Global Health Journal xxx (xxxx) xxx

Contents lists available at ScienceDirect

Global Health Journal

journal homepage: https://www.keaipublishing.com/en/journals/global-health-journal/

REVIEW

Burnout and mental distress among community health workers in low- and middle-income countries: a scoping review of studies during the COVID-19 pandemic

Oluchi I. Ndulue[a], Anand Chukka[b], John A. Naslund[a,*]

[a] Department of Global Health and Social Medicine, Harvard Medical School, Boston, Massachusetts, USA
[b] Harvard Medical School, Boston, Massachusetts, USA

ARTICLE INFO

Article history:
Received 20 December 2023
Received in revised form 27 July 2024
Accepted 29 November 2024
Available online xxx

Keywords:
Community health worker
Burnout
Stress
Coronavirus disease 2019 (COVID-19)
Low- and middle-income countries (LMICs)
Mental health distress

ABSTRACT

Community health workers (CHWs) represent the backbone of primary health systems, especially in many low- and middle-income countries (LMICs). The coronavirus disease 2019 (COVID-19) pandemic stretched health systems and increased the workload for CHWs. The objective of this scoping review was to identify the mental health symptoms experienced among CHWs in LMICs during the COVID-19 pandemic. We searched PubMed for published literature, from January 1, 2020 to December 31, 2022 that focused on documenting the experiences of burnout, distress, and mental health symptoms among CHWs in LMICs. The quality of included studies was assessed using the Joanna Briggs Institute Critical Appraisal Tool. Included studies were grouped into the following broad thematic categories: (1) symptoms experienced; (2) drivers of different mental health symptoms; and (3) strategies for coping with different symptoms. We identified 10 cross-sectional, qualitative, and observational studies from 11 LMICs in South and Southeast Asia, South America, and Eastern/Southern Africa that assessed the mental health burden CHWs faced during the pandemic. The studies identified disorders and symptoms such as depression, anxiety, fear, burnout, worsened stress, and fatigue. Contributing factors included increased workload, financial constraints, and an understaffed and underequipped workplace. CHWs reported using different adaptive responses like humor, support from family and colleagues, denial, and substance use, and asked for recommended regular mental health checkups and counseling. More research and policies should be targeted towards promoting the mental wellbeing of CHWs to help ensure responsive and resilient health systems in LMICs in the face of future emerging public health threats.

1. Introduction

The COVID-19 pandemic overwhelmed the healthcare systems of many countries and, in particular, many low- and middle-income countries (LMICs).[1] Most LMICs were already struggling with underequipped, short-staffed, and poorly funded health systems; thus, the added demands of the coronavirus disease 2019 (COVID-19) pandemic further challenged their ability to effectively deliver healthcare services.[1,2] In most LMICs, economic conditions were worsened by the COVID-19 pandemic and resulting lockdown measures.[3] Compared to high-income countries where COVID-related economic challenges like unemployment and food insecurity were mitigated with government incentives and relief efforts, this was not the case in many LMICs.[3] Higher income countries often have ample health system resources such as critical care units, specialist providers, urgent and emergency services, stable electricity, and online/remote healthcare services; however, LMICs faced challenges meeting these basic infrastructural needs – for instance, countries like Tanzania and Ethiopia struggled with communication-infrastructure and with physical resource limitations.[3-5]

Healthcare professionals in LMICs experienced mental health distress during the COVID-19 pandemic due to increased workload and fears and anxieties about the pathology of the highly contagious coronavirus, especially in the early stages of the pandemic.[6,7] Given the insufficient numbers of healthcare specialists per population size in most LMICs and the existing mental health care gap in these countries, the mental health demands of the COVID pandemic weighed heavily on the providers working on the frontlines.[3,8] A study on the prevalence of mental health symptoms and their associated factors among physicians and nurses exposed to COVID-19 in China showed a significant prevalence of symptoms like depression (50.4%), anxiety (44.6%), distress (71.5%), insomnia (34%), and these symptoms were more severe among nurses, women, and frontline workers in Wuhan, which at

* Corresponding author.
E-mail address: john_naslund@hms.harvard.edu (J.A. Naslund).

https://doi.org/10.1016/j.glohj.2024.11.007

Please cite this article as: O.I. Ndulue, A. Chukka and J.A. Naslund, Burnout and mental distress among community health workers in low- and middle-income countries: A scoping review of studies during the COVID-19 pandemic, Global Health Journal, https://doi.org/10.1016/j.glohj.2024.11.007

the time was the focal point of the pandemic.[9] In a systematic review and meta-analysis conducted by Wu and colleagues, the mental health symptoms emerging during the COVID-19 pandemic were assessed and compared among various populations groups in many LMICs, revealing that healthcare workers (primarily physicians and nurses) experienced greater distress and insomnia relative to the general population.[10]

While burnout has been studied extensively among professional healthcare workers, such as physicians and nurses, the mental health of frontline non-specialist health workers, such as community health workers (CHWs), has been sparsely evaluated.[7,11] Many studies have focused on the mental burden of in-hospital healthcare workers like physicians, and nurses, leaving an essential gap in the literature.[6,12-14] CHWs primarily work in outpatient, communal settings and often do not have the ancillary staff, health system, or financial support that many in-hospital frontline health workers have.[15] Additionally, CHWs are primarily younger women, and a comparative analysis of different health worker subgroups found a disproportionate rate of mental health consequences among younger, women, and non-physician health workers during the COVID-19 pandemic.[16] Given that CHWs represent the cornerstone to achieving universal health coverage in many LMICs, it was thus important to investigate CHW-specific mental health concerns.[17,18] Definitionally, CHWs are often community members without specialized or professional training, but who have been trained to deliver basic medical and nursing care.[19] Their roles can include a broad range of tasks such as supporting health campaigns and awareness, promotion, counseling, referral, and implementation of health programs (i.e., maternal and child health programs, immunizations, breastfeeding practices, infection control, etc.).[17-19] The extent of their training and certification requirements typically vary by country, with positions ranging from volunteer service to paid employees depending on the country's health system.[15,17] CHWs provide a unique service by bringing healthcare to their communities, often reaching patients in vulnerable settings and in contexts where few clinic-based services are available.[19] The invaluable roles of CHWs have been observed in many settings,[18] and importantly, the Alma-Ata Declaration of 1978 specifically recognized CHWs as being an essential part of primary healthcare services, especially in countries with limited health coverage.[20]

During the COVID-19 pandemic, experts believed that CHWs were best positioned for community management of viral spread in LMICs, given their critical role during efforts to contain prior infectious disease outbreaks, such as the recent Ebola outbreak in West Africa.[21,22] CHWs in many LMICs were required to take on more responsibilities due to the increased demands placed on already strained health systems.[7,23] Research has highlighted the challenges that CHWs faced during the pandemic, particularly in rural settings, such as risk of infection and death, personal fear of infecting their families and communities, and stigma from their community, due to fear of community spread.[23-25] CHWs also experienced safety and security concerns as they lacked essential hygienic and personal protective equipment (PPE), and some faced financial worries, especially if unpaid or underpaid.[23,24] CHWs have often experienced stigmatization during pandemics including being avoided in their communities as they were regarded as being responsible or as a hazard for spreading the virus.[26]

Despite the critical role of CHWs in the health systems of many LMICs and in playing a key role in responding to the COVID-19 pandemic, their position as formal healthcare professionals is not officially defined in some countries, which may account for the limited attention paid to them and why they have been excluded from many studies on health worker burnout.[15,26] This gap is critical to address to inform efforts aimed at strengthening policies and pandemic-mitigating measures in the health systems of LMICs. Early in the pandemic, advocates noted that CHWs are integral to the primary healthcare structure, especially in communities with underpowered health teams, and there is the risk of losing them through attrition and burnout if they remain neglected and unsupported,[27] especially in the years to come as efforts shift to strengthening health systems.[28] Additionally, health systems in LMICs rely heavily on female CHWs to ensure accessibility to basic health services across rural regions, with little to no economic support, and thus CHWs in LMICs have faced a uniquely challenging situation compounded by gender hierarchies further exposed during the COVID-19 pandemic.[15]

Therefore, the primary objective of this scoping review was to identify studies reporting on the mental health burden and distress experienced specifically among CHWs working in LMICs during the COVID-19 pandemic. This review aimed to synthesize the findings from these studies to identify the primary mental health symptoms and their prevalence, consider the key drivers of additional stress and burnout among CHWs, and identify current strategies that can potentially attenuate this added mental health burden. The overarching goal of this review was to inform ways to prioritize the wellbeing of these essential frontline health workers and to support efforts to strengthen the resiliency of health systems in LMICs.

2. Methods

2.1. Search strategy

We reviewed empirical studies describing the COVID-19 pandemic-related mental health impact on CHWs in LMICs according to the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) reporting guidelines.[29] We searched the PubMed (MEDLINE) database from January 1, 2020, to December 31, 2022 to identify studies on the COVID-19 pandemic-related burnout and mental health impact on CHWs from LMICs. This timeframe captures the key timepoints when many countries faced lockdowns and significant restrictions on day-to-day activities, when the potential psychological impacts for frontline health workers may have been greatest.[30] Given our broad objectives, we considered our review a scoping review, as opposed to a systematic review.[31] Further, we opted to search only the PubMed database given that prior studies have found that the use of additional databases offers only modest impact on the search results,[32,33] which also permits a more rapid synthesis of the literature suitable for the objectives of our scoping review. Additionally, we determined this would be ideal for the current review given that there will be many additional studies documenting the impact of the COVID-19 pandemic on mental health in the coming years. We used search terms relevant to "mental disorders," "stress," "psychological distress," and "burnout." We combined these with search terms for "community health worker," "frontline health worker," or "lay health worker," and relevant search terms for COVID-19. The complete list of search terms can be found in Table 1. We entered the terms as keywords and their corresponding medical subject heading (MeSH) terms. MeSH terms enabled us to retrieve all index citations and records related to our review, irrespective of the variations in spelling and wording.[34] Our review focused on recent studies published since January 1st, 2020 through December 31, 2022, to ensure that our search specifically captured the short-term mental health burden on CHWs reported since the onset of the COVID-19 pandemic. The end date of the search reflected the date the search was completed, as well as ensuring a 3-year window to capture published empirical studies. This search strategy was adapted from the search strategies described in prior reviews, primarily drawing on the experience of similar research from previous pandemics.[7]

2.2. Study selection

Our initial search was broad and encompassed all studies related to the occurrence of distress and mental health symptoms among CHWs and other frontline health workers reported in LMICs since onset of the COVID-19 pandemic. We then narrowed our focus to studies that met our inclusion criteria: (1) the study population must be CHWs (or other non-specialist frontline health workers working in community settings); (2) the study setting must be in low-income and middle-income countries (LMICs); (3) mental health symptoms, including stress and

Table 1
Complete list of search terms used in the MEDLINE database.

Search	Search terms
"Mental health"	"Mental illness" OR "mental health" OR "mental wellbeing" OR "depression" OR "anxiety" OR "affective disorder" OR "psychological wellbeing" OR "psychological" OR "psychological distress" OR "stress" OR "post-traumatic stress disorder" OR "PTSD" OR "stress disorder" OR "mental disorders" [MeSH Terms] OR "Anxiety Disorders" [Mesh] OR "Stress Disorders, Traumatic" [Mesh] OR "Mood Disorders" [Mesh] OR "Depressive Disorder" [Mesh] OR "Stress, Psychological" [Mesh] OR "Psychological Distress" [Mesh]
"Community health workers"	"Community Health Worker" OR "Frontline Health Worker" OR "health care worker" OR "personnel" OR "clinician" OR "nurse" OR "midwife" OR "midwives"OR "first responder" OR "Community Health Workers" [Mesh] OR "Health Personnel" [Mesh]
"COVID-19"	"COVID-19" OR "sars cov" OR "nCOV" OR "coronavirus 2" OR "novel coronavirus" OR "Severe Acute Respiratory Syndrome"[Mesh] OR "SARS" OR "severe acute respiratory syndrome coronavirus 2" OR "COVID-19" [Supplementary Concept]

COVID-19: coronavirus disease 2019.

other forms of distress must be assessed or reported; (4) only studies from 2020 to 2022 where data collection occurred during the COVID-19 pandemic; and (5) only empirical studies reporting results could be included, covering a range of study designs such as observational, qualitative, surveys and cross-sectional studies, and experimental studies. We followed the PRISMA reporting guidelines in identifying and screening studies for inclusion in our review.[29] We defined community health workers (CHWs) based on the World Health Organization (WHO) definition which states that they are "health care providers who live in the community they serve and receive lower levels of formal education and training than professional health care workers such as nurses and doctors".[35] Their task designations describe them as non-specialized healthcare groups that provide community health services and essential treatments in collaboration with the primary healthcare system and specialized health providers. We adapted the definition for LMICs based on the World Bank's gross national income-based classification of countries for the year 2021.[36] We defined mental health distress as a broader scope of any mental health symptoms CHWs may experience, including stress, depression, or anxiety. We also used the term burnout, as this refers to exhaustion beyond one's physical, emotional, psychological, or mental capacity.[37,38] WHO's international classification of disease 11 (ICD-11) defines burnout in an occupational context as a syndrome whereby one experiences feelings of low energy, emotional and mental depletion, and decreased occupational output.[39]

We excluded unpublished papers, abstracts, reviews or commentaries, papers not published in the English language, and papers not focused on CHWs and their mental health concerns during the COVID-19 pandemic. We included any type of empirical study on mental health distress and burnout among CHWs during the COVID-19 pandemic. All included studies were initially identified from the search by the first author, and then inclusion criteria were reviewed by the last author to confirm eligibility. The authors met to discuss the inclusion of studies and reach consensus on the final list of included studies.

2.3. Data extraction and synthesis

After establishing the final list of included studies, the lead author extracted common characteristics from each study as well as a summary of the key findings and entered these details into a table. The last author then reviewed the table to ensure accuracy. The first author and last author then met to discuss the findings and common themes that emerged from the studies before grouping the findings from the included studies into three broad overarching categories. These categories were determined by the authors through iterative discussion and reaching consensus and are summarized in the results section below and covered: (1) symptoms experienced; (2) drivers of different mental health symptoms; and (3) strategies for coping with different symptoms.

2.4. Quality assessment

The lead author also assessed the methodological quality of the included studies using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for reporting prevalence data and qualitative studies, a widely used and recognized tool for assessing quality and risk of bias in observational studies.[40] This tool was selected for quality appraisal because all the included studies were observational or qualitative in nature. The checklist has nine components which varied on whether the study was quantitative or qualitative. The quantitative categories were: "Appropriate Sample Frame," "Appropriate Study Participants," "Sample Size," "Detailed Study Subject Setting," "Data Analysis," "Identifying Conditions," "Condition Measurement," "Statistical Analysis," and "Response Rate." The qualitative categories were: "Perspective and Methodology," "Methodology and Objectives/Questions," "Methodology and Data Collection, "Methodology and Data Analysis," "Methodology and Results," "Researcher," "Researcher's Influence," "Participants' Voices," "Ethics," and "Conclusion." These categories were adapted from the JBI Checklist.[41]

Across these categories, the lead author scored each considered paper. The responses included "yes," "no," "unclear," and "not applicable." These responses were translated to numerical scores, (yes = 1, no = 0, unclear = 0.5, not applicable = excluded). Each study was appraised as: "include," "exclude," or "seek further information" based on the overall score. The authors then met to review the scores; disagreements were limited and reached a global consensus. The scores were not averaged. The JBI checklist does not provide any specific cutoffs for appraisal of studies but rather provides a series of guidelines on how to evaluate each paper in a systematic way. To incorporate these guidelines, which focused on preventing evaluation of studies of poor methodological quality, in a quantitative way we assigned a cut off "5" on the 9-point and 10-point scale, as a previous study identified studies with > 50% quality metrics as of "medium quality." Previous reviews have used cutoff scores that range from 60% to 75% as high-quality and thus, to include the greatest number of studies, we used a slightly lower cut-off.[42,43]

3. Results

Fig. 1 illustrates our study selection using a PRISMA flowchart. We identified 2073 entries through the MEDLINE database search and excluded three duplicates. Following title and abstract review, we then excluded 1995 entries that were not empirical studies and did not report mental health symptoms experienced among CHWs during the COVID-19 pandemic. Of the 75 full-text articles reviewed, we further excluded 65 articles that were not relevant to CHWs in LMICs (Fig. 1).

Our review synthesized findings from ten studies from literature relevant to COVID-19-related mental health impacts on CHWs. We summarized the key characteristics of the studies that included various types of CHWs in LMICs, see summary of included studies in Table 2. Four studies were quantitative assessments, four were qualitative interviews, and two involved mixed methods. The participants interviewed included service-users who relied on CHWs, national and miscellaneous CHWs, and CHW program managers. The studies covered CHWs in 11 countries spanning regions including South Asia, Southeast Asia, South America, Eastern and Southern Africa to get a broad overview of different experiences among CHWs. These studies assessed mental health symptoms such as anxiety and depression, as well as other symptoms of distress such as fatigue, occupational stress index, pandemic burnout, and sleep quality.

Table 2
Summary of the included studies on COVID-19 related mental health impact and burnout on CHWs in LMICs.

Author and year of study	Time of study	Location	Participants	Study design/methodology	Conclusion
Akhter et al., 2021[44]	Between April and June 2020	Bangladesh	Purposive sampling of pregnant women and their community healthcare providers	23 telephone-based key informants (CHWs) and individual in-depth interviews of community healthcare providers' experiences and challenges during the pandemic	The community healthcare providers expressed feelings of fear, frustration, powerlessness, sadness
Aryal and D'mello, 2020[45]	January to April 2019	Mangalore Taluk, Karnataka, India	347 CHWs [ASHA, ANM, and Multipurpose workers (MPW)] from 16 selected PHCs	A cross-sectional study was used to examine CHW stress and coping strategies. Occupational stress was measured using the occupational stress index scale (OSI), while their coping strategies were measured using a 28-item brief COPE inventory	70% of participants showed moderate levels of occupational stress, while about 23% reported severe occupational stress. Some participants adopted positive behaviors like humor, venting, positive reframing, and affirmation to cope with occupational stress, while some engaged in negative strategies like a self-distraction, denial, substance use, and blame
Correia da Silva et al., 2022[46]	October to November 2020	Brazil	Primary healthcare workers (including CHWs) in Sao Paulo, Brazil	Comparison of prevalence of probable depression pre and during the pandemic using data from cross-sectional surveys in PANDORA-SP and HEROES-SP projects	CHWs had a higher prevalence of probable depression before the pandemic when compared to the pandemic period (25% vs. 20 %, $P = 0.24$)
Hameed et al., 2022[47]	August and October 2020	Pakistan	Primary healthcare workers (including LHWs and LHS) from 42 rural and basic health facilities across 15 urban and rural districts of Sindh and Punjab provinces of Pakistan	47 In-depth qualitative interviews of participants using a standard semi-structured guide were conducted via telephone	All participants reported depressive symptoms like fear, anxiety, excessive worry, frustration, mental pressure, fatigue, and isolation. LHS reported the lack of mental health focus in their support
Hoang et al., 2022[48]	March 2021 to April 2021	Viet Nam	979 CHWs	A cross-sectional online survey was used to evaluate COVID-19-related depression (PHQ-9) among CHWs who worked during Viet Nam's largest COVID outbreak (2021 Tet holiday outbreak)	Findings showed a significant increase in depression. The prevalence of mild depression increased by 1.6-fold, moderate depression by 4-fold, and severe depression by 5-fold ($P < 0.001$) compared to pre-pandemic rates
Lotta et al., 2022[49]	Between 15th June and 1st July 2020; group discussion took place between March and July 2020	Brazil	870 CHWs- for quantitative and 600 CHWs for qualitative	Mixed methods study assessing the impact of COVID-19 on frontline workers and evaluating the vulnerability of the CHWs	70% of CHWs did not have access to PPE, 72% lacked access to testing materials, 73% reported mental health impact, 89% experienced fear, and 83% felt unprepared
Mishra et al., 2022[50]	February to April 2021	India	CHWs (ASHA, ANM, LHV) from six districts in Odisha state East India	In-depth interviews and focused group discussions were used to assess CHWs' mental health symptoms and coping strategies	Findings include fear, anxiety, stress, and stigma. Coping strategies identified include family support, regular Yoga, and pranayama
Niyigena et al., 2022[51]	August 30th to October 3rd, 2020	Rwanda	292 CHWs from three Rwandan districts	A Mixed method convergent parallel study was used to assess CHWs needs and challenges during the COVID-19 pandemic	CHWs reported challenges like denied access to homes, scarce resources, fear of getting infected, and mortality. They experienced worsened stress and burnout during the pandemic due to increased work hours and limited time off
Yakubu et al., 2022[52]	May 25th to June 8th, 2020	India, Kenya, Bangladesh, Ethiopia, Nepal, the Philippines, and South Africa	Program managers and institution leaders from 61 governmental and nongovernmental institutions that worked with CHWs	Online qualitative assessment of CHW pandemic-related mental health stress and support available to them	Over 50% of the respondents admitted their CHWs experienced mental health symptoms (depression, anxiety, fatigue, somatization, burnout, feeling overwhelmed due to workload), with anxiety and depression being the most prevalent (76%) symptom
Yella and Dmello, 2022[53]	February to April 2020	Guntur, India	221 ASHA and 189 ANM across 13 urban primary healthcare centers	A cross-sectional study was used to measure the type of burn out-work-related, pandemic-related, and personal burnout and the sleep quality (using the Pittsburg Sleep Quality Index) of CHWs	Of the three categories of burnout assessed, pandemic burnout was the most prevalent (25%). About 35% of the participants recorded poor and moderate (37%) sleep quality

CHW: community health worker; COVID-19: coronavirus disease 2019; LMICs: low- and middle-income countries; ASHA: Accredited Social Health Activists; ANM: auxiliary nurse midwife; PPE: personal protective equipment; COPE: coping orientation to problems experienced inventory; LHWs: lady health workers; LHS: lady health supervisors; PANDORA-SP: Panorama of Primary Health Care Workers in São Paulo, Brazil; HEROES-SP: COVID-19 Health Care Workers Study–São Paulo; PHQ-9: patient health questionnaire-9; LHV: lady health visitors.

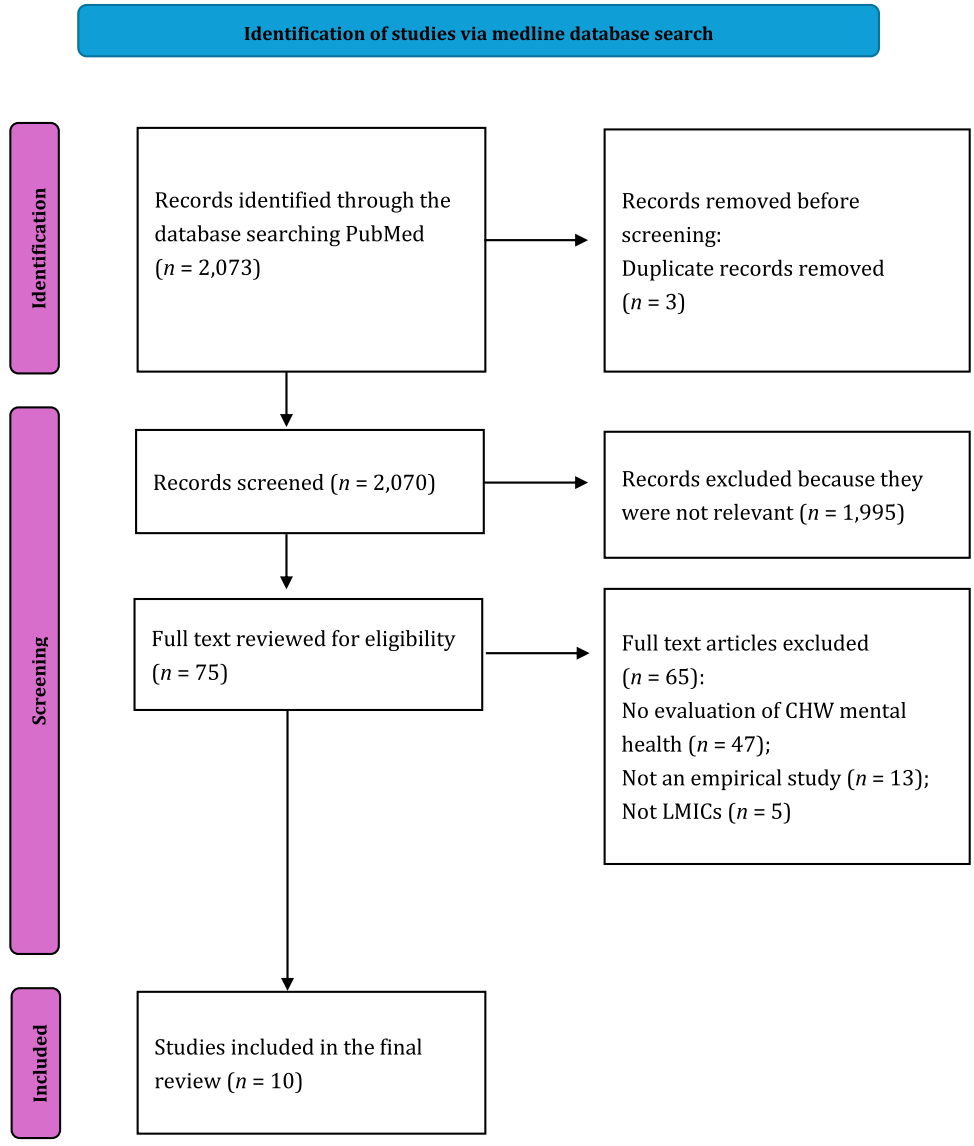

Fig. 1. PRISMA flow diagram of studies included in this scoping review.
CHW: community health worker; LMICs: low- and middle-income countries.

Table 3
The ratings of methodological quality of included quantitative studies using the Joanna Briggs Institute Assessment tool.

Author and year	Quality criteria for quantitative studies									Total quality score
	Appropriate sample frame	Appropriate study participants	Sample size	Detailed study subject and setting	Data analysis	Identifying conditions	Condition measurement	Statistical analysis	Response rate	
Aryal and D'mello, 2020[45]	1	1	1	0	1	1	1	1	1	8
Correia da Silva et al., 2022[46]	1	1	1	1	1	1	1	1	1	9
Hoang et al., 2022[48]	1	1	1	1	1	1	1	1	1	9
Yella and Dmello, 2022[53]	1	1	1	1	1	1	1	1	1	9

We grouped the findings from the studies according to three broad thematic areas, including: (1) characterizing the types of symptoms, mental distress and other related challenges experienced by CHWs; (2) factors contributing to these symptoms and challenges among CHWs; and (3) strategies employed by CHWs to manage and cope with these symptoms. The quality assessment of included studies across these thematic areas is summarized in Tables 3 and 4.

3.1. Symptoms and mental distress experienced by CHWs

Burnout was a common symptom that emerged from two of our included studies.[52,53] CHWs reported experiencing more pandemic-related burnout when compared to personal and work-related burnout.[53] A survey of institutions on the pandemic-related mental health burden of CHWs in certain LMICs, including India, Kenya, Peru,

Table 4
The ratings of methodological quality of included qualitative studies using the Joanna Briggs Institute Assessment tool.

Author and year	Quality criteria for qualitative studies										Total quality score
	Perspective and methodology	Methodology and objectives/questions	Methodology and data collection	Methodology and data analysis	Methodology and results	Researcher	Researcher's influence	Participant's voices	Ethics	Conclusion	
Akhter et al., 2021[44]	1	1	1	1	1	1	1	1	1	1	10
Hameed et al., 2022[47]	1	1	1	1	1	1	1	1	1	1	10
Lotta et al., 2022[49]	1	1	1	1	1	1	1	1	1	1	10
Mishra et al., 2022[50]	1	1	1	1	1	1	1	1	1	1	10
Niyigena et al., 2022[51]	1	1	1	1	1	1	1	1	1	1	10
Yakubu et al., 2022[52]	1	1	1	1	1	1	1	1	1	1	10

Bangladesh, Ethiopia, Nepal, the Philippines, and South Africa, conducted between May 25 and June 8, 2020 showed that excessive workload and burnout were prevalent, as 14.8% of all CHWs had these symptoms.[52] Similarly, mental fatigue, as well as occupational and emotional stress were frequently reported. A cross-sectional study of CHWs was conducted in selected Primary Health Centers of Mangalore Taluk, Karnataka, India, and measured their occupational stress levels using the occupational stress index (OSI) scale and categorized as low, moderate, or high levels of occupational stress.[45] All the participants reported being short-staffed at their respective Primary Health Centers, and that they had to take on extra work responsibilities. About 40% of the participants experienced occupational stress, with 70% having moderate stress and 23% having severe stress.[45] The four qualitative studies also identified stress and fatigue as the highest prevalent symptoms during the pandemic.[44,47,50,52]

Depression and anxiety were also common pandemic-related symptoms experienced by CHWs. In a comprehensive study based on surveys of organizational leaders, researchers found that combined depression and anxiety had a prevalence of 76.5% among CHWs across LMICs.[52] Similarly, Hoang et al. compared the prevalence and severity of depression among CHWs 6 months before the pandemic and during the 2021 Tet holiday COVID outbreak in Viet Nam.[48] They found higher rates of depression and worsened severity during the Tet holiday than before the pandemic.[48] They measured depression in mild, moderate, moderately severe, and severe categories and found a 1.6 to 5-fold increase in depressive symptom levels during the 2021 COVID outbreak. Another study comparing the depression rates pre- and post-pandemic onset showed that CHWs in Sao Paulo, Brazil, who had limited patient contact compared to higher patient contact during the pandemic, had lower depression rates.[46] In another study, in-depth interviews and focus group discussions with CHWs in Odisha State in East India revealed that providing care services during the pandemic was very challenging and left them feeling anxious.[50]

Adverse effects on sleep quality also emerged as a concern in some studies. Yella et al. measured sleep quality among CHWs in Guntur, India, using the Pittsburgh Sleep Quality Index (PSQI).[53] About one-third of the participants reported poor and moderate sleep quality, and the level of sleep quality was significantly associated with age, marital status, and housing.[53] The CHWs reported reduced interest, lack of enthusiasm, and difficulty staying awake while at work.[53] Poor sleep quality was significantly associated with workers who were married and above 30 years.[53] Similarly, in the study from Viet Nam, Hoang et al. found that workers who had poor sleep quality and quantity, poor working conditions, and poor work hour protections were more likely to have an increase in depression metrics.[48] Fear and stigma were also common sentiments for many CHWs. Most respondents feared contracting the virus and spreading it to their loved ones.[44,47,49-51,53] Some CHWs were stigmatized, harassed, and unwelcomed during home visits.[46,47,50,51] Interviews with one of the auxiliary nurse midwives (ANM) in the study conducted in Odisha, India quoted:

> "*Most people did not allow us to enter their home. They told us that we work in the hospital and hence we must have been infected.*"[50]

In a study conducted in Pakistan, Hameed et al. noted that some female health workers were ostracized in the community during the early stages of the pandemic when there was a great deal of uncertainty, making it difficult to carry out their duties, but this feeling waned as people became more accepting of them in their homes over time.[47]

3.2. Factors contributing to these symptoms and challenges among CHWs

There were several factors that exacerbated and contributed to the symptoms of distress experienced among CHWs. For instance, increased workload, absent or limited work resources, lack of mental health care/support, poor working conditions, job ambiguity, isolation, and financial insecurity were identified across the different studies. Specifically, Mishra et al. found that fear of infecting themselves and their loved ones was associated with greater anxiety.[50] Faced with this fear, many CHWs reported isolating themselves from their family and feeling alone for several weeks.[49] Aryal et al. found that factors like lack of financial incentives, low status, and feeling powerless were strongly associated with their elevated occupational stress levels.[45]

Many CHWs were expected to provide services amid deplorable and unsafe working conditions; they complained about the overcrowded workspaces, lack of safety supplies like personal protective equipment, water, hand washing units, hand sanitizers, and face masks, as well as transportation difficulties. Only 28% of CHWs had access to testing materials, while 30% had access to personal protective equipment.[49] These conditions contributed to their mental stress, fear, worry, and emotional despair.[44,47,49,51] The frequent exposure to patients at the hospital and in the community exacerbated their fear.[50] The lack of managerial support, supervision, debriefing, clear guidelines, and guardianship was also associated with their fears, uncertainty of roles, and lack of confidence at work.[49] One study reported that about 77% of CHWs did not receive institutional support during the pandemic, and 46% did not receive direct guidance from superiors.[49]

CHWs highlighted insufficient knowledge of COVID-19, lack of training, and internet/media news scare as a source of worry and burnout, and also, worsened their pre-existing stress.[47,51] Only 13% of CHWs received any form of training for the pandemic control.[49] Mishra et al. indicated that the media scare and doomsday information were associated with the increased stigmatization of CHWs in India,[50] and Niyigena and colleagues found that being discriminated against and feared by mem-

bers of their communities contributed to burnout among the CHWs in Rwanda.[51]

Some CHWs expressed job dissatisfaction given their working conditions and felt underappreciated and unrecognized despite the danger and sacrifices their jobs demanded.[47,51] Job dissatisfaction and being undervalued were associated with high levels of depression. A common driver of these concerns was heavy workload, reflected among CHWs as feeling overwhelmed or overworked, working multiple jobs, or working more than nine hours per day (often far exceeding this number) was associated with deterioration to higher levels of depression.[48] Excessive work obligations were a source of exhaustion and stress.[47] Lastly, the financial strain on households also posed a significant burden for many CHWs. In two studies, CHWs complained of the irregularities and delays in their financial remuneration and noted that the extra workload left no spare time for alternate income sources.[47,51]

3.3. Strategies employed by CHWs to manage and cope with these symptoms

Despite the wide range of mental health symptoms and emotional distress experienced among CHWs in LMICs, as well as the numerous drivers and contributors to these concerns, some of the included studies described and explored strategies that the CHWs employed to cope with and manage these challenging circumstances. The strategies were varied and encompassed various levels of intervention – personal, community, and system-level. Aryal et al. studied coping mechanisms used by CHWs in a coastal city in Karnataka, India using the Brief Coping Orientation to Problems Experienced (COPE) Inventory.[45] This paper, however, did not find that positive (active coping, positive reframing, humor) or avoidant coping (self-distraction, substance-use, self-blame) skills predominated in patients who self-reported higher levels of occupational stress, implying that it remained unclear whether emphasizing positive or negative coping changed stress.[45] On a systems-level, a study focused on healthcare workers in Pakistan, including lay health workers, identified what health systems mechanisms helped alleviate their concerns: proper provision of personal protective equipment; co-worker social support systems that emphasized their role; proper management and effective communication from higher administration; and professional mental health support (e.g. psychiatry and psychology) offered from the health system.[47] A similar qualitative study focused on the specific role that maternal and child health CHWs played in Odisha, India and identified various coping mechanisms taken to overcome this challenge. These CHWs primarily found that personal-level strategies such as sharing with family-members and yoga were adaptive. At the facility-level, CHWs noted that having adequate financial and structural support (e.g. transportation, availability of PPE) were key to adequate mental health. Finally, this was the only study that investigated what community support was needed to help support CHWs and identified that having community leaders assist CHWs in COVID-19 outreach was key.[47] Overall, from both qualitative studies, it is imperative that health systems focus on strengthening their structural and economic support for CHWs. Other initiatives require further investigation to ensure they provide adequate support at multiple levels. Additionally, further quantitative studies of real-time coping strategies similar to that of Aryal et al. are key to understand what coping strategies can be helpful.[46]

4. Discussion

Drawing from the findings of this scoping review, it is clear that CHWs and other frontline health workers in LMICs experienced elevated mental distress, poor sleep, and increased risk of burnout during the COVID-19 pandemic. The findings from our reviewed studies showed similar trends, where the most frequent mental health symptoms experienced by the CHWs, including depression, anxiety, immense fear, and fatigue were reported. The pandemic saturated and overburdened CHWs with adverse psychological impacts. Some CHWs reported feeling frightened and alone due to their suboptimal working conditions and concerns about the fatality of the COVID-19 virus. They expressed fears pertaining to the contagious virus, contracting it, and infecting their loved ones and communities. These feelings were worsened by the extended work hours and demands, which meant prolonged exposure, frequent contact, and a substantial risk of being infected. These findings are consistent with other studies on the detrimental psychological impacts of COVID-19 on the general population,[54] as well as specifically among health care workers, primarily reported among doctors and nurses across both higher and lower income settings.[55-57]

Our review characterizes many of the key drivers of mental distress among CHWs in LMICs, which can be attributed to health system factors, the nature of their work, and overall limited support offered. For instance, CHWs reported feeling alone, helpless, and unsupported during the pandemic because they were not provided the resources and workforce to perform their jobs safely.[53] Yella et al. advocated for providing essential protective equipment, other work materials, and regular briefings with CHWs.[53] It is believed that these interventions could identify the challenges experienced among CHWs and better respond to their needs, thus minimizing the potential detrimental consequences on their mental health.[53] Similarly, Yakubu et al. considered how various intervention approaches could help allay the risk of worsened mental health symptoms, such as through peer mentorship, educational sessions, communication logistics, group activities, training workshops, and behavioral modifications exercises like sleep hygiene and mindfulness.[52] Our review also showed that although some communities provided support in the form of COVID safety information and awareness, the mental wellbeing of these frontline health workers was not addressed.[47] They expressed a need for regular mental health therapy and assessments. Similar recommendations have been proposed in prior studies on mental health interventions for medical workers during a crisis.[6,13] For instance, Rana et al. encouraged professional counseling sessions for medical workers and their families, while emphasizing the need for healthy working conditions like pre-job training, provision of food and other essential supplies, and an organized shift system.[6]

One of the studies included in our review showed that many CHWs found it challenging to get other jobs to supplement their income,[52] an unfortunate circumstance owing to their increased workload during the pandemic, their lack of adequate financial compensation, and perceived concerns within their communities about their exposure to the virus and potential for transmissibility.[52] CHWs are not regarded as professional health providers, and some health systems do not include them on payroll or remunerate them fairly and consistently[15]; thus, some CHWs work as volunteers or are marginally compensated with gifts or other non-monetary items.[15,17,21,58] Many unpaid CHWs work alongside other health workers who are paid, a concern that has been previously highlighted as a form of labor exploitation, particularly given that CHWs are predominantly lower income women of color.[59,60] This practice poses financial burdens on these workers, especially those who have dependents, oftentimes requiring that they seek other forms of employment to meet basic needs. Official work designs for CHWs' rights, job privileges, and inclusion in salary and benefit schemes commensurable to their job requirements are needed, as well as ensuring ongoing support and opportunities for professional development and growth could enable strengthening of health systems in LMICs and improved resilience in the face of emerging public health threats.[61] Furthermore, improved working conditions and recognition of the role of CHWs through fair compensation could motivate and attract more people to work in this field, reduce financial worry, and improve dedication in service delivery, thereby offering potential avenues to improve the quality of care offered and strengthen health systems in LMICs.[60] In one of the studies included in our review, CHWs recommended that certificates of recognition and appreciation would serve as an incentive and motivation for their service, especially when responding to urgent crisis situations such as a pandemic[47]; yet, such tokens would need to be

offered alongside fair compensation and improved working conditions. While our review further attests to the challenges and added psychological distress experienced among CHWs when confronting a serious public health crisis such as a pandemic, such lessons are needed to inform efforts to better support this essential frontline workforce through tangible support and monetary incentives as a means to strengthen the overall health systems in LMICs.

4.1. Future directions

This review had a limited timeframe, and thus, focused primarily on summarizing short-term mental health consequences experienced among CHWs and the burden incurred directly during the COVID-19 pandemic. However, there is a great need to continue to examine the impact of the COVID-19 pandemic and its after-effects on the mental health and functioning of CHWs, especially as health systems in LMICs continue to rely on CHWs to expand most of the primary and community-based care services available as well as responding to the bulk of maternal and child health needs.[23,62] At the level of CHWs, a future study could focus on the long-term effects of the pandemic; future studies could also focus on a sub-analysis to identify the specific mental health symptoms and conditions that have persisted since the start of the pandemic, and whether this may have differed by individual characteristics, such as age, work experience, gender, region of residence, and need for balancing competing demands.

There has been important formative research indicating that younger, female, and non-hospital-based health workers experience more significant burden owing to the COVID-19 pandemic responses,[43] and this should be further understood. This trend has been further reflected in prior systematic reviews conducted in LMICs, yet primarily among doctors and nurses.[16] It is also important to understand what key social systems are required to sustain a CHW force that is resilient to crisis. We recommend that future studies take a comparative approach both within LMICs (i.e. comparing urban-rural divides) and between countries to better understand how different health systems, and CHW models, have responded to the added burden caused by the COVID-19 pandemic. In our initial literature search, we also noted few studies from sub-Saharan Africa and South America, highlighting the need to better understand how CHWs and other frontline health workers may have been impacted in these regions. Our review identified initial strategies and policy recommendations for coping strategies and mechanisms to ensure that CHWs are protected from systems failures (like the COVID-19 pandemic); a key area of growth in this field is expanding this work, specifically focused on the gendered and often informal nature of their work via rigorous, implementation-based research initiatives. It would also be of great benefit to the field to have more rigorous cohort studies to follow impact CHWs prospectively to determine the long-term consequences of the COVID-19 pandemic on mental health and wellbeing, as well as rigorous randomized controlled trials to understand what interventions and approaches could be effectively deployed to alleviate this burden.

4.2. Limitations

There are limitations with this scoping review that warrant consideration. Given that the pandemic has spanned several years, and thus, our review period included studies published over just under 3 years, from January 2020 to December 2022, we were only able to capture scientific articles reporting on the short-term impacts of the pandemic on CHWs' mental health and wellbeing. We recognize that there will continue to be new studies published documenting the adverse impacts of the pandemic on the psychological wellbeing of frontline health workers. Therefore, this review should be repeated in a few years' time to better understand the long-term effects of the pandemic on CHWs' mental health and wellbeing, the long-term effects on health system functioning in LMICs, and whether any efforts have been successfully implemented to address the shortcomings observed in this review. This review employed a scoping review approach because of our broad research objectives and aim to characterize recent studies documenting the mental health impacts of the COVID-19 pandemic on CHWs in LMICs; therefore, our review does not offer a systematic synthesis of the scientific evidence. As we anticipate that new studies will continue to emerge over the coming years, it may be ideal to conduct a systematic review and quantitative assessment of the evidence in the future to further expand on our findings. Additionally, even though our studies comprised studies across LMICs in many different regions, it is necessary to recognize that there is great between country variability. For example, India's healthcare financing, health system, and national CHW workforce are not directly comparable to those of Ethiopia's, or other LMICs. Additionally, there is great variability between urban and rural settings within each country, where urban settings are typically more highly resourced with greater availability of health services, which further make our results difficult to generalize. We note that none of the identified studies compared the differential infrastructure and community resources that were available for CHWs and likely had an impact on their ability to respond to the pandemic, and ultimately, their mental health and wellbeing. This is an important consideration to better understand the differences in pandemic response between rural and urban settings, and differential impact on the mental health and wellbeing of CHWs in these settings.

It is important to note that there are also several methodological limitations with the studies included in our review, such as small sample sizes and relying primarily on qualitative methods. Namely, there have been few large-scale, rigorous cohort studies specifically enrolling community health workers and other frontline health workers in LMICs to understand the experiences and extent of burnout, fatigue, and depression, and there is a clear need for randomized controlled trials to determine the effectiveness of targeted interventions aimed at addressing these concerns within health systems in LMICs. Given these limitations, it is not possible to draw conclusions from this literature review about the range of mental health challenges and symptoms experienced among CHWs, as well as the prevalence of such concerns in this population group. Finally, we were unable to conduct a pooled analysis or quantitative assessment because we analyzed a wide variety of study designs including quantitative, observational, and qualitative studies. A pooled analysis studying the impact of the COVID-19 pandemic on the mental health of CHWs represents an important future analysis, thereby requiring ample number of quantitative studies capturing symptom details among CHWs.

5. Conclusion

In most LMICs, CHWs play a central role in the delivery of primary care services and represent the backbone of the health system. The COVID-19 pandemic necessitated an increased utilization of CHWs, and public health emergencies like the pandemic are known to have detrimental mental health impacts and significant consequences in this frontline workforce if unaddressed.[26] The COVID-19 pandemic emphasized the importance of CHWs in the health systems of many countries, and mounting literature has shown daunting evidence of neglect of their psychological wellbeing. Drawing from the included studies, it is clear that the main imperative of health systems is to ensure proper material protections for CHWs and ensure adequate financial and workplace support. At the community-level, mandating involvement from local leaders would also ensure proper CHW support. Future policy should also ensure that CHWs get both prophylactic and reactive psychiatric treatment. Efforts to promote the wellbeing and resilience of CHWs and other frontline non-specialist health workers will likely pay long-term dividends towards reinforcing and strengthening the health systems in LMICs, especially in anticipation of future public health threats or pandemics.[8,52,63] Prior studies have documented the consequences of the COVID-19 pandemic on the mental health and well-being of specialized health care providers in LMICs, including doctors and nurses;[16]

yet, alarmingly, our review highlighted the limited number of studies focused on understanding the mental health and wellbeing of CHWs and frontline health workers in LMICs, demonstrating a key gap in the scientific literature and an essential area to address towards strengthening health systems in preparation for future public health threats.[7,23] Additionally, ensuring that CHWs are encouraged to speak openly and seek help as needed will contribute to the sustainability of community health worker programs and potentially minimize the risk of CHW attrition. To date, there has been little attention from the research community on the mental healthcare of the COVID-19 pandemic on CHWs compared to other facility-based healthcare workers, and professional healthcare workers such as doctors and nurses. There is a crucial need for tailored mental health interventions for these indispensable frontline healthcare providers to ensure continued delivery of quality care and encourage scaling up and sustainability of CHWs programs in other settings.

Funding

Dr. Naslund reports receiving funding from the National Institute of Mental Health (U19MH113211–01 and R01MH133230) and the Harvard Global Health Institute Burke Fellowship. Dr. Naslund also reports receiving support from Iméra, Institute for Advanced Study at Aix-Marseille University, Marseille, France.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Oluchi I. Ndulue: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft. **Anand Chukka:** Writing – review & editing, Methodology, Investigation. **John A. Naslund:** Conceptualization, Methodology, Validation, Writing – review & editing, Supervision.

Acknowledgments

This work was supported by grants from the National Institute of Mental Health (U19MH113211–01) and the Harvard Global Health Institute Burke Fellowship.

References

1. Arsenault C, Gage A, Kim MK, et al. COVID-19 and resilience of healthcare systems in ten countries. *Nat Med*. 2022;28(6):1314-1324. doi:10.1038/s41591-022-01750-1.
2. Fejfar D, Andom AT, Msuya M, et al. The impact of COVID-19 and national pandemic responses on health service utilisation in seven low-and middle-income countries. *Glob Health Action*. 2023;16(1):2178604. doi:10.1080/16549716.2023.2178604.
3. Vigo D, Thornicroft G, Gureje O. The differential outcomes of coronavirus disease 2019 in low-and middle-income countries vs high-income countries. *JAMA Psychiatry*. 2020;77(12):1207-1208. doi:10.1001/jamapsychiatry.2020.2174.
4. Bong CL, Brasher C, Chikumba E, McDougall R, Mellin-Olsen J, Enright A. The COVID-19 pandemic: effects on low-and middle-income countries. *Anesth Analg*. 2020;131(1):86-92. doi:10.1213/ANE.0000000000004846.
5. Tessema GA, Kinfu Y, Dachew BA, et al. The COVID-19 pandemic and healthcare systems in Africa: a scoping review of preparedness, impact and response. *BMJ Glob Health*. 2021;6(12):e007179. doi:10.1136/bmjgh-2021-007179.
6. Rana W, Mukhtar S, Mukhtar S. Mental health of medical workers in Pakistan during the pandemic COVID-19 outbreak. *Asian J Psychiatr*. 2020;51:102080. doi:10.1016/j.ajp.2020.102080.
7. Deng D, Naslund JA. Psychological impact of COVID-19 pandemic on frontline health workers in low- and middle-income countries. *Harv Public Health Rev (Camb)*. 2020;28. http://harvardpublichealthreview.org/wp-content/uploads/2020/10/Deng-and-Naslund-2020-28.pdf.
8. Kola L, Kohrt BA, Hanlon C, et al. COVID-19 mental health impact and responses in low-income and middle-income countries: reimagining global mental health. *Lancet Psychiatry*. 2021;8(6):535-550. doi:10.1016/S2215-0366(21)00025-0.
9. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3(3):e203976. doi:10.1001/jamanetworkopen.2020.3976.
10. Wu T, Jia X, Shi H, et al. Prevalence of mental health problems during the COVID-19 pandemic: a systematic review and meta-analysis. *J Affect Disord*. 2021;281:91-98. doi:10.1016/j.jad.2020.11.117.
11. Shrivastava R, Sharma L, Jolly M, et al. We are everyone's ASHAs but who's there for us?" a qualitative exploration of perceptions of work stress and coping among rural frontline workers in Madhya Pradesh, India. *Soc Sci Med*. 2023;336:116234. doi:10.1016/j.socscimed.2023.116234.
12. Dubey S, Biswas P, Ghosh R, et al. Psychosocial impact of COVID-19. *Diabetes Metab Syndr*. 2020;14(5):779-788. doi:10.1016/j.dsx.2020.05.035.
13. Xiang YT, Yang Y, Li W, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. 2020;7(3):228-229. doi:10.1016/S2215-0366(20)30046-8.
14. Zheng W. Mental health and a novel coronavirus (2019-nCoV) in China. *J Affect Disord*. 2020;269:201-202. doi:10.1016/j.jad.2020.03.041.
15. Ahmed S, Chase LE, Wagnild J, et al. Community health workers and health equity in low- and middle-income countries: systematic review and recommendations for policy and practice. *Int J Equity Health*. 2022;21(1):49. doi:10.1186/s12939-021-01615-y.
16. Moitra M, Rahman M, Collins PY, et al. Mental health consequences for healthcare workers during the COVID-19 pandemic: a scoping review to draw lessons for LMICs. *Front Psychiatry*. 2021;12:602614. doi:10.3389/fpsyt.2021.602614.
17. Pallas SW, Minhas D, Pérez-Escamilla R, Taylor L, Curry L, Bradley EH. Community health workers in low- and middle-income countries: what do we know about scaling up and sustainability? *Am J Public Health*. 2013;103(7):e74-e82. doi:10.2105/AJPH.2012.301102.
18. Tulenko K, Møgedal S, Afzal MM, et al. Community health workers for universal health-care coverage: from fragmentation to synergy. *Bull World Health Organ*. 2013;91(11):847-852. doi:10.2471/BLT.13.118745.
19. Olaniran A, Smith H, Unkels R, Bar-Zeev S, van den Broek N. Who is a community health worker? - A systematic review of definitions. *Glob Health Action*. 2017;10(1):1272223. doi:10.1080/16549716.2017.1272223.
20. World Health Organization. From Alma-Ata to Astana: Primary Health care: Reflecting On the past, Transforming For the future: Interim Report from the WHO European Region. Geneva: World Health Organization; 2018.
21. Ballard M, Westgate C, Alban R, et al. Compensation models for community health workers: comparison of legal frameworks across five countries. *J Glob Health*. 2021;11:04010. doi:10.7189/jogh.11.04010.
22. Palafox B, Renedo A, Lasco G, Palileo-Villanueva L, Balabanova D, McKee M. Maintaining population health in low- and middle-income countries during the COVID-19 pandemic: why we should be investing in Community Health Workers. *Trop Med Int Health*. 2021;26(1):20-22. doi:10.1111/tmi.13498.
23. Salve S, Raven J, Das P, et al. Community health workers and Covid-19: cross-country evidence on their roles, experiences, challenges and adaptive strategies. *PLoS Glob Public Health*. 2023;3(1):e0001447. doi:10.1371/journal.pgph.0001447.
24. Jain S, Das AK, Talwar V, Kishore J, Ganapathy U. Social stigma of COVID-19 experienced by frontline healthcare workers of department of anaesthesia and critical care of a tertiary healthcare institution in Delhi. *Indian J Crit Care Med*. 2021;25(11):1241-1246. doi:10.5005/jp-journals-10071-24008.
25. Kaseje N, Ranganathan M, Magadi M, Oria K, Haines A. The effectiveness of rural community health workers in improving health outcomes during the COVID-19 pandemic: a systematic review. *Glob Health Action*. 2024;17(1):2292385. doi:10.1080/16549716.2023.2292385.
26. Bhaumik S, Moola S, Tyagi J, Nambiar D, Kakoti M. Community health workers for pandemic response: a rapid evidence synthesis. *BMJ Glob Health*. 2020;5(6):e002769. doi:10.1136/bmjgh-2020-002769.
27. Ballard M, Bancroft E, Nesbit J, et al. Prioritising the role of community health workers in the COVID-19 response. *BMJ Glob Health*. 2020;5(6):e002550. doi:10.1136/bmjgh-2020-002550.
28. Alegre JC, Sharma S, Cleghorn F, Avila C. Strengthening primary health care in low- and middle-income countries: furthering structural changes in the post-pandemic era. *Front Public Health*. 2024;11:1270510. doi:10.3389/fpubh.2023.1270510.
29. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. doi:10.1136/bmj.n71.
30. Onyeaka H, Anumudu CK, Al-Sharify ZT, Egele-Godswill E, Mbaegbu P. COVID-19 pandemic: a review of the global lockdown and its far-reaching effects. *Sci Prog*. 2021;104(2):368504211019854. doi:10.1177/00368504211019854.
31. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol*. 2018;18(1):143. doi:10.1186/s12874-018-0611-x.
32. Halladay CW, Trikalinos TA, Schmid IT, Schmid CH, Dahabreh IJ. Using data sources beyond PubMed has a modest impact on the results of systematic reviews of therapeutic interventions. *J Clin Epidemiol*. 2015;68(9):1076-1084. doi:10.1016/j.jclinepi.2014.12.017.
33. Waffenschmidt S, Janzen T, Hausner E, Kaiser T. Simple search techniques in PubMed are potentially suitable for evaluating the completeness of systematic reviews. *J Clin Epidemiol*. 2013;66(6):660-665. doi:10.1016/j.jclinepi.2012.11.011.
34. Chapman D. Advanced search features of PubMed. *J Can Acad Child Adolesc Psychiatry*. 2009;18(1):58.
35. Scott K, Beckham SW, Gross M, et al. What do we know about community-based health worker programs? A systematic review of existing reviews on community health workers. *Hum Resour Health*. 2018;16(1):39. doi:10.1186/s12960-018-0304-x.
36. The World by Income and Region. The World Bank Group website. https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html. Accessed May 29, 2023.

37. Selamu M, Hanlon C, Medhin G, Thornicroft G, Fekadu A. Burnout among primary healthcare workers during implementation of integrated mental healthcare in rural Ethiopia: a cohort study. *Hum Resour Health*. 2019;17(1):58. doi:10.1186/s12960-019-0383-3.
38. Dugani S, Afari H, Hirschhorn LR, et al. Prevalence and factors associated with burnout among frontline primary health care providers in low- and middle-income countries: a systematic review. *Gates Open Res*. 2018;2:4. doi:10.12688/gatesopenres.12779.3.
39. WHO adds burnout to ICD-11. *What It Means For Physicians*. American Medical Association website; 2023 *https://www.ama-assn.org/practice-management/physician-health/who-adds-burnout-icd-11-what-it-means-physicians* Accessed May 29, 2023.
40. Ma LL, Wang YY, Yang ZH, Huang D, Weng H, Zeng XT. Methodological quality (risk of bias) assessment tools for primary and secondary medical studies: what are they and which is better? *Mil Med Res*. 2020;7(1):7. doi:10.1186/s40779-020-00238-8.
41. Porritt K, Gomersall J, Lockwood C. JBI's Systematic Reviews: study selection and critical appraisal. *Am J Nurs*. 2014;114(6):47-52. doi:10.1097/01.NAJ.0000450430.97383.64.
42. Pimsen A, Kao CY, Hsu ST, Shu BC. The effect of advance care planning intervention on hospitalization among nursing home residents: a systematic review and meta-analysis. *J Am Med Dir Assoc*. 2022;23(9):1448-1460 e1. doi:10.1016/j.jamda.2022.07.017.
43. Arias-Ulloa CA, Gómez-Salgado J, Escobar-Segovia K, García-Iglesias JJ, Fagundo-Rivera J, Ruiz-Frutos C. Psychological distress in healthcare workers during COVID-19 pandemic: a systematic review. *J Safety Res*. 2023;87:297-312. doi:10.1016/j.jsr.2023.07.016.
44. Akhter S, Kumkum FA, Bashar F, Rahman A. Exploring the lived experiences of pregnant women and community health care providers during the pandemic of COVID-19 in Bangladesh through a phenomenological analysis. *BMC Pregnancy Childbirth*. 2021;21(1):810. doi:10.1186/s12884-021-04284-5.
45. Aryal S, MK D 'mello. Occupational stress and coping strategy among community health workers of Mangalore Taluk, Karnataka. *Indian J Public Health*. 2020;64(4):351-356. doi:10.4103/ijph.IJPH_549_19.
46. Correia da Silva AT, Mascayano F, Valeri L, et al. COVID-19 pandemic factors and depressive symptoms among primary care workers in São Paulo, Brazil, october and november 2020. *Am J Public Health*. 2022;112(5):786-794. doi:10.2105/AJPH.2022.306723.
47. Hameed W, Avan BI, Feroz AS, et al. Impact of COVID-19 on mental health of primary healthcare workers in Pakistan: lessons from a qualitative inquiry. *BMJ Open*. 2022;12(12):e065941. doi:10.1136/bmjopen-2022-065941.
48. Hoang NA, Van Hoang N, Quach HL, et al. Assessing the mental effects of COVID-19-related work on depression among community health workers in Vietnam. *Hum Resour Health*. 2022;20(1):64. doi:10.1186/s12960-022-00760-x.
49. Lotta G, Nunes J, Fernandez M, Garcia Correa M. The impact of the COVID-19 pandemic in the frontline health workforce: perceptions of vulnerability of Brazil's community health workers. *Health Policy Open*. 2022;3:100065. doi:10.1016/j.hpopen.2021.100065.
50. Mishra BK, Kanungo S, Patel K, et al. Resolution of resilience: empirical findings on the challenges faced and the mitigation strategies adopted by community health workers (CHWs) to provide maternal and child health (MCH) services during the COVID-19 pandemic in the context of Odisha, India. *Healthcare (Basel)*. 2022;10(1):88. doi:10.3390/healthcare10010088.
51. Niyigena A, Girukubonye I, Barnhart DA, et al. Rwanda's community health workers at the front line: a mixed-method study on perceived needs and challenges for community-based healthcare delivery during COVID-19 pandemic. *BMJ Open*. 2022;12(4):e055119. doi:10.1136/bmjopen-2021-055119.
52. Yakubu K, Musoke D, Chikaphupha K, Chase-Vilchez A, Maulik PK, Joshi R. An intervention package for supporting the mental well-being of community health workers in low, and middle-income countries during the COVID-19 pandemic. *Compr Psychiatry*. 2022;115:152300. doi:10.1016/j.comppsych.2022.152300.
53. Yella T, Dmello MK. Burnout and sleep quality among community health workers during the pandemic in selected city of Andhra Pradesh. *Clin Epidemiol Glob Health*. 2022;16:101109. doi:10.1016/j.cegh.2022.101109.
54. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: systematic review of the current evidence. *Brain Behav Immun*. 2020;89:531-542. doi:10.1016/j.bbi.2020.05.048.
55. Muller AE, Hafstad EV, Himmels JPW, et al. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatry Res*. 2020;293:113441. doi:10.1016/j.psychres.2020.113441.
56. Saragih ID, Tonapa SI, Saragih IS, et al. Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: a systematic review and meta-analysis. *Int J Nurs Stud*. 2021;121:104002. doi:10.1016/j.ijnurstu.2021.104002.
57. Li Y, Scherer N, Felix L, Kuper H. Prevalence of depression, anxiety and post-traumatic stress disorder in health care workers during the COVID-19 pandemic: a systematic review and meta-analysis. *PLoS One*. 2021;16(3):e0246454. doi:10.1371/journal.pone.0246454.
58. Colvin CJ, Hodgins S, Perry HB. Community health workers at the dawn of a new era: 8. Incentives and remuneration. *Health Res Policy Syst*. 2021;19(Suppl 3):106. doi:10.1186/s12961-021-00750-w.
59. Wennerstrom A, Smith DO. Labour exploitation among community health workers. *Lancet Glob Health*. 2023;11(10):e1484-e1485. doi:10.1016/S2214-109X(23)00409-6.
60. Ballard M, Olaniran A, Iberico MM, et al. Labour conditions in dual-cadre community health worker programmes: a systematic review. *Lancet Glob Health*. 2023;11(10):e1598-e1608. doi:10.1016/S2214-109X(23)00357-1.
61. Naimoli JF, Perry HB, Townsend JW, Frymus DE, McCaffery JA. Strategic partnering to improve community health worker programming and performance: features of a community-health system integrated approach. *Hum Resour Health*. 2015;13:46. doi:10.1186/s12960-015-0041-3.
62. Haregu T, Delobelle P, Shrestha A, et al. Shifting roles of community health workers in the prevention and management of noncommunicable disease during the COVID-19 pandemic: a scoping review. *Health Policy Plan*. 2024;39(7):771-781. doi:10.1093/heapol/czae049.
63. Søvold LE, Naslund JA, Kousoulis AA, et al. Prioritizing the mental health and well-being of healthcare workers: an urgent global public health priority. *Front Public Health*. 2021;9:679397. doi:10.3389/fpubh.2021.679397.