

Adequate protective equipment provided by the health facilities was the most important motivational factor in encouraging the continuation of work in future outbreaks. Strict infection control guidelines, specialized equipment, recognition of their efforts by facility management and the government, and a reduction in reported cases of COVID19 provided psychological benefits [15, 32].

Finally, we call upon Governments (the largest employers of HCWs) in sub-Saharan Africa to do what it takes to improve investments in the mental health of HCWs and to plan proactively in anticipation of
managing infectious disease epidemics, including other disasters.

Limitations

There are some limitations to this study. Most of the studies are from one country, limiting the generalizability of the results. All the studies were cross-sectional and only looked at associations and correlations. There is a need for prospective or retrospective cohort or case-control studies. Longitudinal research on the prevalence of mental disorders in the COVID-19 pandemic is required. Studies did not adequately examine protective or coping measures. Studies did not pay strict attention to confounding variables, leading to inappropriate results and conclusions. Sample sizes were small; larger sample sizes would better identify the extent of mental health problems.

Depression, anxiety, and Stress were assessed solely through self-administered questionnaires rather than face-to-face psychiatric interviews. These studies employed a variety of instruments and used different cut-off thresholds to assess severity. Notably, the magnitude and severity of reported mental health outcomes may vary based on the validity and sensitivity of the measurement tools.

It is unknown if the studied population had pre-existing mental health illnesses that decompensated during the pandemic crisis. Most of the studies included in our analysis did not measure the baseline mental health status of surveyed participants. Investigators give little attention to stigma, burnout, resilience, and self-efficacy. Our review did not employ systematic reviews and meta-analysis; this precluded deeper insight into the quality of reviewed articles. The strict lockdown, quarantine, and isolation imposed by many countries in sub-Saharan Africa were not among the things, investigators considered in our review as possible risk factors for mental health disorders among HCWs.

Conclusion

Based on the articles reviewed, the prevalence of depression, anxiety, insomnia, and PTSD in HCWs in the sub-Saharan during the COVID-19 pandemic has been high. We implore health authorities to consider setting up permanent multidisciplinary mental health teams at regional and national levels to deal with mental health issues and provide psychological support to patients and HCWs, always supported with sufficient budgetary allocations.

Long-term surveillance is essential to keep track of insidiously rising mental health crises. There is a significant variation of related literature calling for more rigorous research in the future. More systematic studies will be needed to clarify the full impact of the pandemic so that meaningful interventions can be better planned and executed at the institutional and national levels in sub-Saharan Africa.

Declarations

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Ethics approval and consent to participate is not applicable.

**Consent for publication:** Not applicable.

**Competing interests:** All authors declare no conflict of interests.

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