



# COVID-19 mental health prevalence and its risk factors in South East Asia

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## Abstract

With the record surge of positive cases in Southeast Asia, there is a need to examine the adverse mental effects of COVID-19 among the under-researched countries. This study aims to synthesize the extant literature reporting the effects of COVID-19 pandemic on the psychological outcomes of people in Southeast Asia, and its risk factors. A scoping review was adopted targeting articles published in PubMed, Google Scholar and Scopus from January 2020 to March 30, 2021. Articles were screened using predetermined eligibility criteria, resulting in 26 papers. Elevated prevalence of adverse mental effects was noted in most of the countries as the pandemic progressed over time, with Malaysia and Philippines reporting higher prevalence rates. Mental decline was found to be more profound among the general population compared to healthcare workers and students. Dominant risk factors reported were age (younger), sex (females), education (higher), low coping skill and social/family support, and poor reliability in COVID-19 related information. Adverse mental effects were noted among population, healthcare workers and students in most of the Southeast Asian countries. Intervention and prevention efforts should be based at community-level and prioritize young adults, females, and individuals with dire financial constraints.

**Keywords** COVID-19 · Mental health · Risk factors · Southeast Asia · Scoping review

## Introduction

The Coronavirus disease 2019 (COVID-19) was first reported in December 2019 after a cluster of atypical cases of pneumonia was reported in Wuhan, China. Within a three-month period, the outbreak was declared to be a global pandemic by the World Health Organization (WHO), with

recent statistics indicating more than 180 million cases worldwide. Apart from causing deleterious effects on the economy, education and employment, the pandemic has specifically resulted in increased adverse mental issues worldwide, including those who are not highly at risk (Lai et al., 2020). As a matter of fact, studies have indicated that the increasing number of mental health cases worldwide may potentially develop into another pandemic (Ornell et al., 2020).

According to a recent report by the Centre of Infectious Disease and Research Policy (CIDRAP) (, 2021), the Southeast Asian (SEA) countries are experiencing a surge in daily positive cases of COVID-19, most of which linked to the more transmissible Delta variant (B16117.2 – first detected in India). For example, the fourth most populous nation, Indonesia reported a record number of 25 K positive cases on July 2, 2021, with the Delta variant accounting to almost 60% of the cases (CIDRAP, , 2021). The daily record-breaking surge in most of the SEA countries have prompted some to reimpose nationwide lockdowns and expedite their vaccination efforts. For instance, Malaysia is currently under a full lockdown with only the essential service sectors in operation (May 2021 - present) whilst

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Vietnam has imposed restrictions on movement in about one-third of its 63 cities and provinces since the outbreak began in late April 2021.

The pandemic, lockdowns, economic recession and uncertainties have caused severe effect on one's psychological wellbeing, with countries reporting higher cases of domestic abuse and suicides (Kamel, 2020; Pramukti et al., 2020). For example, a recent police report cited 468 suicides between January and May 2021 in Malaysia, averaging to 3 suicides daily, a dramatic increase compared to 0.93 suicides/day between 2014 and 2018 (Rahman, 2021). A similar pattern was observed in Thailand whereby a 22% increase in suicide rates in the first six months of 2020 as opposed to the same period in 2019 (Nortajuddin, 2021). A search of the literature also revealed a significant growth in studies reporting the deleterious effects of the pandemic on people's mental health worldwide, among healthcare workers (Chew et al., 2020a, b; Fauzi et al., 2021; Lai et al., 2020), students (Kamaludin et al., 2020; Khan et al., 2020; Yarrington et al., 2021) and the general population (Anindyajati et al., 2021; Lim et al., 2020; Pierce et al., 2020; Rossell et al., 2020), among others.

Considering the detrimental consequences of the COVID-19 pandemic and the subsequent lockdowns on people's mental health, it is not only crucial to examine this phenomenon to assist people through this trying time, but timely as well. In light of this concern, this scoping review aims to examine and describe the extant literature on the impact of COVID-19 in SEA countries, and further identifying its associated risk factors. The review differs from existing reviews in several ways: (i) a wider timeline of studies was taken into consideration (January 2020 – March 2021), hence enabling us to assess the progress in mental health effects from the beginning of the outbreak, (ii) targeting SEA countries, many of which are developing nations and currently struggling in containing the spread of the virus, low/slow vaccinations and reporting record-breaking daily positive cases and deaths, and (iii) focusing on all the cohorts to gain insights into the effect of the pandemic on people's mental health, generally.

## Materials and Method

The current review is part of a large study encompassing countries in the Asia Pacific region. The five-stage approach for scoping review was adopted in accordance with the PRISMA Extension for Scoping Reviews (Arksey & O'Malley, 2005; Tricco et al., 2018). The stages are elaborated in the subsequent sections:

## Research Questions

The following two research questions (RQs) were formulated to support a knowledge synthesis of extant literature on the effect of COVID-19 pandemic on mental health in SEA, and its associated risk factors.

RQ1 – What is the extent of COVID-19's impact on the mental health of people in SEA?

RQ2 – What are the dominant risk factors for adverse mental health among people in SEA?

## Search Strategy

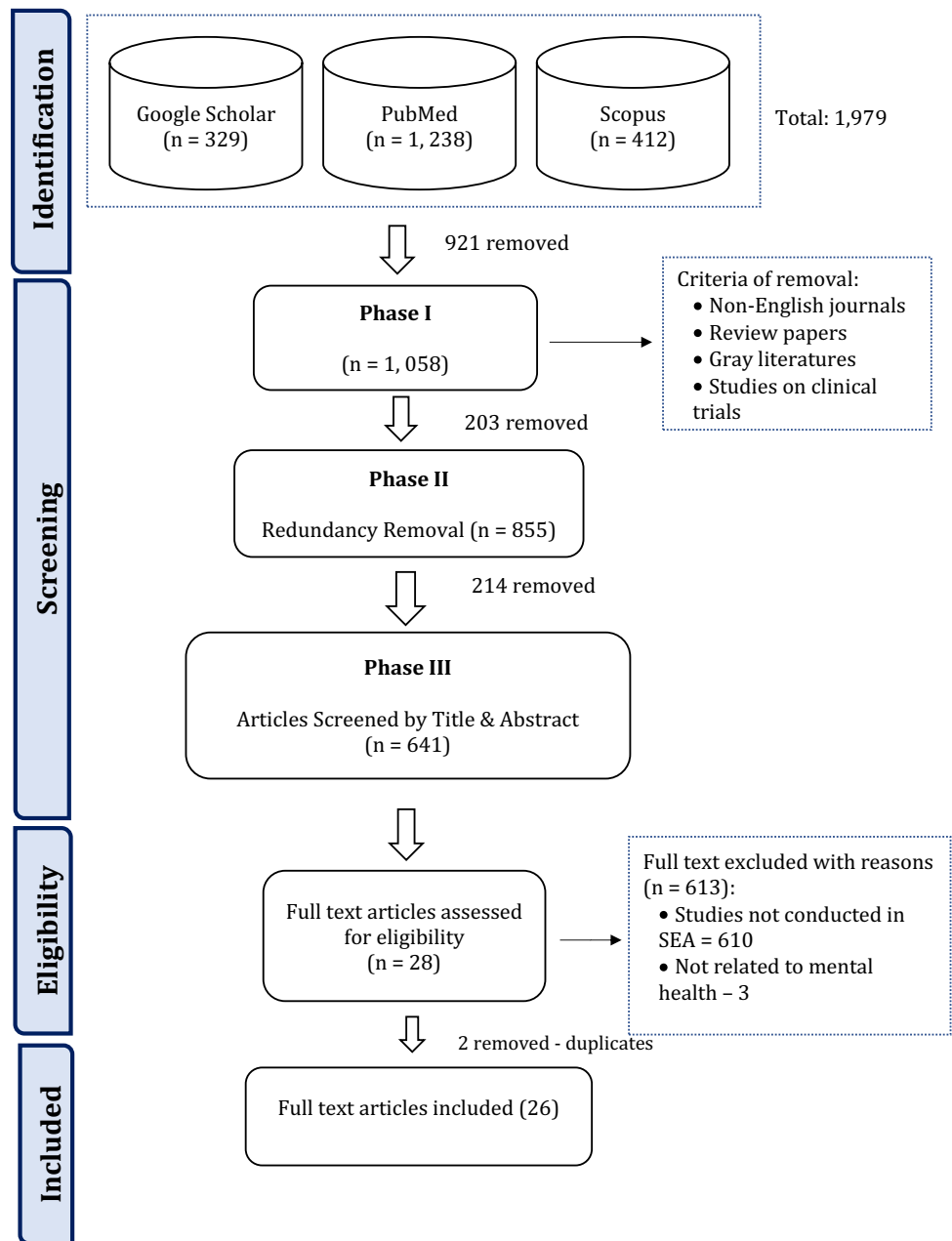
A literature search process was initiated targeting scholarly publications related to COVID-19 and mental health published between January 2020 and March 2021. Specifically, related literature was sought from three academic databases, namely, PubMed, Google Scholar and Scopus. A wide range of keywords were used along with Boolean and wildcard operators to combine and expand searches. These include “mental health and pandemic”, “mental health and C\*”, “mental health and outbreak” and “mental health and epidemic”. Further searches were accomplished by replacing “mental health” with mental issues, stress\*, depression, anxiety, emotion\* and psycho\*, resulting in more than 35 different combinations.

## Study Selection

The search strategy above resulted in a total of 1964 articles, which were then screened based on several inclusion and exclusion criteria. Specifically, the inclusion criteria were journals and conference proceedings published between January 2020 and March 2021, articles written in English, studies targeting SEA countries and based on surveys (cross-sectional, longitudinal etc.). Conversely, the exclusion criteria were studies based on clinical assessments of mental disorders, review articles and publications in the forms of theses, book chapters, extended abstracts, opinions, narrations and gray literature (scholarly information that has not been formally published and often is not peer-reviewed).

The process above reduced the total number of articles to 1058. A manual search of duplicate entries was performed based on author names and titles, resulting in the removal of 203 articles. This was then followed by another round of screening in which three reviewers examined the titles and abstracts to ensure the appropriateness of the articles. In instances where the inclusion criteria were unclear, the reviewers checked the full text before a decision is made. A

Fig. 1 PRISMA-ScR flowchart



total of 26 articles were found to fit the focus of the scoping review. Figure 1 illustrates the PRISMA-ScR flowchart.

### Charting the Data

The next stage involved mapping the articles in terms of quantity, characteristics and sources of evidence in accordance with the aim of this review, which includes the extraction of relevant data such as author, year, country, sample cohort, type of mental health investigated, prevalence results and risk factors. Two reviewers independently extracted data from these studies, and the

results were cross-checked to minimize errors. Table 1 depicts the descriptive statistics of the studies reviewed, in which Malaysia (34.6%), Indonesia (26.9%) and Singapore (26.9%) produced the highest number of mental health related studies. No studies were found for four SEA countries, namely, Timor Leste, Brunei, Cambodia and Laos. Although all the cohorts were included in the search strategy, almost half of the studies (46%) targeted the healthcare workers (HCWs), followed by the general population (26%). In terms of the mental health type, anxiety, depression and stress were the widely investigated types, with DASS-21 as the most popular scale.

**Table 1** Description of articles included in scoping review (N=26)

Characteristics		N (%)	Characteristics		N (%)
Country	Malaysia	9 (34.6)	Cohort	Healthcare	12 (46.1)
	Indonesia	7 (26.9)		Population	10 (26.0)
	Singapore	7 (26.9)		Tertiary students	3 (11.5)
	Philippines	4 (15.4)		RA patients	1 (3.8)
	Thailand	3 (11.5)			
	Vietnam	3 (11.5)			
	Myanmar	1 (3.8)			
			Sample size	< 200	2 (7.7)
				201–499	5 (19.2)
				500–999	6 (23.1)
				> – 1000	13 (50.0)
MH type	Anxiety	20 (30.8)	Factors	Risk factors	24 (77.4)
	Stress	13 (20.0)		Protective factors	3 (9.7)
	Depression	12 (18.5)		Coping strategies	4 (12.9)
	Psychological distress	6 (9.2)			
	Burnout	2 (3.0)			
	Others: Resilience; Stigma, Trauma Fatigue	12 (18.5)			
Scales	DASS-21	10 (24.0)	Scales	HADS	2 (5.0)
	GAD-7	3 (7.0)		PSS	2 (5.0)
	STAI	3 (7.0)		ZAS	2 (5.0)
	IES-R	3 (7.0)		Others: PHQ9, OLBI, IWP-1 etc.	17 (40.0)

SEA countries with no studies: Timor Leste; Brunei; Cambodia; Laos; Others refers to single studies; % for MH type, factors and scales calculated based on respective cumulative studies due to overlaps

MH: Mental health; RA: Rheumatoid arthritis; GAD-7: General Anxiety Disorder 7; DASS-21: Depression, Anxiety and Stress Scale; IES-R: Impact of Events Scale-Revised; PSS: Perceived Stress Scale; HADS: Hospital Anxiety and Depression Scale; PHQ-9: Patient Health Quality-9; OLBI: Oldenburg Burnout Inventory; STAI: State-Trait Anxiety Inventory; IWP-1: Individual Work Performance Questionnaire; ZAS: Zung's Self-Rating Anxiety Scale

## Collating, Summarizing, and Reporting the Results

The final stage summarizes and communicates the outcomes of the review, as presented in the following section in alignment with the RQs.

## Results

### Impact of COVID-19 on the Mental Health of People in SEA

The complete outcomes from the review are depicted in Table 2. A comparison between the SEA countries under-study revealed higher adverse mental health in Malaysia among population (anxiety – 55.1%; depression – 59.2%; stress – 30.6%) (Wong et al., 2021), HCWs (anxiety: 29.7% - 31.6%; depression: 21.8% - 31%; stress:

23.5% - 29.1%) (Fauzi et al., 2021; Woon et al., 2020), and students (anxiety: 34.3%; depression: 37.3%; stress: 22%) (Yunus et al., 2021). This was followed by Filipinos (anxiety: 28.8%; depression: 16.9%; stress: 13.4%) (Tee, Tee, et al., 2020b) and Singaporean HCWs (anxiety: 14.4%; depression: 9%; stress: 6.5%) (Chew, Lee, et al., 2020a). Interestingly, although Vietnamese population scored lowest DASS-21 scores (anxiety: 7%; depression: 4.9%; stress: 3.4%) (Le et al., 2020), a multi-country study (Marzo et al., 2021) revealed Vietnamese population to have the highest distress prevalence (94.5%) compared to other countries.

Looking at cohorts, it can be observed that the prevalence scores for the population-based studies using DASS-21 ranged between 7% and 55.1% for anxiety (Dai et al., 2020; Wong et al., 2021), 4.9% and 59.2% for depression (Dai et al., 2020; Wong et al., 2021), and 3.4% and 39.8% for stress (Dai et al., 2020; Tee, Tee, et al., 2020b) whereas

**Table 2** Data extraction and charting outcomes

No	Author, Year, Title, Location	Aim, Timeline	Mental Health Type, – Scale	Target Respondents (Size), Age	Prevalence Results (%)	Risk factors
1	Anindjayati et al. (2021) Anxiety and Its Associated Factors During the Initial Phase of the COVID-19 Pandemic in Indonesia Indonesia April – May 2020	Assess the proportion of anxiety and its association with COVID-19-related situations during the initial months of the pandemic.	Anxiety - GAD-7	Population (1215) More than 18 Median = 29 (min-max = 18–88)	Anxiety - 20.2%	Age, sex, medical workers, suspected case of COVID-19, satisfaction level of family support and satisfaction level of workers were associated with anxiety. Young females who had suspected cases of COVID-19, and those with less satisfying social support had higher anxiety Healthcare workers have lesser risk of developing anxiety
2	Chew, Lee, et al. (2020a), A multinational, multicentre study on the psychological outcomes and its associated physical symptoms amongst healthcare workers during COVID-19 outbreak Singapore	Association between psychological outcomes and physical symptoms February 19 to April 17, 2020	Anxiety, Depression, Stress – DASS-21 Post-traumatic stress disorder (PTSD) - IES-R	HCW (480) Median age = 29 (25–35)	Depression – 9% Anxiety – 14.4% Stress – 6.5% PTSD - 7.5%	Participants who had experienced symptoms in the preceding month were more likely to be older, have pre-existing comorbidities and presence of physical symptoms for depression, anxiety, stress, and PTSD.
3	Chew, Chia, et al. (2020b), Perceived Stress, Stigma, Traumatic Stress Levels and Coping Responses amongst Residents in Training across Multiple Specialities during COVID-19 Pandemic—A Longitudinal Study Singapore	Explores changes in psychological responses (perceived stress, traumatic stress, stigma, coping) over time in residents, as well as their predictors Timepoint 1: 8th June 2020 to 2nd July 2020 Timepoint 2: 5th March 2020 to 10th April 2020	Stress – PSS; Traumatic – IERS; Stigma - Healthcare Workers Stigma Scale;; Coping – COPE	274 and 221 - two cohorts of HCWs Mean age: (30.6 versus 30.8)	NA Stress higher at a later stage of pandemic	Living alone, less problem solving, and seeking social support - risk factors for Timepoint 2 Less stigma and stress than timepoint 1 Residents not deployed to high-risk areas also experienced more perceived stress than those who did.
4	Chow et al. (2021), Religious Coping, Depression and Anxiety among Healthcare Workers during the COVID-19 Pandemic: A Malaysian Perspective Malaysia	Evaluate the prevalence of anxiety and depression among HCWs amid the pandemic and their association with religious coping Timeline - NA	Anxiety & Depression - HADS Religious Coping - Brief Religious Coping Scale	HCW (200) More than 20 years old	Anxiety - 36.5%, Depression - 29.5%. Anxiety & depression – 23.5%	Mean anxiety and depression scores for doctors higher than nurses; Nurses scored higher positive and negative religious coping than doctors Positive coping lesser anxiety and depression
5	Dai et al. (2020), Perception of Health Conditions and Test Availability as Predictors of Adults' Mental Health during the COVID-19 Pandemic: A Survey Study of Adulisin Malaysia Malaysia	Examine individuals' perception of health conditions and test availability as potential predictors of mental health 2–8 May 2020	Anxiety – GAD7; Depression – PHQ9; Insomnia – AIS-5 Distress – K6	Population (669) Between 20 and 71 years old	Insomnia – 1.76; Anxiety – 4.36; Depression – 4.49; Distress – 5.10	Younger suffered more mental health; Those with worse health conditions had more mental health problems; Perceived test availability negatively predicted anxiety and depression, especially for adults perceiving COVID-19 test unavailability

Table 2 (continued)

No	Author, Year, Title, Location	Aim, Timeline	Mental Health Type, – Scale	Target Respondents (Size), Age	Prevalence Results (%)	Risk factors
6	Fauzi et al. (2021), Doctors' Mental Health in the Midst of COVID-19 Pandemic: The Roles of Work Demands and Recovery Experiences Malaysia	Estimate the level of doctors' fatigue, recovery, depression, anxiety, and stress, and exploring their association with work demands and recovery experiences May 2020	Fatigue – NASA Task Load Index Recovery - Occupational Fatigue Exhaustion Recovery Anxiety, Depression, Stress – DASS-21	HCW (1050) Mean = 33.08	Anxiety - 29.7%; Depression – 31%; Stress - 23.5%	Higher work demands and lower recovery experiences associated with adverse mental health A higher level of control, relaxation and mastery were significantly associated with a lower risk of multiple mental health parameters Higher detachment experience results in lower association with multiple mental health parameters
7	Kamaladin et al. (2020), Coping with COVID-19 and movement control order (MCO): experiences of university students in Malaysia	How university students coped with the psychological impact of the COVID-19 pandemic and restrictions on movement April 20 and May 24, 2020	Anxiety – ZAS; Coping - own	Tertiary students (983); 17–32 years old	Anxiety - 29.8%	More acceptance strategies and less seeking social support strategies, Male students used more maladaptive coping Older students (>25 years old) practiced more maladaptive coping strategy.
8	Lee et al. (2020), Perceived stress and associated factors among healthcare workers in a primary healthcare setting: the Psychological Readiness and Occupational Training Enhancement during COVID-19 Time (PROTECT) study Singapore	Understand the factors contributing to the stress levels of HCWs in a public primary care setting during the COVID-19 pandemic, including their training, protection and support (TPS), job stress (JS), and perceived stigma and interpersonal avoidance. March 2020	Stress - PSS Stigma - Own Avoidance - Own	HCW (1040) Mean = 39.59	Mean stress = 17.2– 20.3	Frequent changing work routine, rapid work completion and logistic challenges adds stress. Muslims and those who had to shift living place reported higher stress; Staff living alone less stress than those living with others. Those who have experience with previous virus less stress Direct contact with patients – higher stress Those with longer working years more stress than juniors
9	Le et al. (2020), Anxiety and Depression Among People Under the Nationwide Partial Lockdown in Vietnam Vietnam	Evaluate the psychological effects of the partial lockdown on the people in Vietnam during the COVID-19 pandemic. April 2020	Anxiety, Depression, Stress – DASS-21	Population (1382) Mean = 36.4	Anxiety (7.0%), Depression (4.9%), Stress (3.4%)	Being single, separated, or widowed, a higher education level, a larger family size, loss of jobs and being in contact with potential COVID-19 patients increased anxiety, depression and stress scores
10	Lim et al. (2020), Population anxiety and positive behaviour change during the COVID-19 epidemic: Cross-sectional surveys in Singapore, China and Italy Singapore	Measure perceptions and responses towards COVID-19 in three countries to understand how population-level anxiety can be mitigated in the early phases of a pandemic Feb – March 2020	Anxiety - STAI	Population (2798) Median: 37–44	NA	Lower anxiety was associated with higher self-efficacy; Higher anxiety was associated with higher scores for superstition and fatalism Higher confidence in authority lower anxiety
11	Marzo et al. (2021), Psychological distress during pandemic Covid-19 among adult general population: Result across 13 countries Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam Singapore	Investigate the psychological distress among the adult general population across 13 countries April – May 2020	Distress - COVID-19 Peritraumatic Distress Index (CPDI)	Population Vietnam (420) Malaysia (1197) Indonesia (1067) Myanmar (415) Thailand (356) Philippines (357) Mean = 33.2	Distress Vietnam – 94.5% Malaysia – 35.9% Indonesia - 40.5% Myanmar – 50.4% Thailand – 28.1% Philippines – 51.8%	Females higher distress. Lower education higher distress

**Table 2** (continued)

No	Author, Year, Title, Location	Aim, Timeline	Mental Health Type, – Scale	Target Respondents (Size), Age	Prevalence Results (%)	Risk factors
12	Noor et al. (2021). Anxiety in Frontline and Non-Frontline Healthcare Providers in Kelantan, Malaysia	Compare the levels of anxiety in frontline and non-frontline healthcare providers during the COVID-19 pandemic May – July 2020	Anxiety - HADS Support - Medical Outcome Study Social Support Survey	HCW (306) Mean (38 versus 38.5 for non-frontlines and frontlines)	Mean HADS score - Frontline (5.6.) Non- Frontline (6.9)	Non-frontline healthcare providers reported a significantly higher anxiety mean score of 1.7 than the frontline providers
13	Pramukti et al. (2020). Anxiety and Suicidal Thoughts During the COVID-19 Pandemic: Cross-Country Comparative Study Among Indonesian, Taiwanese, and Thai University Students in Indonesia, Thailand	Examined the psychological responses toward COVID-19 among university students April 10 to June 30, 2020	Anxiety – STAI, Suicidal – single statement	Tertiary students Indonesia (938) Thailand (734) NA	Thailand Anxiety Mean – 2.55 Indonesia Anxiety Mean – 2.33	Thai students had the highest levels of anxiety. Low confidence in pandemic control, sufficiency of resources, and receiving COVID-19 information from the internet and family were all factors associated with both anxiety and suicidal
14	Rias et al. (2020). Effects of Spirituality, Knowledge, Attitudes, and Practices toward Anxiety Regarding COVID-19 among the General Population in Indonesia: A Cross-Sectional Study in Indonesia	The effects of spirituality, knowledge, attitudes, and practices (KAP) on anxiety regarding COVID-19 7 April–30 May 2020	Spiritual - Daily Spiritual Experiences Scale; Anxiety – DASS-21 Knowledge, attitudes, and practices – KAP-COVID-19	Population (1082) More than 17	NA	Low spirituality high anxiety Those disagreed about whether society would win the battle against COVID-19 and successfully control it had higher anxiety. Those with the practice of attending crowded places had significantly higher anxiety.
15	Setiawati et al. (2021). Anxiety and Resilience of Healthcare Workers during COVID-19 pandemic in Indonesia	Determine the correlation between resilience and anxiety in healthcare workers during COVID-19 pandemic. 10 to 16 June 2020	Anxiety - STAI Resilience - Connor–Davidson Resilience Scale (CR-RISC)	HCW (227) Mean - 39.67	33% - high state (momentary) anxiety 26.9% - high trait (basic) anxiety	State anxiety has a strong correlation with resilience Trait anxiety has a moderate correlation with resilience Higher the anxiety, the lower the total resilience score.
16	Sujadi et al. (2021). Generalized anxiety disorder associated with individual work performance of Indonesian medical personnel during COVID-19 outbreak in Indonesia	Investigate the anxiety experienced by medical personnel during the COVID-19 outbreak and its correlation with individual work performance June 17, 2020 to July 25, 2020	Anxiety – GAD-7 Work Performance – IWP-1	HCW (501) 21–55 years old	Anxiety - 66.66%	Level of anxiety different in terms of sex, age, and type of medical personnel Anxiety correlated with task performance and contextual performance
17	Sunjaya et al. (2021). Depressive, anxiety, and burnout symptoms on health care personnel at a month after COVID-19 outbreak in Indonesia	Explore depressive, anxiety, and burnout symptoms among HCP with a higher risk for psychological trauma One month after outbreak	Anxiety - ZAS Depression - Centre for Epidemiological Studies Depression Scale (CESD R-10) Burnout - Burnout Inventory (BOI)	HCW (544) Adults more than 18	Depression - 22.8%, Anxiety - 28.1%, Burnout - 26.8%	Workers with direct contact and responsibility to treat COVID-19 patients - higher risk for depression and burnout Nurses higher risk than others Loneliness higher in high-risk groups
18	Tan et al. (2020). Burnout and Associated Factors Among Health Care Workers in Singapore During the COVID-19 Pandemic in Singapore	Examine burnout and associated factors among HCW May 29–June 24, 2020	Anxiety Depression – HADS; Exhaustion, Disengagement, Burnout - OLBBI	HCW (3075) Mean – 36.88	Anxiety score - 6.9; Depression score – 5.7 Disengagement - 2.38 Exhaustion – 2.5	Chinese or Malay ethnicity, HADS anxiety or depression scores >8, shifts lasting >8 h, and being redeployed significantly associated with higher burnout

Table 2 (continued)

No	Author, Year, Title, Location	Aim, Timeline	Mental Health Type, – Scale	Target Respondents (Size), Age	Prevalence Results (%)	Risk factors
19	Tee, Salido, et al. (2020a), Psychological State and Associated Factors During the 2019 Coronavirus Disease (COVID-19) Pandemic Among Filipinos with Rheumatoid Arthritis or Systemic Lupus Erythematosus Philippines	Psychological responses of Filipino SLE and RA patients to the COVID-19 pandemic and shortage of hydroxychloroquine supply. May 19 to 26, 2020	Anxiety, Depression, Stress – DASS-21 Psychological impact – IES-R	Patients with systemic lupus erythematosus (SLE) and rheumatoid arthritis (512) Patients more than 12 years old	Stress - 12.3%, anxiety - 38.7% Depression - 27.7% Psychological impact moderate – 20%	Presence of comorbidity of hypertension and asthma; being a healthcare worker; and presence of specific symptoms of myalgia, cough, breathing difficulty, dizziness and sore throat. Protective factors - satisfaction with available health information and wearing of face masks
20	Tee, Tee, et al. (2020b), Psychological impact of COVID-19 pandemic in the Philippines Philippines	Prevalence of psychiatric symptoms and identified the factors contributing to psychological impact in the Philippines March 28–April 12, 2020	Anxiety, Depression, Stress – DASS-21 Psychological impact – IES-R	Population (1879) More than 12	Depression – 16.9%, anxiety – 28.8%; Stress – 13.4% Psychological impact moderate – 16.3%	Female gender; youth age; single status; students; specific symptoms; recent imposed quarantine; prolonged homestay; and reports of poor health status, unnecessary worry, concerns for family members, and discrimination
21	Tee et al. (2021), Impact of the COVID-19 Pandemic on Physical and Mental Health in Lower and Upper Middle-Income Asian Countries: A Comparison Between the Philippines and China Philippines	Compare the levels of psychological impact and mental health between people from the Philippines (LMIC) and China (UMIC) and correlate mental health parameters with variables relating to physical symptoms and knowledge about COVID-19 March 28 to April 7, 2020	Anxiety, Depression, Stress – DASS-21 Psychological impact – IES-R	Population – Philippines (849) More than 12	Depression – 9.72%; anxiety – 7.3; Stress – 10.6; Psychological impact moderate - 20.67%	Physical symptoms and poor self-rated health were associated with adverse mental health
22	Wang, Tee, et al. (2021a), The impact of COVID-19 pandemic on physical and mental health of Asians: A study of seven middle-income countries in Asia Malaysia, Philippines, Thailand & Vietnam	To compare the mental health status during the pandemic in the general population of seven middle income countries After COVID-19 became an epidemic in each country	Anxiety, Depression, Stress – DASS-21 Psychological impact - IES-R	Population Malaysia (726), Philippines (851), Thailand (520) & Vietnam (121) More than 12	Malaysia – A (7.81), D (8.83), S (9.54), IESR (25.7) Philippines – A (7.30), D (9.72), S (10.6), IESR (20.67) Thailand – A (18.66), D (19.74), S (21.95), IESR (42.35) Vietnam - A (2.10), D (2.28), S (3.8), IESR (17.39)	Age < 30 years, high education background, single and separated status, discrimination by other countries and contact with people with COVID-19 Protective factors: male gender, staying with children/more than 6 people in the same household, employment, confidence in doctors, high perceived likelihood of survival, and spending less time on health information
23	Wong et al. (2020), The psychological impact on an orthopaedic outpatient setting in the early phase of the COVID-19 pandemic: a cross-sectional study Singapore	Determine the prevalence of psychological strain among HCWs at outpatient musculoskeletal clinics 2 March 2020 and 4 March 2020,	Psychological strain - Caregiver Strain Index (CSI)	HCW (62) Mean - 40	51.6% had 7 or more positive responses (group 1)	Work adjustments, changes in personal plans and finding it “confining” garnered the most positive responses. Financial concerns - least positive responses



**Table 2** (continued)

No	Author, Year, Title, Location	Aim, Timeline	Mental Health Type, – Scale	Target Respondents (Size), Age	Prevalence Results (%)	Risk factors
24	Wong et al. (2021), Escalating progression of mental health disorders during the COVID-19 pandemic: Evidence from a nationwide survey Malaysia	Measure the level of mental health of the Malaysian public approximately 2 months after the pandemic's onset 12 May and 5 September 2020	Anxiety, Depression, Stress – DASS-21	Population (1163) More than 18	Depression - 59.2%; Anxiety - 55.1%; Stress - 30.6%	Perceived health status strongest significant predictor for depressive and anxiety symptoms Young people (students), females and poor financial conditions higher mental effect
25	Woon et al. (2020), Mental Health Status of University Healthcare Workers during the COVID-19 Pandemic: A Post-Movement Lockdown Assessment Malaysia	Prevalence and severity of depression, anxiety, and stress and determined the association between various factors 1 July 2020, to 21 July 2020	Anxiety, Depression, Stress – DASS-21 Multidimensional Scale of Perceived Social Support (MSPSS)	HCW (399) 18–60 years old	Depression - 21.8%, Anxiety - 31.6%, Stress - 29.1%	Single/divorced, fear of frequent exposure to COVID-19 patients, agreeing that the area of living had a high prevalence of COVID-19 cases, uncertainty regarding the prevalence of COVID-19 cases in the area of living, and a history of pre-existing psychiatric illnesses
26	Yunus et al. (2021), The Unprecedented Movement Control Order (Lockdown) and Factors Associated With the Negative Emotional Symptoms, Happiness, and Work-Life Balance of Malaysian University Students During the Coronavirus Disease (COVID-19) Pandemic Malaysia	Investigates the link, state, and differences of negative emotional symptoms, happiness, and work-life balance among university students April 15–23, 2020	Anxiety, Depression, Stress – DASS-21 Happiness - Oxford Happiness Inventory Work-life balance - Work-Family Conflict Scale	Tertiary students (1005) More than 17 years old	Stress - 22%, Anxiety - 34.3%, Depression - 37.3%, Happy - 50%	Higher score of work-to-family conflict – higher anxiety Higher score of family-to-work conflict – higher anxiety and stress Happiness a protective factor for A, D and S

Healthcare workers (HCW) – nurses, doctors, pharmacists, administrators, clerical staff and maintenance workers etc.; NA: Not available; GAD-7: General Anxiety Disorder 7; DASS-21: Depression, Anxiety and Stress Scale; IES-R: Impact of Events Scale-Revised; COPE: Brief Coping Orientation to Problems Experienced; PSS: Perceived Stress Scale; HADS: Hospital Anxiety and Depression Scale; PHQ-9: Patient Health Quality-9; OLB: Oldenburg Burnout Inventory; AIS-5: Athens Insomnia Scale; STAI: State-Trait Anxiety Inventory; IWP-1: Individual Work Performance Questionnaire; ZAS: Zung's Self-Rating Anxiety Scale; Studies with more than a country – only SEA results are provided;

for the HCWs the scores ranged between 14.4% and 31.6% (Chew, Lee, et al., 2020a; Woon et al., 2020), 9% and 31% (Chew, Lee, et al., 2020a; Fauzi et al., 2021) and 6.5% and 29.1% (Chew, Lee, et al., 2020a; Woon et al., 2020). Though only a single study, the prevalence scores for anxiety, depression and stress among Malaysian university students were found to be generally high, that is, 34.3% for anxiety, 37.3% for depression and 22% for stress (Yunus et al., 2021). Nevertheless, the prevalence rates require a cautious interpretation considering the sample size differs between the studies.

Conversely, other impacts including burnout was examined only among HCWs in Singapore (Tan et al., 2020) and Indonesia (Sunjaya et al., 2021), both of which reported a

high prevalence. Specifically, Sunjaya et al. (2021) found 146 out of their 544 (26.8%) HCWs to have experienced burnout prevalence whilst Tan and colleagues found the burnout thresholds in disengagement and exhaustion met by 79.7% and 75.3% of their respondents, based on a large-scale study involving 3075 HCWs.

### Dominant Risk Factors Associated with Adverse Mental Health

Table 3 depicts a summary of the risk factors extracted from Table 2, indicating age (27%), being HCWs (19%), low coping skills (23%), sex (19%), having direct contact with COVID-19 patients (19%) and information reliability

**Table 3** Summary of risk factors associated with adverse mental health

Risk factors	Studies	Risk factors	Studies
Age	Anindyajati et al. (2021); Chew, Lee, et al. (2020a); Dai et al. (2020); Sujadi et al. (2021); Tee, Tee, et al. (2020b); Wang, Tee, et al. (2021a); Wong et al. (2021)	Work demands & routine/logistic change	Fauzi et al. (2021); Lee et al. (2020); Tan et al. (2020); Wong et al. (2020)
Being HCWs	Anindyajati et al. (2021); Chow et al. (2021); Noor et al. (2021); Sujadi et al. (2021); Tee, Salido, et al. (2020a)	Low coping skills (Relaxation, self-efficacy, confidence, resilience, problem-solving)	Fauzi et al. (2021); Lim et al. (2020); Kannampallil et al. (2020); Noor et al. (2021), Setiawati et al. (2021); Chew, Chia, et al. (2020b)
Sex	Anindyajati et al. (2021); Marzo et al. (2021); Sujadi et al. (2021); Tee, Tee, et al. (2020b); Wong et al. (2021)	Direct contact with COVID-19	Lee et al. (2020); Tee, Tee, et al. (2020b); Sunjaya et al. (2021); Wang, Tee, et al. (2021a); Woon et al. (2020)
Social support/concern – family, co-workers, friends	Anindyajati et al. (2021); Noor et al. (2021); Tee, Tee, et al. (2020b); Yunus et al. (2021)	Marital status	Lee et al. (2020); Tee, Tee, et al. (2020b); Wang, Tee, et al. (2021a); Woon et al. (2020)
Living alone	Chew, Chia, et al. (2020b); Lee et al. (2020)	Religion/Ethnicity	Lee et al. (2020); Tan et al. (2020)
Existing comorbidity	Chew, Lee, et al. (2020a); Dai et al. (2020); Tee, Salido, et al. (2020a); Tee et al. (2021)	Education	Lee et al. (2020); Marzo et al. (2021); Wang, Tee, et al. (2021a); Tan et al. (2020)
Existing mental health disorder	Chew, Lee, et al. (2020a); Woon et al. (2020),	Loss of income/financial worry	Lee et al. (2020); Wong et al. (2020); Wong et al. (2021)
COVID-19 information source (Internet, government etc.)	Wang, Tee, et al. (2021a); Pramukti et al. (2020); Lim et al. (2020); Le et al. (2020); Tee, Tee, et al. (2020b)	COVID-19 like symptoms	Tee, Salido, et al. (2020a); Wang, Tee, et al. (2021a)
Others: Detachment, Test availability, lockdown, family size, working experience	Fauzi et al. (2021); Dai et al. (2020); Tee, Tee, et al. (2020b); Lee et al. (2020)	Discrimination	Tee, Tee, et al. (2020b); Wang, Tee, et al. (2021a)

Single studies are grouped into Others

(19%) to be mainly reported by the majority of the studies (based on five or more studies).

## Discussion

### Mental Health Prevalence

Prevalence results generally indicate higher adverse mental effects in Malaysia (both population and HCWs) compared to other SEA countries. For example, the study by Wong and colleagues among 1163 Malaysians found a significant increase in anxiety, stress and depression as the pandemic progressed over time (May – September 2020), a pattern echoed in other non-SEA studies including in United Kingdom (Pierce et al., 2020). In fact, compared to all the 26 studies reviewed, only the work of Wong et al. (2021) involved data collection at a much later stage (September 2020), with results indicating the highest anxiety (55.1%), depression (59.2%) and stress (30.6%) using DASS-21. This is interesting considering the lockdown restrictions were relaxed in Malaysia at the time of study, however the increased adverse mental effects show the detrimental consequences of continuous and prolonged economic and societal consequences on people.

Prevalence rates for psychological effects were however, mixed among Vietnamese population. The low mental effect prevalence among the Vietnamese were attributed to a higher confidence in the physician's ability to diagnose or recognize, greater likelihood to survive COVID-19, and satisfaction with health information provided, which further indicates the local government's success in keeping both infections and death rates low (Le et al., 2020). This finding is similar to those reported in Wang, Tee, et al. (2021a) who found their Vietnamese respondents to have the lowest DASS-21 scores compared to several middle-income countries including Malaysia, Philippines, and Thailand. Conversely, Marzo et al. (2021) found Vietnamese to have scored the highest distress prevalence (397/420), despite the similarity in the timeline of the studies. The latter attributed the high distress to be associated with the wide spread of unverified news and rumors with regard to COVID-19 deaths, food and masks shortages etc. which eventually inflamed the COVID-19 panic, confusion, anxiety and frustration among the public.

Though not markedly significant, a generally higher psychological impacts were noted among populations across the countries despite the difference in scales and sample sizes (Tee, Tee, et al., 2020b; Wong et al., 2021), compared to HCWs (Chew, Lee, et al., 2020a; Chow et al., 2021; Sunjaya et al., 2021). This can be attributed to the timeline of the majority of the studies in this review in which they were mostly conducted in the first 6 months of

the pandemic and lockdowns, a time when the prolonged effect of the pandemic and its consequences were yet to be felt completely. For example, unlike the current period (mid-2021) in which the healthcare systems in countries such as Malaysia is at a breaking point due to the daily increase of positive cases, the situation was more manageable 24-months prior. Moreover, unlike the majority of the population who were forced to a restricted movement in many countries for a prolonged period, the HCWs daily work routines were not disrupted significantly as they were expected to work on site instead of working from home, the latter of which brought upon many challenges in various forms (Tee, Tee, et al., 2020b). Evidences exist showing a higher distress levels among people who were forced to stay indoor as they had to struggle with childcare, work commitments, lack of resources, loss of income, boredom and loneliness, among others (Dai et al., 2020; Lee et al., 2020).

Nevertheless, being at front lines fighting the battle against the COVID-19 pandemic, the HCWs are subjected to long working hours, exhaustion and as our review shows, a high burnout prevalence (Sunjaya et al., 2021; Tan et al., 2020). The studies generally reported HCWs who had direct contact with COVID-19 patients to be more likely at risk of being burnout, in line with other studies in other regions including Canada (Khan et al., 2021) and US (Kannampallil et al., 2020). Considering the current situation of the pandemic in which the majority of the SEA countries are grappling with record breaking cases, deaths and hospitalizations exacerbated with a slow and low vaccination process, the HCWs are at a greater risk of adverse mental effects. Therefore, there is an urgent need for effective mental health policies to support all the HCWs, regardless of their roles.

Though limited, university students in Malaysia (Kannampallil et al., 2020; Yunus et al., 2021) and Indonesia (Pramukti et al., 2020) were generally found to have experienced more psychological impacts. The pandemic and lockdowns have drastically changed the education landscape globally, with the countries shifting to online teaching and learning, both at secondary and tertiary levels. Although technology has enabled the education sector to progress with minor disruptions to lectures and assessments, new challenges were observed primarily the lack of Internet (problem that is more pertinent among SEA countries that are mostly still on 4G) and computer resources, academic delays (e.g., clinical exams), financial stress and uncertainties about their future (Pramukti et al., 2020; Tee, Tee, et al., 2020b; Yunus et al., 2021). It is also possible that students who have to be on-campus lack social support and/or coping skill as observed by Kannampallil et al. (2020) among their Malaysian health science students. Therefore, given the current COVID-19 situation in most SEA countries and the uncertainties as to how long online teaching and learning

will take place in schools/colleges/universities, it is pertinent to closely monitor students' mental health status and provide psychological counseling or services. This requires health and education authorities to work together to deliver prompt psychological support to the affected students.

## Risk Factors

Majority of the SEA studies found age and sex to be significant predictors for adverse psychological effect, with many reporting young(er) females to be at a higher risk, regardless of the sample cohorts investigated (Anindyajati et al., 2021; Chew, Lee, et al., 2020a; Dai et al., 2020; Marzo et al., 2021; Sujadi et al., 2021; Tee, Tee, et al., 2020b; Wang, Tee, et al., 2021a; Wong et al., 2021), in accordance with studies conducted in non-SEA countries including US (Ettman et al., 2020), UK (Pierce et al., 2020), and Australia (Rossell et al., 2020), among others. The evidences therefore support the notion that women generally were more profoundly affected due to the COVID-19 pandemic than men, probably due to an increased workload both at workplace and home, higher risk of domestic abuse, lack of resilience in handling crisis etc. Further, older women are probably better able to handle COVID-19 fear and change in lifestyle, experience a more settled life and also have the ability in handling crisis (Nair et al., 2020). The age and sex differences indicate the need for age and gender-specific intervention strategies and policies to address mental health inequities (Wang, Tee, et al., 2021a).

Marital status (single, divorced and separated) (Lee et al., 2020; Tee, Tee, et al., 2020b; Wang, Tee, et al., 2021a; Woon et al., 2020), living alone (Chew, Chia, et al., 2020b; Lee et al., 2020), higher education levels (Lee et al., 2020; Marzo et al., 2021; Tan et al., 2020; Wang, Tee, et al., 2021a) and financial concerns (Lee et al., 2020; Wong et al., 2020, 2021) were identified by many as risk factors exacerbating declines in mental health as well. Interestingly, these factors were commonly found to be reported in studies targeting samples from other regions including other Asian and Western countries (Ettman et al., 2020 in US; Bibas et al., 2020 in Iraq; Rossell et al., 2020 in Australia). Individuals living alone are more prone to loneliness, hence are more likely to experience adverse mental effect as they may not have adequate social support. Emotional exhaustion during the pandemic is not uncommon as individuals may be unable to share or unleash their emotions due to the lockdowns and isolations (Chew, Chia, et al., 2020b; Lee et al., 2020).

Similar to other regions, financial concerns were linked to various factors including loss of income (either self or partner), low savings and uncertainties especially during a lockdown which saw many businesses being shut down (Lee et al., 2020 in Vietnam; Wong et al., 2020 in Singapore;

Wong et al., 2021 in Malaysia). For example, recent reports revealed more than 300 K Malaysians to have lost their jobs in the past 16 months in the retail sector alone, with 30% of businesses closed permanently (Rahman, 2021). A similar observation was made in Thailand whereby the household debt surged to an 18-year high of 90.5% of GDP and the jobless rate expected to rise from 1.96% in 2021 (Yujejwattana & Thanthong-Knight, 2021). When faced with job losses and retrenchments, individuals are forced to seek employment elsewhere, which can further worsen their mental well-being (Lee et al., 2020).

Further, individuals facing financial hardships and especially those from lower-income groups have limited access to social and psychological resources; thus, they are more susceptible to adverse mental health compared to those in the higher-income group (Wong et al., 2021). While there may be a need to impose prolonged and stricter lockdowns to contain the virus spread, especially the highly contagious Delta-variant, local governments should devise policies to enhance financial assistance for lower-income families and unemployed youths including the provision of essential supplies and relief packages to improve psychosocial outcomes during this trying time. The Malaysian government for example, has released multiple aid packages to assist the senior citizens, B40 (families at the bottom 40% of income earners) community and small and medium businesses, with the more recently established People Protection and Economic Recovery Package (USD 36.2 billion) to assist people to cope with the financial difficulties arising from the reimposed total lockdown.

Two population-based studies involving adults from Malaysia, Philippines, Thailand and Vietnam identified discrimination by other countries to be significantly associated with higher stress, anxiety, depression and distress (Tee, Tee, et al., 2020b; Wang, Tee, et al., 2021a). Though not elaborated in the studies, discrimination here is seen in terms of travel restrictions as a means of infection control, either in the form of restrictions or outright bans on the entry of foreign nationals from certain countries. For example, the Philippines have recently closed their borders to Malaysia and Thailand till end of July 2021 to prevent the raging Delta variant (Reuters, 2021). Interestingly, two Singaporean studies identified religion and ethnicity to be risk factors for adverse mental health. Specifically, HCWs of Chinese or Malay ethnicity were found to be at a higher risk of burnout (Tan et al., 2020) whereas Muslim HCWs reported higher stress (Lee et al., 2020). The latter for example, attributed this to Muslim HCWs who had to cancel their pilgrimage in March 2021, and incidents whereby COVID-19 Singaporeans having visited ten local mosques during their infectious period (Lee et al., 2020).

A few SEA studies also found low levels of family and other forms of social support to be risk factors

(Anindyajati et al., 2021; Noor et al., 2021; Tee, Tee, et al., 2020b; Yunus et al., 2021). The Asians including SEA communities are generally collectivist in nature, hence there is a strong sense of community and family wellbeing, and a tendency for individuals to turn to family and close friends for social and emotional support instead of professional agencies or medical professionals (Balakrishnan et al., 2021; Marzo et al., 2021). This highlights the importance of social connectedness, thus those lacking these supports such as elderlies, HCWs, single people, students etc. may be more prone to mental health issues (Anindyajati et al., 2021; Marzo et al., 2021; Yunus et al., 2021). Therefore, a good social connection and a supportive environment in households and workplaces are deemed important for a positive mental health.

Finally, reliability and confidence in COVID-19 related information were identified as potential risk factors for adverse mental effects (Anindyajati et al., 2021; Lim et al., 2020; Pramukti et al., 2020; Tee, Tee, et al., 2020b; Wang, Tee, et al., 2021a). For example, Filipino respondents in Tee, Tee, et al. (2020b) expressed concerns regarding the need for additional and up-to-date information, showing signs of anxiety and moderate psychological effect which may lead to what some call “headline stress disorder” (Dong & Zheng, 2020). As a matter of fact, excessive health information pertaining to the disease and pandemic not only heightens the psychological distress but also the physical symptoms, which inadvertently affect one’s mental well-being. For instance, Wang, Chudzicka-Czupala, et al. (2021b) found the need for health information to positively mediate physical symptoms (i.e., headache, sore throat, cough etc.) and the perceived psychological impact of the pandemic. Further, the dissemination of fake news related to COVID-19 increased during the pandemic at a global scale, with evidence showing such false content having negative psychological impacts (Tee, Tee, et al., 2020b; Wang, Tee, et al., 2021a). There is an urgent need to ensure that information shared is relevant and accurate, especially during a crisis such as the COVID-19 pandemic as they may alleviate unnecessary panic and distress. Therefore, relevant parties including local governments, media and advocacy organizations should ensure that COVID-19 related information and advices provided to the public are accurate, authentic and consistent with national guidelines. Further, in multi-ethnicity countries such as Malaysia and Singapore, COVID-19 communication strategies should be linguistically tailored prevention messaging regarding practices to improve emotional well-being.

In general, the review found interesting patterns related to mental health status due to COVID-19 in SEA countries, and identified sub-cohorts that are more vulnerable, and the dominant risk factors. The identification of the sub-cohorts at increased risk for adverse mental effect during a public health crisis should be useful to authorities such as mental health advocates, policymakers, etc. so that proper intervention strategies and policies can be devised to help these people cope better psychologically. For example, psychological interventions should be made a priority for women, young adults, individuals who are single/separated/living alone and those with dire financial constraints. Additionally, as social and family support is extremely important among the SEA population, more family-oriented psychotherapeutic interventions focusing on the greater involvement of family and community members can be devised to manage mental disorders. Considering the urgency in addressing mental issues and the barriers due to lockdowns which restrict face to face interactions, technology-based interventions such as Internet Cognitive Behavior Therapy (I-CBT) should be considered as well (Soh et al., 2020). The review also revealed the absence of mental health studies in countries such as Laos, Cambodia, Timor Leste and Brunei. As the global and review evidence show adverse mental effect due to the pandemic is not country-specific, we call for fellow researchers to include these under-researched countries so that useful and timely assistance can be provided to its people as well. Finally, more recent studies have begun to explore the effects and roles of COVID-19 vaccination targeting various cohorts including parents (Yılmaz & Sahin, 2021) and general population (Hao et al., 2021), with findings suggesting individuals with adverse psychological symptoms such as depression and anxiety to exhibit a higher willingness to pay for the said vaccine compared to healthy individuals (Hao et al., 2021). Therefore, it would be interesting to further examine risk factors associated with COVID-19 vaccination and their associations with adverse mental health effects as well.

## Limitation

We identify several limitations in this scoping review. Firstly, the articles were limited to three electronic databases, hence this may have resulted in the majority of the studies reviewed to over-represent general population and HCWs. Therefore, generalizations of mental health effects in SEA countries should be made cautiously. Further, a scoping review is more narrative in nature, thus a clearer insight into the mental status could be achieved through systematic reviews. It is also to note that all the studies in this review were based on online survey questionnaires – expected due

to lockdowns and restricted movements in most of the countries. However, this results in most of the samples studied to be urbanites with Internet connections, thus creating a selection bias in the populations studied.

## Conclusion

The scoping review examined the impact of COVID-19 and its restrictions on the mental health of people in SEA countries between January 2020 and March 2021, and its associated risk factors. Results revealed elevated prevalence of reported adverse mental effects in SEA countries as the COVID-19 pandemic progresses over time, hence highlighting the deleterious impacts on mental wellbeing and the urgent need in preventing and treating these conditions. Although countries around the world is prioritizing strategies to flatten the COVID-19 transmission curve, prevention and treatment of mental disorders need to be emphasized as well. This requires key players and health authorities including local governments to work together in mitigating mental disorders.

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**Data Availability** No data were used in this study.

**Code Availability (Software Application or Custom Code)** Not applicable.

## Declarations

**Conflict of Interest** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Additional Declarations for Articles in Life Science Journals that Report the Results of Studies Involving Humans and/or Animals** Not applicable.

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**Consent to Participate** Not applicable.

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