Review

The Impacts of COVID-19 Pandemic on Mental Health: A Scoping Review

BO Josiah,[1,2,3*] F Ncube[1,4]
[1]UNICAF in Partnership with Liverpool John Moores University.
[2]Turks and Caicos Islands Community College, Turks and Caicos Islands
[3]Institute of Nursing Research Nigeria
[4]Lupane State University, Zimbabwe
Corresponding author: Blessing Osagumwendia Josiah, *josiahblessing141@gmail.com;* +2347062361494
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Abstract
Background: This scoping review assessed the COVID-19 impacts on mental health and associated risk factors.
Methods: A literature search for relevant articles published between March 2020 and July 2022, was conducted in the APA PsychInfo, JBI Evidence Synthesis, Epistemonikos, PubMed, and Cochrane databases.
Results: The article inclusion criteria were met by 72 studies. The commonly used mental health assessment tools were the Patient Health Questionnaire (41.7%), Generalized Anxiety Disorder Scale (36%), 21-item Depression, Anxiety, and Stress (13.9%), Impact of Event Scale (12.5%), Pittsburgh Sleep Quality Index (9.7%), Symptom Checklist and the General Health Questionnaire (6.9% each). The prevalence rate of depression ranged from 5-76.5%, 5.6-80.5% for anxiety, 9.1-65% for Post-Traumatic Stress Disorder, 8.3-61.7% for sleep disorders, 4.9-70.1% for stress, 7-71.5% for psychological distress, and 21.4-69.3% for general mental health conditions. The risks included female gender, healthcare-related/frontline jobs, isolation/quarantine, poverty, lower education, COVID-19 risk, age, commodities, mental illness history, negative psychology, and higher social media exposure. The incidence of mental disorders increased along with the increasing cases of COVID-19 and the corresponding government restrictions.
Conclusion: Standard mental health assessment tools were used in these studies conducted during COVID-19. Mental health disorders like depression, anxiety, and stress increased during the COVID-19 pandemic and lockdowns. Various factors impacted the prevalence of mental health disorders. Policymakers need to provide social protective measures to improve coping in critical health events. Further studies should investigate the effectiveness of interventions for reducing the prevalence and risk factors for mental health conditions during a public health emergency.

Keywords: COVID-19, impacts, lockdown, mental health, and pandemic.

Introduction
Background
The COVID-19 outbreak was declared a pandemic in 2020, with over half a billion cases and over 6 million deaths by the end of May 2022.[1] The high transmissibility, morbidity, and mortality rate led governments to adopt strict measures such as quarantines, restrictions on social gatherings, travel, and closure of borders, schools, churches, and workplaces which disrupted the lives of many people.[2,3] COVID-19-related factors, especially the response measures, induced significant levels of stress among people.[4–6] An increase in mental health conditions has been recently observed due to these disruptions and stresses.[2,7]
Some review studies have been conducted on the pandemic's impact on mental health in the general population, including a systematic review by Xiong et al. which used studies conducted before the 18th of May 2020.[8] Another study was conducted by Hannemann et al., but the study population was limited only to medical staff.[9] A scoping review was conducted on the impact of the pandemic on people with similar mental health conditions,[10] however, the review only included literature from the first year of the pandemic (i.e., 2020). Similarly, a scoping review[11] conducted among children and young people only included evidence from the early stage of the pandemic. Meanwhile, all the studies identified pointed toward an occurrence or expectation of a heightened prevalence of mental disorders during the COVID-19 pandemic.
A study conducted in the United States found that almost half of the study participants experienced high levels of anxiety and stress three months into the COVID-19 pandemic.[12] About one-third of the

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population in the UK likewise experienced high levels of anxiety according to the Office for National Statistics (ONS)[13] In Italy, several people suffered from COVID-19-related stress, severe anxiety, and insomnia.[6] Although several primary studies have investigated these mental health conditions, there is a lack of recent scoping reviews to summarise findings on this key concept. Consequently, this review summarises findings on the assessment tools, prevalence, risk factors, and trends of mental health conditions during the COVID-19 pandemic.

Methods

This scoping review was conducted following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines,[14] recommendations of the Joanna Briggs Institute Manual for Evidence Synthesis[15] and existing similar studies for the protocol design.[16,17]

Identification of relevant studies

The APA PsychInfo, JBI Evidence Synthesis, Epistemonikos, PubMed, and Cochrane databases were searched to identify relevant articles (**Error! Reference s ource not found.**). A final search string with truncations was (mental health* OR mental illness* OR psychiatric situation* OR sanity* OR psychological* OR psychiatric disorder* OR mental health condition* OR mental health disorder* OR mental disease* OR mental stress*) AND (COVID-19 OR COVID-19 pandemic* OR pandemic* OR COVID-19 outbreak* OR lockdown measures* OR Coronavirus* OR SARS-COV2 OR epidemic*) AND (impact* OR effect* OR cause* OR influence* OR result of OR challenge*). In addition, a manual search was done on the references of the most relevant peer-reviewed papers to gather more results suitable for this study (Fig 1).

Inclusion and exclusion criteria

The eligibility criteria for this review considered:

- Peer-reviewed papers that focused on the mental health impact of the COVID-19 pandemic.
- Primary research studies whose full texts were publicly and freely accessible.
- Papers published after March 11, 2020 - when the WHO declared COVID-19 a pandemic.
- Papers that were published in the English language.

Data extraction, analysis, synthesis, and reporting

After a thorough full-text assessment and collation of 72 selected relevant articles, data extraction and setting up of the selected bibliography and abstracts was done using Mendeley Cite® software. The abstracts were then examined for key findings which were then charted into a summary table (Table 2). Each study was then critically read to capture more information from the full texts. The findings were collated in Microsoft word documents and then key data was carefully transferred into Excel spreadsheets for further descriptive analysis. Results were then presented in tables and graphs. The information captured author names, country of study, study setting and population, study design, the study aims and objectives, mental health assessment tools used, type, risk factors, and prevalence of mental health conditions studied. Where quantitative measurements were used, the numeric data were collated, grouped, and compared according to selected populations and geographical metrics such as gender, age, continents, and countries, and then presented in tables and chats. The risks identified were further summarised in a table (Table 5) and discussed as they relate to the research objectives. An arithmetic mean value was calculated for the prevalence of mental health conditions by taking the arithmetic mean of all the prevalence reported to provide an estimate of the trends of prevalence over time. Various gaps identified were further discussed with necessary recommendations.

Quality appraisal

The Newcastle-Ottawa Scale (NOS)[18] was used to assess the methodological quality of primary studies in this review. For cross-sectional studies, we used a modified version of the NOS, as described by Modesti et al.,[19] The modified NOS contains 3 major sections, with a total of 7 categories, which assess representativeness, sample size, non-respondents' comparability, risk factor, confounding factors, assessment, and statistical issues. Quality assessment on cohort studies was carried out using a modified NOS for cohort studies.[20] It has a total of 8 categories assessing representativeness, selection of non-exposed cohort, exposure, the outcome of interest, confounders control, outcome assessment, and follow-up duration and adequacy graded over 9 stars. The final quality scores for each study were assigned by modifying the scales used in previous studies:[18–21] A score of 7 and above denoted a high-quality paper with low risk for bias, 4 – 6 were moderate quality papers with low risk for bias, and scores less than 4 were considered very low-quality papers with high risk for bias.[18]

Results

Search results

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The initial search of APA PsychInfo, JBI Evidence Synthesis, Epistemonikos, PubMed, and Cochrane databases produced 34,037 results (Table 1). Of these results, 2,016 were primary studies with the accessible full text, out of which 1,672 studies were published between March 2020 – July 2022. The references were initially imported into Mendeley reference management software, where 365 were identified as duplicates and removed, leaving a total of 1,307. The abstracts and titles were screened. A total of 826 papers did not meet the relevance and/or eligibility requirements for the review. The full text of the remaining 481 papers was assessed and 72 papers met the inclusion criteria and their quality.

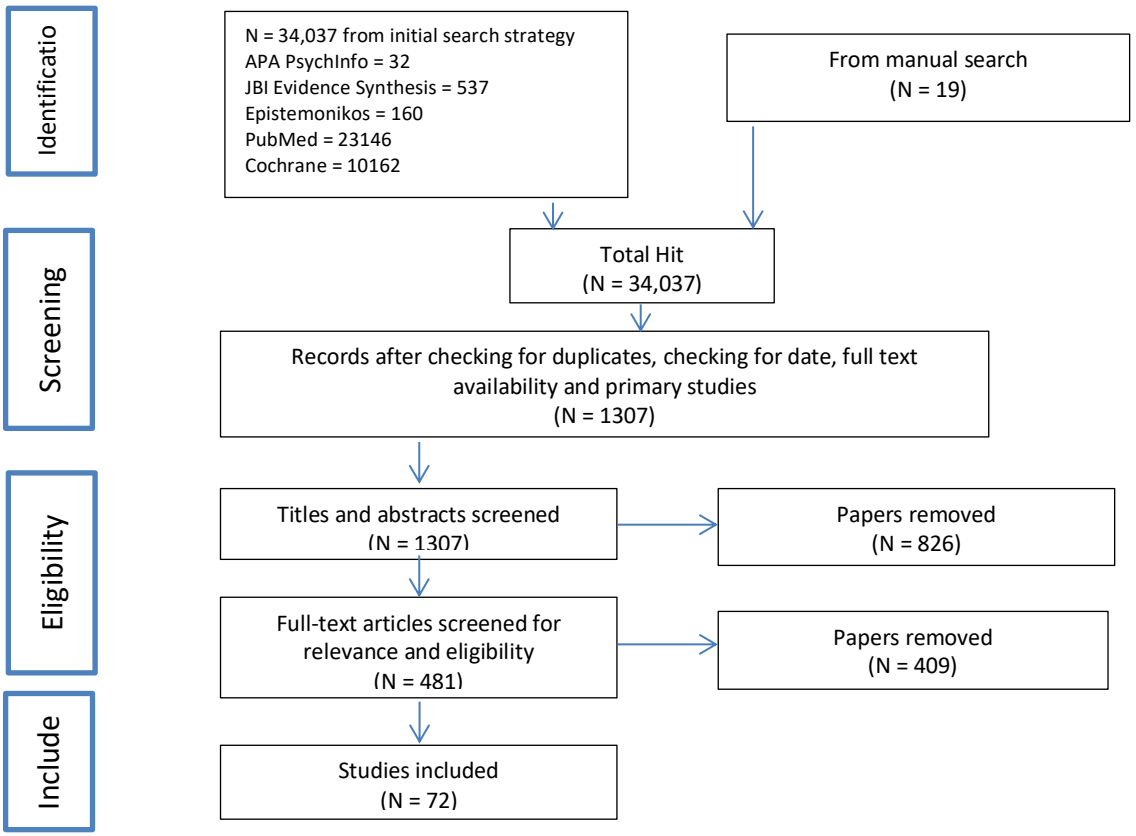

Fig 1: Flow diagram showing study selection results following PRISMA Recommendations

Table 1: Table of search strategies

Date of Search	Database	The number of studies retrieved
28/06/2022	APA PsychInfo	32
1/07/2022	JBI Evidence Synthesis	537 (full text available: 530; Primary research papers: 228; open access full text available: 8
6/07/2022	Epistemonikos	160 (primary study: 147; Relevant years: 146
6/07/2022	PubMed	23127 (primary research papers: 229; open access full text: 183; relevant date: 159)
8/07/2022	Cochrane	10162 (direct research papers: 1646; relevant duration: 1327)
15/07/2022	Manual Search	19
Duplicates		365
Total removed for eligibility		826
Total accepted		72

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Summary of studies

Most studies (95.8%) used a cross-sectional design methodology. A few studies (4.2%) were cohort studies. Three-quarters of the studies had more female participants than males. The total number of study participants was 914,078. Three papers studied multiple countries, but a greater number (32) of the studies were conducted in China (44%), 5 in Italy (7%), 4 each in the United States and India (6% each), 3 in Indonesia (4%), 3 each in Brazil and Saudi Arabia (3% each), and 1 from every other country (Table 3), making up a total of 24 countries spanning 5 continents; Africa, Asia, Europe, and North and South America. The study objectives varied slightly around the mental health of participants during the pandemic, a one-time comparison between different groups, or a time-lapse comparison of mental health statistics before and during the pandemic in a single group. A total of 27 papers were published in 2020, 34 in 2021, and 11 in 2022. Almost all the studies collected data directly in 2020[68] and 2021,[4] but 5 studies did not report the exact time except for data submission/publication dates.

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Table 2: Data Chart Showing Study Characteristics

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
He et al. (22)	CS	To assess the differences in mental health conditions among the general population, quarantined population, and healthcare workers during the COVID-19 outbreak in China	China; N = 2689 (374 general population, 403 healthcare workers, 1912 quarantined population, Adults ≥18).	PHQ-9 (depressive symptoms) GAD-7 (anxiety)	Quarantined: Dep: 58.6%, anxiety: 41.2 Gen. Pop.: dep: 25.1%, anxiety: 18.5 HC workers: dep: 48.6%, anxiety: 35.7	LRA: All: Perceived effect on media led to more depr
Gramaglia et al. (23)	CS	To assess burnout, depression, anxiety, and PTSD symptoms in the ICU staff during the pandemic period	Italy; N = 95 (HCW of ICU in an Italian hospital, online survey participants, 67% female).	MBI (occupational burnout), GHQ-12 (MH issues), IES (PTSD), BAI (anxiety), BDI-II (depression)	Dep: 20% Anxiety: 12% PTS symptoms: 50%	Pearson's chi-square tes Increased mental health gender (female), negativ family habits because o Influenced gen. MH pr Single or divorced or n dep. symptoms, Lack of previous ICU e
Gloster et al. (24)	CS	To determine mental health outcomes during pandemic-induced lockdowns and examine known predictors of mental health outcomes	International; N = 9565 (≥18 years, 78 countries, online survey, Latvia & Italy = 2242).	PSS (stress), MSBS (depression), PANAS (affect), MHC-SF (wellbeing)	Low mental health: 10% Moderate mental health: 50%	ANOVA, Univariable l model: Increased risk of menta lower social support lev psychological flexibility basic supplies
Gao et al. (25)	CS	To evaluate the mental health of nursing students during the COVID-19 pandemic	Finland; N = 1532 (nursing students in vocational college, average age: 19.95, 88% females)	IES-R (PTSD), DASS-21 (depression, anxiety, stress), PSQI (insomnia)	PTSD: 44.5%, Depression: 2.9%, Anxiety: 2.9%, stress = 1.1% Psychological interventions should be implemented for nursing students	Mann-Whitney U-test: Higher risks of PTSD, nursing students, gende

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Priyantini et al. (26)	CS	To analyze the factors that influence the MH crisis of COVID-19 infection on the island of Java	Indonesia; N = 1218 (69% women, 44.7% between 17-25 years	Brief-COPE (coping ability) ADQ (MH crisis emergencies questionnaire, depression, anxiety, stress)	Heavy stress levels: 11.7% Ver high level of anxiety: 23.6% 23.4% experiencing a Mental Health crisis	Chi-square test & Logis Mental health condition location (West Java), re income range, lower co
Davis et al. (27)	CS	To assess the perceived ability to comply with national COVID-19 mitigation strategies and their impact on household finances, food security, and mental health of medical and pharmacy students in Liberia	Liberia: N = 113 (≥ 18, medical and pharmacy students, 61.9% male, 75.2% single).	PHQ-8 (depression)	Positive depression screen (PHQ-9 >= 10): 19.4%	Chi-square test, Mann-W Increased risk of depres living with a partner, co household's health
Chi et al. (28)	CS	To investigate the prevalence and risk factors for poor MH of Chinese university students during the COVID-19 pandemic	China; N = 2038 (students from 180 Chinese universities, avg. age: 20.6, 63% female).	PHQ-9 (depression), Z-SAS (anxiety), CD-RISC (resilience)	PTSD: 30.8%, anxiety: 15.5%, depressive symptoms: 23.3%	RIDGE regression: PTSD, depression, and knowing people who ha childhood experiences,
Chen and Li (29)	CS	To investigate the prevalence and influencing factors of anxiety, depression, perceived stress, and acute stress disorder among dental medical staff in emergencies during COVID-19	China; N = 808 (≥ 18 years, avg. age: 36.2, emergency dental staff).	GAD-7 (anxiety), PHQ-9 (depression), PSS-10 (perceived stress), ASDS (acute stress)	Depression: 46.4%, anxiety: 36.3%, perceived stress: 65.2%, ASD: 1.1%	Chi-square test, non-pa Kruskal-Walli's test: More anxiety is linked t (Wuhan) More perceived stress: (Wuhan)
Cai et al. (30)	CS	To investigate the psychological abnormality in HC workers battling the COVID-19 epidemic and to explore the associations	China; N = 1521 (HC workers, 147 experienced staff, 1374 fresh staff)	SCL-90 (depression, anxiety),	Psychological abnormality: 14.1%	Chi-square, t-test, multi Increased risk of psych Lower PH emergency e

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		among social support, resilience, and MH		CD-RISC (resilience)		
Buonsenso et al. (31)	CS	To ascertain the clinical characteristics, activity levels, and MH problems in children with long COVID	UK and USA; N = 510 (children with long COVID, avg. age: 10.3, 56.3% female).	LCKRS-2 (MH status)	Lack of concentration: 60.6%, Memory problems: 45.9%, Difficulty processing info.: 32.7%, Short-term memory issues: 32.7% Had 3 or more MH issues: 54.7%	ANOVA: Mental health condition closure
Bettinsoli et al. (32)	CS	To investigate the psychological health of Italian HC professionals during the COVID-19 outbreak	Italy; N = 580 (HC workers in Italy, 59% male).	ADQ (psychological states), GHQ-12 (mental health status), CSES-brief (coping ability), BRCS (resilience)	33.5% at risk for psychiatric morbidity	Chi-square, t-tests, linea Increased risk of menta (nurses), Gender (fema
Bella Nichole and Jonathan (33)	CS	To determine the presence of, and magnitude of associations between baseline associations and anxiety and depression in the US general population	United States; N = 1005 (avg. age: 45, 48.8% male).	GAD-7 (anxiety), PHQ-9 (depression), ULS-8 (loneliness)	Anxiety disorder: 26.8% (cut-off of 10), clinical anxiety: 41.4% Depression: 21.6%	Logistic regression anal Increased risk of anxiet smaller home, rural loc hospitalization Increased depression ri time outdoors, smaller of hospitalization
Angelina et al. (34)	CS	To investigate the magnitude of COVID-19-related MH problems in adolescents and the associated factors	Indonesia; N = 2018 (adolescents, 91% male, avg. age: 19).	K-10 (psychological distress, i.e., depression, nervousness, etc.)	Psychological distress: 54.1%	Mann-Whitney U test, Increased risk of psych dietary patterns, low sle arguments with parents illnesses

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Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
Alshumrani et al. (35)	CS	To evaluate sleep quality and assess the psychological burden of the pandemic on COVID-19 patients and the general population	Saudi Arabia; N = 1091 (58.9% +ve for COVID, 61.1% male).	PSQI (Sleep quality), PHQ-9 (depression), AIS (insomnia)	Poor sleep quality: 66.1% (COVID patients), 72.8% (gen. pop.) Insomnia: 50.5% (COVID patients), 58.5% (gen. pop.) Depression: 39.5% (COVID patients), 70.1% (gen. pop.)	Chi-square test, t-tests: Increased MH issues: ir
AlAteeq et al. (36)	CS	To explore depression and anxiety levels among HC providers during the COVID-19 outbreak in Saudi Arabia	Saudi Arabia; N = 502 (HC providers, 68.1% males).	PHQ-9 (depression), GAD-7 (anxiety)	Depressive disorder: 55.2% (mild to severe), Generalized anxiety disorder: 51.4%	Multivariate analysis: Increased anxiety assoc Increased depression ar
Murphy et al. (10)	CS	To explore the impact of COVID-19 and restrictions to daily living because of social distancing within veterans with pre-existing MH difficulties	United Kingdom N = 275 (treatment-seeking military veterans, avg. age: 48.7, 94.9% male).	GHQ-12 (CMD, e.g., depression, anxiety, etc.), PCL-5 (PTSD), DAR-5 (anger), AUDIT (alcohol misuse)	Common MH issues 69.3% (GHQ-12 >= 4), PTSD: 65% (PCL-5 = 34), anger issues: 52.7% (DAR-5 ≥ 12), alcohol misuse: 30% (AUDIT ≥ 8)	Regression analyses: Increasing severity of C increasing number of st
Steward et al. (37)	CS	Impact of COVID-19 on the MH and physical activity of pharmacy students at the University of Zambia	Zambia; N = 273 (undergraduate pharmacy students, University of Zambia, 51.6% female).	GAD-7 (anxiety)	Mild, moderate, and severe anxiety: 34.4%, 24.9%, and 16.9% respectively (GAD-7 = 5-9, 10-14, 15-21 respectively)	Partial proportion odds Increasing MH issues li attention to MH, year c time, feeling helpless
Morniroli et al. (38)	CS	To determine the prevalence of anxiety symptoms in new mothers throughout their hospital stay during the COVID-19 pandemic	Italy; N = 109 (negative COVID-19 newly delivered mothers in Italian hospital).	STAI-Y (anxiety)	Anxiety because of the pandemic: 42% (STATE-A ≥ 40)	Binary logistic regressio Increased anxiety linke hospital stay

Print ISSN: 0189-9287

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Lu et al. (39)	CS	To investigate the mental and psychological health of adolescents in China and its possible related factors	China; N = 795 (adolescents, 73.2% male, avg. age: 17) March 19 – 29, 2020	SDS (depression) SAS (anxiety)	Depression: 76.48% (SDS ≥ 50) Anxiety: 33.08% (SAS ≥ 50)	Multiple regression ana Increased depression li of mental disorders, far 19 knowledge reserve Increased anxiety linke knowledge reserves, far
Jiang et al. (40)	CS	To investigate the sleep quality and MH status of HC professionals during the outbreak of COVID-19	China; N = 569 (HC professionals, avg. age: 34, 59.9% females).	PSQI (sleep disorders), GAD-7 (anxiety), PHQ-9 (depression)	Sleep disorders: 28.8% (PSQI > 7) Anxiety: 33.2% (GAD-7 > 4) Depression: 39.4% (PHQ-9 >4)	Chi-square, t-test, Pears Sleep disorders linked t underlying disease Increased anxiety and d (frontline workers), unc
Jakhar et al. (41)	Coh.	To investigate how the psychological health of HC professionals on COVID duty was different from those who were not directly in contact	India; N = 450 (doctors and nurses, avg. age:31.6, 52% females).	DASS-21 (depression, anxiety, stress)	Stress: 33.8% Anxiety: 38.9% Depression: 43.6% (non-exposed),	Chi-square, Pearson co Increased stress, depres individuals (double that
Maehl et al. (41)	CS	To investigate whether the pandemic affected primary care and health outcome of a disease management program for coronary artery disease (DMP-CAD) patients	Germany; N = 750 (DMP-CAD patients, avg. age: 73.3, 67.2% male).	PHQ-9 (depressive symptoms) GAD-7 (anxiety)	Total PHQ-9 mean score: 4.2 ± 4.2 Total GAD-7 mean score: 3.9 ± 4.1	Univariate ANOVA: Increased risk of menta (female), reduced family
Ma et al. (42)	CS	To assess the MH problems associated factors among a large sample of college students during the COVID-19 outbreak in China	China; N = 746217 (students from 108 colleges, 55.6% female).	PHQ-9 (depressive symptoms) GAD-7 (anxiety) IES-6 (acute stress)	Acute stress: 34.9% Depressive symptoms: 21.1% Anxiety: 11%	Univariate and hierarch Increased risk of MH p friends/relatives, 2.13x more risk of acut Increased anxiety and d social support (5x more problems

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Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
Lugito et al. (43)	CS	To investigate the impact of social media exposure during the COVID-19 pandemic on depression, anxiety, and stress	Indonesia; N = 220 (participants, 18 years and above, avg. age: 24, 55% female, 98.2% had no family member with COVID-19).	DASS-21 (depression, anxiety, stress)	Mild-moderate depression: 29.5% Severe-extremely severe depression: 46.4% Mild-moderate anxiety: 19.6% Severe-extremely severe anxiety: 60.9% Mild-moderate stress: 16.3% Severe-extremely severe stress: 38.2%	Pearson chi-square and Severe-extremely severe Mild-moderate depressi Reduced likelihood to s depression, mild-moder and mild-moderate stre exposure
S. Liu et al. (44)	CS	To investigate the prevalence and gender differences of various MH problems among HC workers in China during the COVID-19 outbreak	China; N = 1563 (HC workers, 82.7% females).	PHQ-9 (depressive symptoms) GAD-7 (anxiety) IES-R (stress) ISI (insomnia)	Depressive symptoms: 50.7% (PHQ-9 ≥ 5), Anxiety: 44.7% (GAD-7 ≥ 5), Stress: 52.5% (IES-R ≥ 20), Insomnia symptoms: 36.1% (ISI ≥ 8)	Mann-Whitney U-test, Increased prevalence o living situations in the p
Liang et al. (45)	CS	To evaluate psychological symptoms in frontline medical workers during the COVID-19 epidemic in China in comparison with the general population	China; N = 1913 (899 frontline medical workers, 1104 general population respondents).	PHQ-9 (depression) GAD-7 (anxiety) ISI (insomnia) CD-RISC-10 (resilience)	Depression in frontline workers: 30.43% (Hubei), 23.13% (others) Depression in gen. pop.: 23.33% (Hubei), 18.25% (others) Anxiety in frontline workers: 20.29% (Hubei), 13.14% (others) Anxiety in gen. pop.: 16.67% (Hubei), 9.22% (others) Insomnia in frontline workers: 14.9% (Hubei), 10.64% (others) Insomnia in gen. pop.: 6.67% (Hubei), 7.17% (others)	Bonferroni's Post Hoc Increased resilience: Fr Order of increasing MH regions < gen. pop. in regions < medical work

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Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
Le et al. (46)	CS	To examine multiple types of COVID-related discrimination and their associations with MH outcomes among racial/ethnic groups in the US	United States; N = 1688 (adults, 44.3% non-Hispanic White, 19.9% prior mental health diagnosis).	PHQ-4 (psychological distress)	Psychological distress: 20.8% (PHQ-4 ≥ 6)	Bivariable comparisons Increased MH issues: p
Lawson et al. (47)	CS	To evaluate perceptions of delayed fertility care secondary to the COVID-19 pandemic	United States: N = 787 (patients from a single academic fertility centre, participants were randomized 1:1 to receive education regarding fertility treatment, 82% female).	PHQ-8 (depression) GAD-7 (anxiety)	Moderate to severe anxiety: 69.1% (education group), 73.7% (no education group) Depression: 77.5% (education group), 77.9% (no education group)	Ordinal logistic regressi Distress: related to age, availability
Lai et al. (48)	CS	To investigate factors associated with MH outcomes among HC workers in China	China; N = 1257 (HC workers treating patients with COVID-19 in 34 hospitals, 64.7% aged 26 to 40, 76.7% females).	PHQ-9 (depression) GAD-7 (anxiety) ISI (insomnia) IES-R (distress)	Depression: 50.4% Anxiety: 44.6% Insomnia: 34% Distress: 71.5%	Multivariable logistic re Increased risk of distres Increased risk of depres frontline HC workers Risk of severe sympton gender (female)
Ko et al. (49)	CS	To evaluate traumatic stress and MH problems associated with the prolonged COVID-19 pandemic and to determine differences across age groups	Korea; N = 1151 (children/adolescents (19.9%), adults (56.6%), elderly (23.5%), avg. age: 41.03, 67% female).	PHQ-9 (depression) CDI (depression in children) GAD-7 (anxiety) PSWQ-C (anxiety in children) P4 screener (suicide risk) PC-PTSD-5 (PTSD symptoms)	PTSD symptoms: 24.1% (gen.), 14.4% (children/adolescents), 30.8% (adults), 15.9% (elderly) (PC-PTSD-5 ≥ 3) Depression: 20.9% (gen.) 4.4% (children/adolescents), 28.8% (adults), 15.9% (elderly) (PHQ-9 ≥ 10, CDI ≥ 26) Anxiety: 16.8% (total) 7.4% (children/adolescent), 22.5% (adult), 10.7% (elderly) (GAD-7 ≥ 10, PSWQ-C ≥ 21)	Chi-square analysis, Pea Increased risk of all MH In children and adolesc increased PTSD sympt In both the adult and el related to an increased

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Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
					Suicide risk: 20.5% (total) 20.9% (adolescent group), 25% (adult group), 9.3% (elderly group)	
Katz et al. (50)	CS	To examine changes in symptoms of anxiety and depression from pre-pandemic to during the pandemic	United States; N = 1504 (avg. age: 66.1, 85.7% female).	PHQ-4 (anxiety and depression)	Increase in anxiety: 10.6% Increase in depression: 7.9%	Multiple logistic regress COVID-specific stress Increased depression ar specific stress
Kalita et al. (51)	Coh	To evaluate the impact of COVID-19 and lockdown on the physical and MH, and quality of sleep in a cohort of myasthenia gravis patients	India; N = 38 (median age: 45, 57.9% female).	HADS (anxiety and depression) PSQI (sleep quality)	Depression: 5% (HADS-D > 11) The median quality of sleep reduced from 4 to 3 The Median HADS score increased from 2 to 3	Mann Whitney U test, c Depression, anxiety, an participants as a result c
Kang et al. (48)	CS	To explore the MH status of medical and nursing staff and the efficacy of critically connecting psychological needs to receiving psychological care	China: N = 994 (medical and nursing staff in Wuhan, 85.5% female, 63.4% aged 25 – 40, participants were grouped into 4 groups of "disturbances").	PHQ-9 (depression) GAD-7 (anxiety) ISI (insomnia) IES-R (distress)	MH disturbances: 36.9% Mild disturbances: 34.4% Moderate disturbances: 22.4% Severe disturbances: 6.2%	Chi-square test, structu Increased disturbances: Groups with higher dis exposure
Hu et al. (52)	CS	To assess the prevalence of both depression and anxiety symptoms among civil servants in Jiangsu and surrounding provinces	China: N = 867 (Chinese civil servants aiding in COVID-19 control, 18 years and above).	PHQ-9 (depression) GAD-7 (anxiety)	Depression: 37.25% Anxiety: 38.06%	Multivariable logistic re Increased depression ar education, less work ex
Islam et al. (21)	CS	To assess the prevalence of depression, anxiety and stress, and associated factors among university students in Bangladesh	Bangladesh; N = 3122 (Bangladeshi university students, 59.5% males, avg. age: 21.4).	DASS-21 (depression, anxiety, stress)	Depression: 76.1% (mild to severe) Anxiety: 71.5% (mild to severe) Stress: 70.1% (mild to severe)	Regression analyses: Increased DAS: lower s the pandemic
Htun et al. (53)	CS	To assess the prevalence and associated factors of depressive symptoms in patients with	India; N = 142 (patients with COVID-19 at Hmawbi Treatment Centre).	CES-D (depressive symptoms)	Depressive symptoms: 38.7%	Bivariable logistic regre Increased depressive sy household size less tha infection to family mem

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
		COVID-19 at the Hmawbi treatment centre				
Hou et al. (54)	CS	To examine the effect of social support on MH of HC workers and its underlying mechanisms	China; N = 1472 (HC workers, 76.5% female).	CD-RISC (resilience) SCL-90 (mental health evaluation)	Psychological abnormality: 7% (SCL-90 ≥ 160)	Structural equation mo Resilience was positivel
Shen et al. (55)	CS	To explore the psychological status of medical staff in the epidemic period of COVID-19 and to analyze its influential factors	China; N = 373 (medical staff room 2 Chinese hospitals, 87% female, avg. age: 29.55).	SCL-90 (MH disorders)	Terror symptoms: 11.26% Compulsive symptoms: 7.77% Anxiety: 5.63%	Stepwise regression ana The mental health of m impact of COVID-19 i or fever, insomnia, fear
Shah et al. (5)	CS	To assess the impact of the COVID-19 pandemic and lockdown on MH symptoms in children	India; N = 423 (children aged 11-15, 54.4% male).	PSC (MH disorders)	Psychosocial problems: 30.7% Anxiety or depressive symptoms: 25.2%	Binary regression analy Increased psychosocial inability to attend scho Higher risk of anxiety o social media use
Severinsen et al. (56)	Coh	To compare the MH response among pregnant women with that in similarly aged women from the general population during the first wave of the COVID-19 pandemic	Denmark; N = 1505 (647 pregnant women in their 2nd trimester, 858 women from the general population, the median age for pregnancy Women: 31.4, the median age for gen. pop.: 35).	CMHDQA-4 (anxiety) ULS-3 (loneliness) CCMH (MH disorders)	70.3% negative feelings (pregnant women)	Non-parametric Wilcox Pregnant women were but less lonely Pregnant women repor
Ruengorn et al. (57)	CS	To evaluate the association of economic burden during the first phase of the pandemic and the risk of adverse MH outcomes in the Thai population	Thailand; N = 2303 (18 years and above, 60% females, avg. age: 34.5) April 21 – May 4, 2020	PHQ-9 (depression) GAD-7 (anxiety) PSS-10 (perceived stress)	Job loss led to: 51.9% depressive symptoms (PHQ-9 ≥ 9), 56.9% anxiety (GAD-7 ≥ 5), 84.7% perceived stress (PSS ≥ 14) ≥ 50% income loss led to: 43.2% depressive symptoms,	Multivariable logistic re Increased risk of percei COVID-19 Increased risk of anxiet more MH issues: self-reporte

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
					49.4% anxiety, 78.4% perceived stress Financial problems led to 43.5%, 50.4%, and 80.2% depressive, anxiety, and perceived stress symptoms respectively.	
Pieh, Budimir and Probst (58)	CS	To evaluate MH during the COVID-19 lockdown in Austria	Austria: N = 1005 (53% female).	PHQ-9 (depressive symptoms) GAD-7 (anxiety) ISI (insomnia) PSS-10 (Perceived stress)	Depressive symptoms: 21% (PHQ-9 ≥ 10) Moderate anxiety symptoms: 19% (GAD-7 ≥ 10) Clinical insomnia: 16% (ISI ≥ 15)	Bonferroni-corrected p Highest MH problems: people with no work, lo
Qin et al. (59)	CS	To investigate the MH of patients with COVID-19 in Changsha, China	China: N = 112 (patients with COVID-19, ≥ 18 years, 52.7% male, median age: 40).	SCL-90 (MH issues)	MH issues 21.4% (SCL-90 ≥ 160)	Mann-Whitney U test, Increased MH symptor
Rossi et al. (60)	CS	To investigate MH outcomes among frontline and second-line HC workers during the COVID-19 pandemic in Italy	Italy: N = 1379 (HC workers, 77.2% female, avg. age: 39).	GPS (posttraumatic stress symptoms) PHQ-9 (depression) GAD-7 (anxiety) ISI (insomnia) PSS (perceived stress)	PTSD: 49.38% (GPS ≥ 3) Depressive symptoms: 24.73% (PHQ-9 ≥ 15) Anxiety: 19.8% (GAD-7 ≥ 15) Insomnia: 8.27% (ISI ≥ 22) High perceived stress: 21.9%	Multivariable logistic re Increased PTSS, depres gender (female), younge colleague in quarantine Increased PTSS, depres Increased insomnia: oc
Prati (61)	CS	To investigate the psychological impact of national quarantine in Italy	Italy: N = 1569 (81.5% female, avg. age: 31.3).	GHQ-12 (MH symptoms)	Common MH disorders: 31.7% (men), 52.3% (women)	ANCOVA: Increased MH issues: g media, employed, lower institutions
Penteado et al., (62)	CS	To examine the magnitude of psychiatric symptoms and to	Brazil: N = 100 (71 older adults with	HADS (anxiety, depression)	Depression: 50.7% (elderly), 3.4% (others)	ANOVA, linear regress

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
		determine their association with caregiver distress	psychogeriatric/neurocognitive disorders, 29 ageing adults with down syndrome).	NPI-Q (psychological and behavioural symptoms)	Neurocognitive disorder: 90.1% (elderly), 34.4% (others) Anxiety: 65% (elderly)	Higher HADS and NPI distress in all groups Higher HADS scores: p
Norhayati, Che Yusof and Azman (63)	CS	To compare the levels of vicarious traumatization between frontline and non-frontline HC providers in response to the COVID-19 pandemic	Malaysia: N = 306 (160 frontline, 146 non-frontline HC providers).	VTQ (vicarious traumatization)	Mean Vicarious traumatization: 79.7 (non-frontline) Mean vicarious traumatization: 74.3 (frontline)	ANCOVA: Higher vicarious traum social support
Nguyen et al. (64)	CS	To explore COVID-19-related, psychological stress risk factors among HC workers, their concerns, and demands for MH support during the pandemic	Vietnam: N = 761 (HC workers, 58.2%)	IES-R (psychological response to trauma)	Stress: 34.3%	Chi-square test, Fisher' Increased risk of stress perceived worse well-b suffering chronic diseas
Naser et al. (65)	CS	To explore the prevalence of depression and anxiety among the general population, HC practitioners, and university students during the COVID-19 outbreak	Jordan: N = 4126 (1798 gen. pop., 1163 HC practitioners, 1165 students; 59% female, 53.9% single).	PHQ-9 (depression) GAD-7 (anxiety)	Depression: 23.8% (PHQ-9 ≥ 15) Anxiety: 13.1% (GAD-7 ≥ 15)	Logistic regression anal Increased depression li students with chronic d students Increased anxiety risk li pop.), university studen
Shi et al. (66)	CS	To investigate the prevalence of and risk factors associated with MH symptoms in the gen. pop. in China during the COVID-19 pandemic	China: N = 56679 (avg. age: 35.97, 52.1% female).	PHQ-9 (depression) GAD-7 (anxiety) ISI (insomnia) ASDS (stress)	Depression: 27.9% Anxiety: 31.6% Insomnia: 29.2% Acute stress: 24.4%	Logistic regression anal Increased risk of depre and insomnia linked to confirmed or suspected occupational exposure Increased risk of depre not working
Simegn et al. (67)	CS	To assess depression, anxiety, and stress and identify associated factors among university students	Ethiopia: N = 423 (university students, 64.3% male, avg. age: 22.96).	DASS-21 (depression, anxiety, stress)	Depression: 46.3% Anxiety: 52% Stress: 28.6%	Binary logistic regressio Increased risk of depre materials, and access to prevention.

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
		in Ethiopia during the early stage of the COVID-19 pandemic				Increased risk of anxiet ages, non-health-relate unpreventable, lack of i prevention Increased risk of stress: 1st and 2nd years, thinki COVID-19 patients in materials
Xingyue et al. (68)	CS	To assess the MH of emergency department medical staff during the epidemic in China	China: N = 14825 (doctors and nurses).	CES-D (depressive symptoms) PCL-5 (PTSD)	Depressive symptoms: 25.2% (CES-D ≥ 16) PTSD: 9.1%	Logistic regression mod Increased risk of depre (males), age (middle-ag long hours daily, lower Increased risk of depre Increased risk of PTSD
Teixeira et al. (69)	CS	To verify the prevalence of symptoms of psychological distress n medical students during the COVID-19 pandemic	Brazil: N = 656 (medical students).	SRQ-20 (psychological distress)	Psychological distress: 62.8% (SRQ-20 ≥ 7)	Pearson's chi-square te Increased risk linked to of study, struggling wit difficulty concentrating previous mental disord healthy habits, fear of i
Zheng et al. (70)	CS	To assess the sleep quality, MH status, and associated factors among medical workers during the COVID-19 pandemic	China: N = 207 (medical workers, 84.54% female, 63.29% > 30 years).	PSQI (sleep quality) SCL-90 (MH status)	Poor sleep quality: 34.3% (PSQI > 10) MH symptoms: 27.05% (GSI > 1.50)	Logistic regression anal Increased risk of poor s work experience > 15 y shifts, supporting Wuh
Zhang et al. (71)	CS	To investigate and compare the prevalence and severity of MH symptoms between frontline medical staff and non-frontline medical staff during the COVID-19 outbreak	China: N = 524 (150 frontlines, 374 non-frontline medical staff).	ADQ (occupational stress) GAD-7 (anxiety) PHQ-9 (depression) ISI (insomnia)	Depression: 31.3% Anxiety: 41.2% Insomnia: 39.3%	Hierarchical multiple re Increased levels of anxi medical (especially fron Increased risk of MH is (married), poorer physi all participants)

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
G. Y. Zhang et al. (72)	CS	To observe the impact of the COVID-19 pandemic on MH outcomes among patients with mild to moderate illness in Fangcan shelter hospitals	China: N = 129 (patients, avg. age: 43.8 years, 62% male).	SRSS (sleep condition) PHQ-9 (depressive symptoms) GAD-7 (anxiety symptoms)	Depressive symptoms: 49.5% (PHQ-9 ≥ 10) Insomnia: 14.7% (SRSS ≥ 23) Anxiety symptoms: 49.6% (GAD-7 ≥ 7)	Correlation analysis: Increased depressive an disturbances, hypochon Depression, anxiety, dis The COVID-19 pander anxiety symptoms, sleep also led to lower psycho
Ying Zhang et al. (73)	CS	To investigate the incidence and risk factors of MH status among Infection Control Professionals (ICPs) in China during the COVID-19 outbreak	China: N = 9228 (ICPs from 3776 hospitals, 93.25% female, avg. age: 42.26, 80% nurses).	GHQ-12 (MH status) PCQ (psychological capital)	MH problems: 60.77% (GHQ-12 ≥ 3) Poor psychological capital: 39.2%	Chi-square test, backwa Increased risk of MH p (public hospital), greate Reduced risk of MH pr (unmarried), working y week, feeling hopeful/c
Zhang et al. (74)	CS	To assess the psychological status of HC workers who were exposed to different risk levels in China and explore the factors that affected their MH	China: N = 810 (participants, 70.5% nurses, 81.7% female).	FSS (fatigue) GAD-7 (anxiety) ISI (insomnia)	Fatigue: 74.3% (FSS ≥ 36) Anxiety: 73.7% Insomnia: 61.7%	Binary logistic regressio Increased risk of MH p (female), workers expos Increased symptoms of exposure to high-risk ar
Zhan et al. (75)	CS	To understand medical students' MH during the COVID-19 pandemic	China: N = 266 (medical students from 4 schools).	DASS-21 (depression, anxiety, stress)	Depression: 20.3% Anxiety: 17.7% Stress: 6.4%	ANOVA, chi-square te Increased depression w among college students
Ying et al. (76)	CS	To investigate the MH status and related factors in families of HC workers employed in designated hospitals in Ningbo, China	China: N = 845 (family members of HC workers, 52.66% male, median age: 37 years).	GAD-7 (anxiety) PHQ-9 (Depression)	Anxiety: 33.73% (GAD-7 ≥ 5) Depression: 29.35% (PGQ-9 ≥ 5)	Multivariable logistic re Increased risk of anxiet COVID-19, a family m COVID-19 patients Increased depression li 19, longer work time pe having a Healthcare wo sector workers

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
Xiaoxv et al. (77)	CS	To quantitatively evaluate the influence of the COVID-19 outbreak on residents' MH	China: N = 8151 (residents, avg. age: 31.7).	PHQ-9 (depression) GAD-7 (anxiety)	Depressive symptoms: 15.02% Anxiety symptoms: 7.69% Depressive and anxiety symptoms increased by 11% and 15% respectively between February 2019 and February 2020	Multivariable logistic re Increased anxiety and d reported health status, c toll, treatment difficulty
Yang et al. (78)	CS	To assess the impact of COVID-19 on the MH of university students in Sichuan, China	China: N = 521 (medical and non-medical students, avg. age: 22.02, 77.5% female).	SRQ-20 (distress) SAS (anxiety)	Distress: 19% (SRQ-20 > 7) Mild, moderate, and severe anxiety: 31.5%, 8.1%, 5.8%	Logistic regression anal Increased distress amor Increased risk of anxiet pandemic information,
Xu et al. (79)	CS	To investigate the potential factors associated with MH outcomes among Chinese adults during the COVID-19 epidemic	China: N = 1456 (participants, avg. age: 33.8, 59.1% female).	ULS-3 (loneliness) PHQ-2 (depression) GAD-2 (anxiety)	Depressive symptoms: 11.3% (PHQ-2 ≥ 3) Anxiety symptoms: 7.6% (GAD-7 ≥ 3) Loneliness: 38.7% (ULS-3 ≥ 4) PTSD symptoms: 33.9%	Multivariable analysis: Loneliness linked to ma separated/divorced/wi symptoms, lower self-e Depression is associate symptoms, lower self-e drinking Anxiety is linked to mo efficacy PTSD symptoms are li self-efficacy, increased
Xie et al. (80)	CS	To investigate depressive and anxiety symptoms among students in Hubei province, China	China: N = 1784 (students, 845 from Wuhan, 1485 from Huangshi).	CDI-S (depressive symptoms) SCARED (anxiety)	Depressive symptoms: 22.6% Anxiety symptoms: 18.9%	Logistic regression anal Increased risk of depre students in Wuhan, we COVID-19, and studer epidemic
C. Wang et al. (81)	CS	To compare the levels of impact of COVID-19 on MH among people from Spain and China	China & Spain: N = 1528 (687 Spanish and 841 Chinese participants, avg age: 43.06	IES-R (MH impact)	Spanish participants reported higher depression and stress scores	Linear regression, chi-s Increased risk of adver health information

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
			years (Spanish), 24.73 years (Chinese).	DASS-21 (depression, anxiety, stress)	Chinese participants: higher IES-R scores	Higher DASS-21 and I myalgia, and dizziness i
Q. Wang et al. (82)	CS	To compare the MH and psychological responses in Wuhan and other areas of China during the COVID-19 epidemic	China: N = 4191 (1397 from Wuhan, 2794 from other areas).	PHQ-9 (depression) ISI (insomnia)	MH issues: 46.6% (Wuhan), 32.2% (others) Anxiety: 15.2% (Wuhan), 6.2% (others) Depression: 18.3% (Wuhan), 9.7% (others) Suicidal ideation: 10.5% (Wuhan), 7.1% (others) Insomnia: 38.6% (Wuhan), 27.6% (others)	Regression analysis: Living in Wuhan was li behaviour, feeling fearf
Xia et al. (83)	CS	To investigate sleep quality and MH of patients with Parkinson's disease during the COVID-19 pandemic	China: N = 288 (119 PD patients, 169 healthy controls).	PSQI (sleep quality) HADS (psychological distress)	Mean HADS score: 4.89% (PD patients), 3.82% (control) Mean PSQI score: 8.13% (PD patients), 5.36% (control) Sleep disturbance: 68.9% (PD patients), 44.4% (others)	Logistic regression anal Increased sleep disturb exacerbation of PD sy Higher PSQI scores, a linked to gender (femal
Wauters et al. (84)	CS	To investigate MH outcomes among parents of children with a chronic disease during the COVID-19 pandemic	Belgium: N = 1016 (599 parents of children with CD, 417 parents of healthy children).	PROMIS (anxiety, depression) PSQI (sleep quality)	Mean Parental anxiety: 2.4 (clinical sample), 1.65 (control) Mean parental depression: 1.7 (clinical sample), 1.59 (control)	Correlational and regre Increased risk of paren parents of children wit Increased parental dep alone, single parents
Wang et al. (85)	CS	To explore the psychological characteristics and influencing factors of college students after experiencing the impact of the epidemic and quarantine measures for epidemic prevention and	China: N = 3641 (college students, 71.74% female, avg. age: 22.5 years).	SCSQ (coping ability) DASS-21 (depression, anxiety, stress) IES-6 (MH impact)	Negative emotions (depression, anxiety, stress, others): 14.69% Depressive symptoms: 11.04% Anxiety symptoms: 10.49% Stress symptoms: 4.9% PTSD: 34.19%	Logistic regression anal Increased risk of depre (male) Decreased risk of depr family support

Print ISSN: 0189-9287

Author year	Study Design	Study Aim	Country, Sample size & characteristics,	Mental Health (MH) Condition Studied & Assessment tool used	Summary of Findings (Prevalence#)	Associated Risk facto
		control in the early stage of the outbreak of novel COVID-19				
Teng, Wu and Xu (86)	CS	To investigate the psychological effects of operating a quarantined hotel on its employees	China: N = 170 (participants, 58.2% female, 53% aged 26 – 44 years).	DASS-21 (depression, stress, anxiety)	Depressive symptoms: 43.5% Anxiety: 68.2% Stress: 8.2%	ANOVA, regression an Increased anxiety: senio employees (then in und incomes
Niekerk and van Gent (87)	CS	To determine the MH and well-being of staff members in an Eastern Cape university just after levels 4 and 5 lockdowns in South Africa	South Africa: N = 280 (staff members, avg. age: 48.84).	K-10 (psychological distress) MHC-SF (psychological, emotional, and social well-being)	Psychological distress: 27.6% Mental illness: 72.5% (K-10) Moderate or low wellbeing:39.3%	ANOVA: Increased risk of psych (female), staff members administration and serv Higher mental well-bei
Vujčić et al. (88)	CS	To determine the impact of the COVID-19 epidemic on MH of the general adult Serbian population and to identify associated factors during the state of emergency and lockdown	Serbia: N = 1057 (participants from 146 Serbian cities, avg. age: 36.06 years, 67.7% female).	DASS-21 (depression, anxiety, stress)	Severe depression: 28.9% Anxiety: 36.9% Stress: 38.1%	Multiple ordinal regress Increased risk of depre feeling of helplessness, death, experiencing CO Increased risk of depre smoking status, younge Decreased risk of depr higher socioeconomic s

CS = Cross-sectional Study, Coh = Cohort Study.
#Reports about the mental health impact of COVID-19 on the population under study

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Mental Health assessment tools

In total, 62 mental health assessment tools were used. The most used tools include the Patient Health Questionnaire [PHQ] (41.7%), Generalized Anxiety Disorder Scale [GAD] (36%), 21-item Depression, Anxiety, and Stress [DASS-21] (13.9%), Impact of Event Scale [IES] (12.5%), Pittsburgh Sleep Quality Index [PSQI] (9.7%), Symptom Checklist [SCL] and the General Health Questionnaire [GHQ] (6.9% each). Three studies (4.1%) used a custom-made questionnaire that had the standard elements for the assessment of mental health conditions. The most studied mental health symptom was depression (73.6%) and anxiety (70.8%). Also, some assessed stress (41.6%), sleep issues/insomnia (26.4%), general mental health status (19.4%), general psychological states (13.8%), and post-traumatic stress disorder/symptoms (8.3%). Coping, fatigue, loneliness, and general well-being were also assessed. Specific tools used included PHQ-2/4/8/9 for depression, GAD-2/7 for anxiety, ISI for insomnia, IES/PSS for stress, CD-RISC resilience, PSQI for sleep quality, and DASS-21 as a stand-alone tool to measure anxiety, depression, and stress.

Quality assessment

Using the NOS star rating as shown in Table 3, out of the 69 cross-sectional studies reviewed, 50 (72.5%) were of high quality, and the other 19 (27.5%) and the 3 cohort studies (Table 4) reviewed were of moderate qualities (Fig 2)

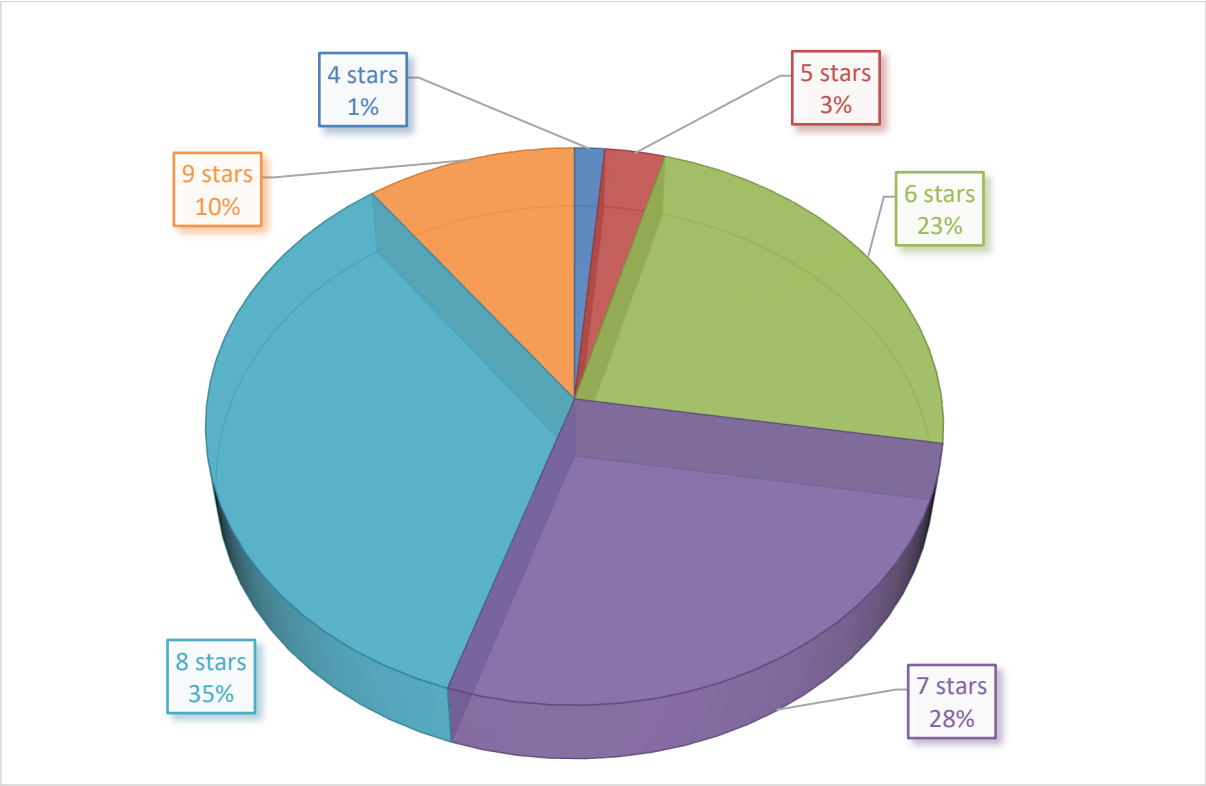

Fig 2: Pie chart showing the quality distribution of cross-sectional studies

Table 3: Result of quality appraisal (cross-sectional studies: Maximum Score = 10)

Paper	Selection				Comparability	Outcome		Total score
	Represent-ativeness	Sample size	Non-respondents	Ascertainment of exposure	Confounding factors	Outcome assessment	Statistical test	
Vujčić et al., 2021	*	*		**	**	*	*	8
Niekerk and van Gent, 2021	*	*		**	**	*	*	8
Teng, Wu and Xu, 2021		*		*	**	*	*	7
C. Wang et al., 2021	*	*		**	**	*	*	8
Wauters et al., 2022		*		**	**	*	*	7
Xia et al., 2020	*			**	**	*	*	7
Q. Wang et al., 2021		*		**	**	*	*	7
Wang et al., 2022		*	*	**	**	*	*	8
Xie et al., 2020		*	*	**	**	*	*	8
Xu et al., 2021		*		**	**	*	*	8

Teixeira et al., 2021				**	**	*	*	6
Xingyue et al., 2020	*	*		**	**	*	*	8
Shi et al., 2020		*	*	**	**	*	*	8
Simegn et al., 2021	*	*	*	**	**	*	*	9
Naser et al., 2020	*	*		**	**	*	*	8
Nguyen et al., 2021	*			**	**	*	*	7
Norhayati, Che Yusof and Azman, 2021		*	*	**	**	*	*	8
Penteado et al., 2020	*	*		**	**	*	*	8
Prati, 2021a		*		**	**	*	*	7
Rossi et al., 2020				**	**	*	*	6
Qin et al., 2020				**	*	*	*	5
Pieh, Budimir and Probst, 2020	*	*		**	**	*	*	8
Ruengorn et al., 2021		*		**	**	*	*	7
Shah et al., 2021		*	*	**	**	*	*	8
Shen et al., 2020		*	*	**	**	*	*	8
Hou et al., 2020		*		**	**	*	*	7
Htun et al., 2021	*	*		**	**	*	*	8
Islam et al., 2020	*	*		**	**	*	*	8
Hu et al., 2021		*		**	**	*	*	7
Kang et al., 2020		*		**	**	*	*	7
Katz et al., 2020				**	**	*	*	6
Ko et al., 2021				**	**	*	*	6
Lai et al., 2020a		*	*	**	**	*	*	8
Lawson et al., 2021				**	**	*	*	6
Le et al., 2022				**	**	*	*	6
Liang et al., 2020				**	**	*	*	6
S. Liu et al., 2021		*		**	**	*	*	7
Lugito et al., 2021a				**	**	*	*	6
Ma et al., 2020	*	*	*	**	**	*	*	9
Maehl et al., 2021				**	**	*	*	6
Jiang et al., 2022				**	**	*	*	6
Lu et al., 2022		*		**	**	*	*	7
Morniroli et al., 2020			*	**	**	*	*	7
Steward et al., 2021	*	*	*	**	*	*	*	8
Murphy et al., 2022b				**	**	*	*	6
Davis et al., 2021				**	**	*	*	6
Chi et al., 2020	*		*	**	**	**	*	9
Chen and Li, 2021	*	*	*	**	**	*	*	9
Cai et al., 2020		*	*	*	**	*	*	7
Buonsenso et al., 2022				*	*	*	*	4
Bettinsoli et al., 2020				**	**	*	*	6
Bella Nichole and Jonathan, 2020		*	*	**	**	*	*	8
Angelina et al., 2021				**	*	*	*	5
Alshumrani et al., 2022		*		**	**	*	*	7
AlAteeq et al., 2020		*		**	**	*	*	7
He et al., 2022	*	*	*	**	**	*	*	9
Gramaglia et al., 2022	*	*	*	**	**	*	*	9
Gloster et al., 2020		*		**	**	*	*	7
Gao et al., 2021	*	*	*	**	**	*	*	9
Priyantini et al., 2021				**	**	*	*	6

Assigned 1 point (*) or 2 points (**) based on performance against a predetermined criterion on the scoring system

Table 4: Result of Quality Appraisal (Cohort Studies Quality Assessment: Max. Score = 9)

Paper	Selection				Comparability	Outcome		
	Represent-ativeness	Non-exposed cohort	Ascertainment of exposure	Outcome present?	Confounding factors	Outcome assessment	Follow-up	Total score
Jakhar et al., 2021	*	*	*		**		*	6
Kalita et al., 2021	*		*		**		*	5
Severinsen et al., 2021	*	*	*		**		*	6

Table 5: Prevalence rate and risk factors for mental health conditions

Mental Health Condition	Incidence Rate (%)			Risk Factors					
	Min	Max	Mean	Demographic-related	Relationship-related	Psychological-related	Occupation-related	Socioeconomic-related	H
Depression	5.00	76.48	34.75	• Female gender (n=8) • Male gender (n=4) • Younger children (n=4) • Older age (n=3) • Divorcees (n=1) • Proximity to high cases (n=5) • Senior Students (n = 2) • Urban Students (n = 1)	• Being quarantine (n = 1) • Concern about family (n = 3) • Link with someone infected/isolated (n = 1) • Family history of hospitalization (n = 1) • Living with a partner (n = 1) • Lower family support (n = 1)	• Loneliness (n = 1) • Pessimism (n = 1) • Worry/fear (n = 6) • High stress/distress (n = 1) • Lower resilience (n = 1) • Lower self-efficacy (n = 1)	• Shorter work experience (n =2) • Working longer hours (n =2) • Exposure to COVID-19 at work (n =1) • Frontline workers (n =2) • Nurses (n =1) • Private sector workers (n =1)	• Losing job to pandemic (n =3) • Financial concerns (n =1) • Low social support (n =3) • Lower income (n =2) • Lower socioeconomic status (n =1) • Living in a smaller home (n =2)	• Low hea • History disorder • Report c (n =1) • Sleep iss • Presence sympton • Perceive COVID-
Anxiety	5.63	80.5	35.63	• Female gender (n =11) • Male gender (n =1) • Younger age (n =4) • Older age (n =1) • Divorcees (n =1) • Senior students (n =2) • Urban students (n =1)	• Concern for family members (n =2) • Link with someone infected/isolated (n =1) • Less family support (n =2) • Family history of hospitalization (n =2)	• Depression (n =1) • Helplessness (n =1) • Loneliness (n =1) • Worry/fear (n =4) • High stress/distress (n =1) • Lower resilience (n =1) • Lower self-efficacy (n =1) • Adverse childhood experiences (n =1)	• Frontline medical workers (n =3) • Nurses (n =1) • Lower work experience (n =1) • Higher occupational exposure (n =1)	• Lower income (n =2) • Higher income (n =1) • Loss of job (n =2) • Living in a smaller house (n =1) • Lower socioeconomic status (n =1) • Lower social support (n =2)	• Perceive COVID- • Being qu • History or previo =2) • History condition • Presence sympton • Presence disease (• Lower h • Lower s
PTSD	9.1	65.0	37.06	• Younger age (n =1) • Middle age (n =1) • Older age (n =1) • Male gender (n =3) • Female gender (n =2) • Senior students (n =1) • Urban students (n =1)	• Concern for family members (n =1) • Link with infected/ isolated people (n =1) • Less family support (n =1) • More adverse childhood experiences (n =1)	• A higher number of stressors (n =1) • Lower resilience (n =1) • Lower self-efficacy (n =1)	• Less work experience (n =1) • Working long hours (n =1) • Nurses (n =1)	• Low social support (n =3)	• Presence =1) • Perceive infection
Sleep Disorder	8.27	61.7	30.74	• Male gender (n =2)	• Concern about family members (n =1)	• Anxiety (n =1)	• Higher occupational exposure (n =1)	• Losing job to pandemic (n =1)	• Being qu

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				• Proximity to areas of high incidence (n =1)			• Nurses (n =1) • Healthcare assistants (n =1) • Frontline medical workers (n =2) • Workers with work experience ≥ 15 years (n =1)		• Presence disease (
Stress	4.9	70.1	34.88	• Female gender (n =1) • Younger age (n =2) • Proximity to areas of high incidence (n =2) • Early college years (1st/2nd) (n =1)	• Concern about family members (n =2) • Lower family support (n =1)	• Fear/worry (n =1) • Helplessness (n =1)	• Higher occupational exposure (n =1) • Frontline workers (n =1)	• Lower socioeconomic status (n =1) • Losing job to pandemic (n =1)	• Being qu • Previous history (• Presence sympton • Perceive COVID-
Psychological Distress	7	71.5	34.61	• Female gender (n =3) • Lower age (n =2) • Proximity to areas of high incidence (n =1) • Early college years (1st/2nd) (n =1)	• Lack of confidant (n =1) • Frequent arguments with parents (n =1)	• Worry (n =2)	• Frontline healthcare workers (n =1)	• Low social support (n =1)	• Bad diet • Poor sle • Presence disease (• History condition
General Mental Health Conditions	21.4	69.3	40.97	• Female gender (n =8) • Married (n =1) • Divorced/ married (n =1) • Single (n =1) • Younger age (n =2) • Older age (n =1) • School closure/ lockdown (n =1) • First=year students (n =1)	• Change of family habits as a result of the pandemic (n =1) • Having to leave home frequently (n =1) • Reduced family care (n =1) • Reduced family visits to the hospital (n =1)	• Helplessness (n =1) • Hopelessness (n =1) • Concern for loved ones (n =1) • Fear/worry (n =1) • Severe stress levels (n =1) • Perceived discrimination (n =1) • Higher self-efficacy (n =1)	• Higher working experience (n =1) • Working longer hours (n =1) • Occupational stress (n =1) • Working in healthcare (n =1) • Nurse (n =2)	• Lower financial status (n =2) • Lower-income range (n =2) • Perceived lower social support (n =1) • Less access to basic supplies (n =2) • Loss of job to pandemic (n =1) • Being employed (n =1)	• Report c =1) • Report c • Perceive COVID- • Testing virus (n

Print ISSN: 0189-9287

Variations in the Incidence of Mental Health Conditions

Some epidemiological differences were observed in different population groups, places, and periods of study.

Demographic Variations in Prevalence of Mental Health Conditions

Variations in the incidence of various mental health conditions among different demographic groups are depicted in Table 6.

Table 6: Variations of mental Health Conditions in Different Populations

Population		Depression (%)	Anxiety (%)	Insomnia (%)
Healthcare Jobs	Healthcare workers	↑48.60	↑35.70	+
	Non-Healthcare	25.10	18.50	+
Age group	Older Adults	↑28.80	↑22.50	↑30.80
	Younger Adults	20.90	16.80	24.10
Parents with a sick dependant	With a sick child/dependant	↑1.70	↑2.40	+
	Without a sick child/dependant	1.50	1.65	+

Factors	Prevalence Level of Mental Health Conditions	
	Increased	Decreased
Gender	Females	Males
Experience of health workers	Less experience	More experience
Exposure to COVID-19	Exposed	Not Exposed
Education	Masters Students	College Students
Pregnancy	Pregnant women	Non-pregnant women

+ No value reported, ↑ A higher prevalence than others

Variations in mental health prevalence over time

The prevalence of depression, anxiety, and PTSD were compiled for the studies conducted on them, which were mostly in 2020. Arithmetic means a calculation involving the groping of values over three months intervals, which was carried out on the reported prevalence from January to September 2020. Three months interval was selected because some months did not have any or enough studies conducted on the selected conditions. The resulting pattern showing the average dynamic of the prevalence is summarized in Fig. 3.

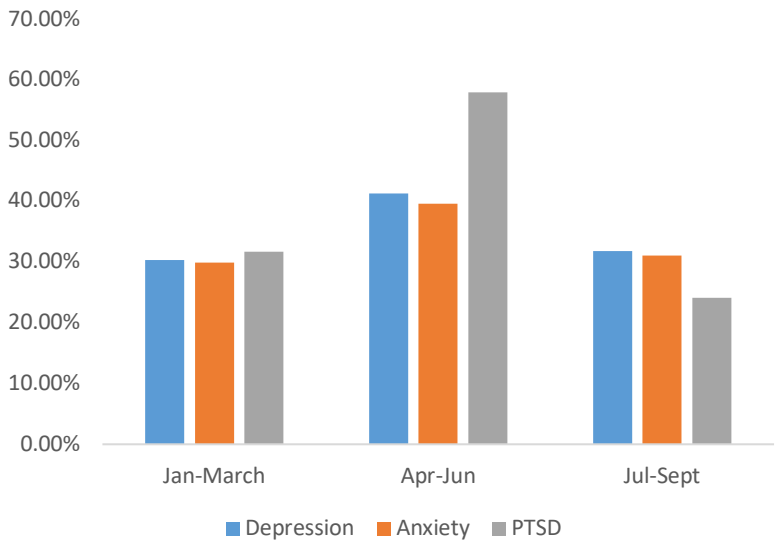

Fig 3: A Quarterly Representation of the Mean Prevalence of depression, anxiety, and PTSD from Jan. to Sept. 2020

Variations across countries and continents

Table 7 shows the maximum, mean, and minimum prevalence of mental health disorders across the assessed five continents. Only one study was found written on some disorders in some continents, while fewer than 5 were found in most other continents per disorder.

Table 7: Prevalence of Mental Health Challenges during the COVID-19 Pandemic in five Continents

Continent	Psychological Distress	Stress	Sleep Disorder	PTSD	Anxiety	Depression	General Mental Health Conditions	Value
Africa	27.60 (n=1)	28.60 (n=1)	-	-	43.20(n=2)	32.85(n=2)	72.50*(n=1)	Mean
	27.60	28.60	-	-	52.00*	46.30	72.50*	Max
	27.60+	28.60+	-	-	34.40	19.40	72.50+	Min
Asia	29.02(n=5)	39.18(n=12)	36.70(n=10)	31.36(n=6)	32.68(n=32)	34.01(n=32)	44.81(n=3)	Mean
	54.10*	80.20*	68.90*	49.38	73.70*	76.48*	60.77*	Max
	7.00	6.40	8.27	9.10	5.63	5.00	27.05	Min
Europe	-	38.10(n=)	16.00(n=1)	53.17*(n=3)	19.24(n=5)	18.20(n=4)	52.03*(n=3)	Mean
	-	38.10	16.00	65.00*	42.00	28.90	70.30*	Max
	-	38.10	16.00	44.50	2.40	2.90	33.50	Min
North America	20.80(n=1)	-	-	-	35.67*(n=3)	49.55(n=3)	-	Mean
	20.80	-	-		69.10*	77.50*	-	Max
	20.80+	-	-	-	41.40	7.90	-	Min
South America	62.80*(n=1)	-	-	-	65.00(n=10	50.70(n=1)		Mean
	62.80	-	-	-	65.00	50.70	-	Max
	62.80+	-	-	-	65.00+	50.70+	-	Min

+ Only one study was found here
* Value is above 50% prevalence
- No value in cell

In selected eight (8) countries with the highest prevalence records during the pandemic, the chart below (Fig 4) contains the data on the prevalence of depression and anxiety.

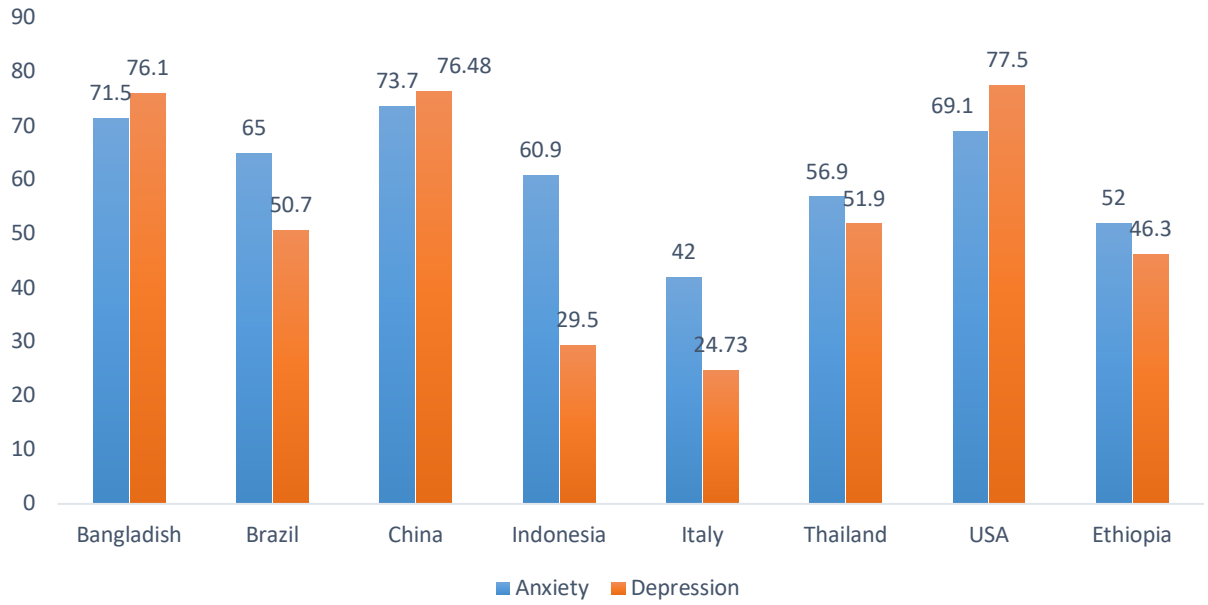

Fig 4: Highest prevalence recorded on mental health challenges during the COVID-19 Pandemic in eight selected countries.

Discussion

The scoping review describes the prevalence of mental health disorders, the mental health tools used, and the risk factors identified by researchers during conditions during the COVID-19 pandemic.

Mental health assessment tools

All reviewed studies used standard mental health assessment tools.[89–93] The popular Patient Health Questionnaire (41.7%), and Generalized Anxiety Disorder Scale (36%) were the most applied tool by researchers in the assessment of mental health conditions. This strongly corresponds to the high number of studies that engaged in the assessment of depression, anxiety, and either stress or PTSD during the pandemic.[23,25,28,40,42,94]

Prevalence of mental disorders during the COVID-19 pandemic

Depression, anxiety, and stress were the most studied mental health conditions. Most studies reported a high (prevalence ≥ 50%) vulnerability to these three mental conditions[21, 22, 36, 39, 43, 44, 47, 57, 62, 74, 86] This finding is consistent with previous studies.[95,96] On the contrary, Jörns-Presentati et al.,[94] reported a lower prevalence (29.0%) of depression. According to the WHO, the pandemic spiked with a 25% increase in the prevalence of mental disorders worldwide.[7,95,96] Indeed, these differences were mostly attributed to the stress of COVID-19 by most of the studies. Some studies, however, reflected closer findings to Jörns-Presentati et al.,94 for mental health challenges with prevalence ranging between 20% and 49% for depression, anxiety, and stress. This included Alshumrani et al.,[35] Bella Nichole and Jonathan,[33] Chi et al.,[28] Naser et al.,[65] Nguyen et al.,[64] Simegn et al.,[67] Zhang et al.,[71] and various other studies. Most studies were conducted before the lockdown and during periods when the lockdown was being relaxed around the world. Some studies also reported a lower prevalence, especially those conducted in places or periods with lower cases of COVID-19.[54,58,75] Public crises can cause mental health disorders to rise way more than is naturally experienced among people, therefore, public health practitioners should be alert to the mental health of people and patients in crises.

Factors associated with mental health disorder prevalence

This study revealed that many risk factors were associated with the presence of mental health mental disorders experienced during the COVID-19 pandemic. Most of the studies reported a higher prevalence of mental health challenges such as anxiety and depression among females who are usually more vulnerable to stress and psychological distress such as PTSD,[73,97–99] in line with earlier studies.[65,100–105] On the contrary Liu et al[44] and Oginni et al[106] found a higher prevalence of PTSD among males. Pregnant women and lactating mothers also showed a higher prevalence of mental disorders during the pandemic.[107]

On the other hand, the higher prevalence of mental health conditions among females may also be attributable to the fact that higher numbers of the COVID-19 frontline workers such as nurses and other categories of caregivers are females who were faced with heightened COVID-19 challenges both at work and home during the pandemic.[65,66,68,73,98,99,108,109] This finding is consistent with past studies[71,108,110] which found that health workers were vulnerable to the key risk factors for developing stress, anxiety, depression, and PTSD. Some studies reported that the length of one work experience, training, and support mechanisms helped reduce extreme burnout, psychological stress, and distress.[111,112]

Equally noteworthy, people who shared proximity to places with higher COVID-19 cases had a higher level of mental health challenges.[22,45,82] This finding is in line with the WHO observation that depression and anxiety disorders were higher in places with higher COVID-19 cases[113,114] This is supported by previous studies that showed that the fear and anxiety associated with the threatening numbers of cases and death in people's neighbourhoods was seen earlier to increase the serious risk for mental breakdown[115] since a perceived or actual increase in the risk of exposure to COVID-19 was a major driver for adverse mental health.[48,74]

Some studies reported that poor psychosocial support increased the prevalence and severity of mental health disorders among vulnerable population groups such as strictly isolated or heavily quarantined persons,[116] individuals who lacked family support or care,[117] elderly persons in need of nursing care,[49,118] persons at risk of losing their jobs,[33] persons without financial and social support,[24,30,42,47,54,63,69,77,119] divorced persons,[23,65,79] and relatives and guardians of sick persons.[84] This finding indicates that social connections are a strong mechanism of survival and stress management for humans. Once this bond is disturbed by any stressors,[120,121] such as done by COVID-19 pandemic, the mind is bound to be impacted if no interventions are put in place.[8,117,122–125]

A few studies reported that living with a partner and being married were risk factors for mental health disorders, especially for individuals who also had mental or physical health challenges.[71] During the Covid-19 pandemic, stressors from work and home were multi-factorial triggers to mental health distress,[126,127] just as living with a partner with fears, mental stress, and emotional vulnerability, which was more prevalent during COVID-19, has been linked in the past to the presence of psychological stress.[76,121,128]

Several articles found that one's emotional or psychological state contributed to mental health conditions.[52,119,129–133] Positive feelings such as hope, optimism, and self-efficacy were generally associated with better mental health status than helplessness, pessimism, worry/fear, distress, and anxiety.[129,131,134,135] Ying Zhang et al.[73] however, reported that participants with higher self-efficacy had an increased risk of mental breakdown,

similar to Khalil et al.[52,136] which explained that participants with higher self-efficacy reported having lower assertiveness, which was a stronger predictor of mental illnesses.[134,135]

Similarly, one's socioeconomic status was linked to an increased risk of mental health problems in almost all of the reviewed articles following similar findings.[137–139] Sampaio et al.,[98] reported a higher risk of depression among healthcare practitioners with higher incomes, which is justifiable looking at the fact that some healthcare workers doing overtime and extra shifts make more money, but at the risk of severe adverse health effects.[98,139]

Persons with pre-existing mental and non-mental health issues, especially persons suffering from chronic illnesses, were more prone to higher mental health illnesses than otherwise healthy individuals,[140–143] in agreement with the established relationships between health status and mental health[140] by studies such as MacMillan[144] and MHF.[145] Mental health challenges among COVID-19 patients were higher than the general population in most of the studies,[59,80,146,147] except Alshumrani et al.,[35] who found that COVID-19 patients were less likely to suffer from mental health breakdown during the pandemic, which they attributed to factors such as lesser fear of unknown or increased confidence among COVID-19 survivors.[35]

Although the impact of specific details of contents people got exposed to were not reported in any studies, some evidence showed that increased social media exposure was linked to an increase in the risk of mental health conditions.[148–150] There was, however, no clear conclusion whether social media exposure led to an increase in mental health conditions. While some studies posited that social media can be a force for good when used properly, others suggested that the spread of uncensored content and unverified information would have been the reason behind the higher occurrence of mental disturbances among people with more social media usage.[150–152]

Trends in the prevalence of mental health conditions

Using the average values of the data collated the result showed that just as the pandemic grew stronger, the global prevalence of mental health conditions rose sharply from 30.31%, 29.97%, and 31.74% to 41.31%, 39.61%, and 58% for depression, anxiety, and post-traumatic stress disorder respectively.[7,95,96,113,147] A decline to 31.83%, 31.03%, and 24.10% was also observed for the three disorders as the cases and restrictions started reducing in various places,[33,42,73,87,95,96,113] although the impact continued to linger.[95] There were variations in mental health prevalence across different population groups from 24 different countries in Asia, Africa, North America, South America, and Europe (Table 7). The differences observed in countries were mostly related to outbreak severity, degree of government-imposed restrictions, and socioeconomic status of the region.[22,60,61,66,85,86]

Variations due to sociodemographic attributes

The females[65] frontline workers,[109,110] people who were ill[41,66] who work long hours,[68,153] whose job increased their exposure to COVID-19[48,74] were living in proximity to COVID-19 cases,[22,45,82] were young or older,[4,5,35,62,83,84,107,116,118,154–159] had lower economic & education status, weak psychological makeup, and low social supports[142] had higher levels of mental health conditions during the pandemic[7,113,148] which serves as a call to set up protective measures for this population during any interventions.

Geographical variations

Table 7 shows that the highest prevalence of depression and anxiety was in North America, precisely the United States[47] followed by China[39] and Bangladesh.[21] Stress and sleep disorders were highest in Asia, especially Thailand[57] and Bangladesh[21] respectively. Also, the prevalence of psychological distress was highest in Brazil[69] which represented South America, while general mental health disorders or conditions showed up more in Africa,[87] followed closely by Europe.[13,56] (Fig 4). The review found that at the country level, Bangladesh, the USA, and China were at the top of the list for both depression and anxiety during the pandemic.[21,43,119]

Time-related variations of mental health challenges

In Bangladesh Islam et al.,[21] found a significantly higher level of mental health than those conducted before and after the peak of COVID-19 incidence. In general, the reported prevalence of most mental disorders rose steadily with the advent of the pandemic until the middle of the year 2020. This coincides with periods with higher COVID-19 cases and deaths with stricter lockdown measures.[160] (Fig 4). After this peak period, a steady decline was observed in the last 3 months, with values falling below those obtained during the onset of the pandemic. This decline followed the period the governments began to ease off the COVID-19 restrictions.[2,13,95,96,160–162] Although there is a wide view that the mental health prevalence naturally reduced as COVID-19 eased off or people adjusted to the new reality, it is important to bear in mind that the observed prevalence after the strict lockdown was still higher than before.[80,95]

Gaps in literature

Although COVID-19 and mental health are crucial global issues, most studies were conducted in Asia, with few from Europe, while North & South America and Africa had a very limited number. Based on the inclusion criteria for this review, no relevant articles were found in Australia or Antarctica. This partially limited the ability to draw a clear line on the global prevalence of mental health conditions. Few studies investigated the impacts of COVID-19 on the mental health of other vulnerable populations, such as students, pregnant women, children, the elderly, and persons with chronic diseases. Few studies examined the specific relationship between government restrictions and mental health conditions. More research is needed to examine these issues in detail to guide future interventions by governments and policymakers.

Limitations

The review considered articles written in the English language, which may limit the generalizability of the study findings to the non-English speaking regions. The timeframe was also from March 2020 to July 2022, hence all other studies before and after this period will have findings that may support or contradict this study. We did not include grey literature or non-peer-reviewed articles, and these may have wider, similar, or contradictory views. The review included only open-source articles and did not include any articles that required payments or prior consent before review, which may have also limited the content of this review and the generalizability of the findings.

Conclusion

Our review of 72 articles on the mental health impacts of the COVID-19 pandemic found that various standard tools were used to assess mental health disorders during the COVID-19 pandemic. We observed that the prevalence of mental health conditions increased during the COVID-19 pandemic and decreased as the COVID-19 prevalence was declining. Factors such as one's profession, occupation, gender, age, marital status, family relationships, socioeconomic status, access to information, psychological makeup, and longstanding health status, played important parts in the development of mental health conditions during the pandemic. Also, while some variations were seen in the mental health prevalence across the globe during the pandemic, healthcare workers were generally found to be more prone to the challenges as they were highly strained and faced by the pandemic than many other professions. Further studies should investigate ways to reduce mental health challenges during public health crises and beyond since mental challenges often linger way after the precipitating event. Finally, more research is needed in places like North & South America, Africa, and Europe to create accurate global prevalence.

Implications of Findings: Governments and policymakers in both public and private organizations should develop and intensify policies that ensure social protection during public health events. Similar policies and protocols should be specifically extended to developing robust mental health and social support mechanisms for frontline/health workers in similar situations.

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Appendix

Abbreviations

ACE	Adverse Childhood Experience
ADQ	Author Designed Questionnaire
AIS	Athens Insomnia Scale
ASDS	Acute Stress Disorder
AUDIT	Alcohol Use Disorders Identification Test
BAI	Beck Anxiety Inventory
BDI-II	Beck Depression Inventory-II
Brief COPE	Brief Coping Orientation to Problem Experienced
BRCS	Brief Resilience Coping Scale
CDI-S	Children's Depression Inventory-Short Form
CCMH	Copenhagen Corona-Related Mental Health Questionnaire
CES-D	Center for Epidemiologic Studies Depression scale
CMD	Common Mental Health Diseases
CMHDQA-4	Four-item Common Mental Health Disorder Questionnaire Anxiety subscale
CSES	Coping Self-Efficacy Scale
CD-RISC	Connor-Davidson Resilience Scale
CD-RISK-10	Abbreviated Version of the Connor–Davidson Resilience Scale
CDI	Child Depression Inventory
COVID-19	Coronavirus Disease 2019
DAR-5	Dimensions of Anger Reactions-Revised
DASS-21	21-item Depression, Anxiety, and Stress Scale
FSS	Fatigue Severity Scale
GAD-7	7-item Generalized Anxiety Disorder scale
GHQ-12	General Health Questionnaire-12
GPS	Global Psychotrauma Screen
HADS	Hospital Anxiety and Depression Scale
IES	Impact of Event Scale
IES-R	22-item Impact of Event Scale-Revised
ISI	Insomnia Severity Index
K-10	Kessler Psychological Distress Scale
LCKRS-2	Long COVID Kids Rapid Survey 2
MBI	Maslach Burnout Inventory
MHC-SF	Mental Health Continuum Short Form
MSBS	Multidimensional State Boredom Scale
NPI-Q	Neuropsychiatric Inventory Questionnaire
PANAS	Positive and Negative Affect Scale
PCL	Abbreviated PTSC Checklist
PCL-5	PTSD Checklist

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PC-PTSD-5	Posttraumatic Stress Symptoms scale
PCQ	Psychological Capital Questionnaire
PHQ-4	4-item Patient Health Questionnaire
PHQ-9	9-point Patient Health Questionnaire
PROMIS	Patient-Reported Outcomes Measurement Information System
PSC	Pediatric Symptom Checklist
PSQI	Pittsburgh Sleeping Quality Index
PSS	Perceived Stress Level
PSS-10	10-item Perceived Stress Scale
PSQI	Pittsburgh Sleep Quality Index
PSWQ-C	Penn State Worry Questionnaire for Children
PTGI	Post Traumatic Growth Inventory
SAS	Self-rating Anxiety Scale
SCARED	Screen for Child Anxiety-Related Emotional Disorders
SCL-90	Symptom checklist 90
SCSQ	Short Coping Style Questionnaire
SDS	Self-rating Depression Scale
SRSS	Self-Rating Scale of Sleep
SRQ-20	20-item Self-Reporting Questionnaire
STAI-Y	State-Trait Anxiety Inventory-Form Y
ULS-3	3-item UCLA Loneliness Scale
ULS-8	8-item UCLA Loneliness Scale
VTQ	Vicarious Traumatization Questionnaire
Z-SAS	Zung Self-Rating Anxiety Scale