

Review

Prevalence of Post-Traumatic Stress Disorder in General Population During COVID-19 Pandemic: An Umbrella Review and Meta-Analysis

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Abstract

During the COVID-19 pandemic, global populations have experienced quarantine and lockdown restrictions, adversely affecting individuals' psychological well-being. This comprehensive review aims to estimate the prevalence of Post-traumatic Stress Disorder (PTSD) within the general population amidst the COVID-19 pandemic. Employing the PRISMA guideline, the databases PubMed/Medline, Science Direct, Web of Science, Cochrane and Google Scholar were used in the data extraction process, and publications from December 2019 to 30th November 2022 were searched. A meta-analysis using the random effects model and an evaluation of heterogeneity using the I^2 index was performed. The initial search yielded 264 studies, from which 11 were selected for this comprehensive review after eliminating



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duplicates and assessing study quality. The findings revealed an overall prevalence of PTSD among the general population during the COVID-19 pandemic at 19.34% (95% CI: 16.29-22.38%; $I^2 = 40.44\%$; <0.1). Subgroup analysis based on region and scale did not reveal significant differences between groups. Future research should focus on conducting additional studies to examine the long-term impact of the COVID-19 pandemic on the mental health status of the general population worldwide.

Keywords

Stress disorders; post-traumatic; general population; COVID-19; mental health

1. Introduction

Coronavirus disease, also known as COVID-19, is an infectious illness caused by the SARS-CoV-2 virus [1]. In December 2019, China experienced the first outbreak of severe acute respiratory syndrome coronavirus [1]. The World Health Organization declared this outbreak a global pandemic in March 2020 [1]. The COVID-19 pandemic is still a severe international emergency over two years after the first SARS-CoV-2 infections were confirmed. Over 651 million confirmed cases and over 6.6 million COVID-19 fatalities have been reported since December 23, 2022 [2].

Quarantine and lockdown restrictions have been imposed on populations globally to halt the spread of COVID-19. However, social isolation and the high incidence of illnesses and fatalities have negatively affected the psychological health of people and society [3]. According to the study, the general population reports anxiety symptoms (24.4% to 41.1%), depressive symptoms (22.9% to 32.5%), stress (39.1%), psychological distress (44.2%) and PTSD/PTSS symptoms (18.8%) [4].

The COVID-19 pandemic causes multiple stress factors such as loneliness, fear of infection, suffering and death for oneself and loved ones, grief after bereavement, and financial worries leading to anxiety and depression [5]. Indeed, there was a correlation between PTSD symptoms and COVID Traumatic Stress [6]. Almost everyone will respond differently to trauma, but most people naturally get over their initial symptoms. Those who don't may be given a PTSD diagnosis [7]. Numerous systematic reviews and meta-analyses have assessed PTSD among various populations. The estimated prevalence of child PTSD in Chinese, American and Italian populations after the outbreak was 28.15% (95% CI: 19.46–36.84%) [8]. The pooled prevalence estimates of moderate PTSD among healthcare workers across 21 countries in East Asia, South Asia, Europe, the Middle East, South America, North America and West Africa was 21.5% (95% CI, 10.5%-34.9%) [9] and in the general population was 15% (95% CI: 11-21%) [10]. Umbrella reviews also have been conducted among healthcare workers, the overall prevalence of PTSD during the COVID-19 pandemic was 13.52% (95% CI: 9.06–17.98%) [11].

The estimates of post-traumatic stress disorder are required to thoroughly evaluate it. However, there is no comprehensive research to pool these results and report the overall prevalence of PTSD in the general population. On the pyramid of medical evidence, umbrella studies rank among the most thorough studies and have the highest degree of support. This study is the first umbrella review that has evaluated the prevalence of PTSD among the population globally. The study desires to highlight the post-traumatic stress disorder impact caused by the COVID-19 pandemic on the

general population. Our results will offer solid, current evidence to support public health strategies and long-term responses. Given the anticipated findings, research will help policymakers monitor and evaluate current mental health programs and strengthen advocacy efforts for mental health [12]. In this umbrella review and meta-analysis, we have conducted a study titled “The prevalence of post-traumatic stress disorder among the general population during the COVID-19 pandemic” to estimate the prevalence of post-traumatic stress disorder among the general population during the COVID-19 pandemic.

2. Materials and Methods

This study followed the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA) [13] and the 9 steps to conduct an umbrella review of the literature [14]. The steps involved in conducting a parachute assessment include: 1) identifying the research topic; 2) designing the protocol and registering the assessment protocol; 3) preparing a search strategy and conducting literature research; 4) identifying the assessment articles; 5) evaluating the quality of the research; 6) extracting and analyzing data; 7) reporting the results and summarizing the evidence; 8) examining the limitations and strengths of the study; 9) concluding [13, 14]. The study protocol was registered in PROSPERO with CRD42022358529, ensuring transparency and adherence to established research standards [15].

2.1 Databases and Search Strategy

PubMed/Medline, Science Direct, Web of Science; Cochrane; Google Scholar were searched to identify relevant studies. Any references section of studies that were found to supplement the data. All studies were searched using the terms identified from the title, abstract, keywords, or medical subject headings as Table 1. The search in databases was performed from the outbreak of COVID-19 in December 2019 to 30th November 2022.

Table 1 The Keywords for search strategies.

AND				
	“General Population”	“PTSD”	“COVID-19”	“systematic review”
	“People”	“PTSS”	“Sars-Covi 2”	“meta-analysis”
	“Citizens”	“post-traumatic stress”	“2019-nCovi”	“meta-analytic”
OR	“The public”	“revised impact of event scale”	“Wuhan coronavirus”	
	“General Public”	“posttraumatic stress”	“coronavirus disease19”	
		“mental health”	“COVID-19 pandemic”	
		“mental health disorder”	“pandemic”	

2.2 Eligibility Criteria

The main focus of this study was to measure the prevalence of PTSD in the general population during the COVID-19 pandemic. The included studies in this umbrella review adhered to the following selection criteria and exclusion criteria:

Inclusion Criteria: (1) Written in English; (2) Reporting the prevalence of PTSD among the general population during the COVID-19 pandemic; The diagnosis of PTSD can be made using such as DSM-

IV, DSM-IV-R, DSM-5, and ICD-10, or validated PTSD assessment tools that adhered to recognized thresholds. (3) Systematic review and meta-analysis or meta-analysis.

Exclusion Criteria: (1) Not written in English; (2) Systematic reviews with no quantitative analysis.

2.3 Study Selection

Two reviewers (T.N.T.H and N.D.T) independently read the studies and decided which to include in umbrella reviews based on the selection criteria established in the protocol. A third reviewer (V.H.T.H) was consulted if there was a discrepancy in data extraction between the two primary reviewers and a consensus regarding the information was needed. The application of the selection criteria was carried out in two phases. During Phase 1, the titles and abstracts of the articles were examined to assess their potential adherence to the selection criteria, as indicated by the available information. In Phase 2, the full texts of the articles that remained eligible after the initial phase were obtained. In cases where an article was not accessible online or through the library, efforts were made to contact the authors directly to request a copy. The articles were then read thoroughly to assess their compliance with the selection criteria.

We used STATA software to manage references and the excluded references by screening process were saved in Excel.

2.4 Quality Assessment and Data Extraction

T.N.T.H. and N.D.T performed a risk of bias assessment. The AMSTAR-2 (A Measurement Tool to Assess Systematic Reviews version 2) independently assessed the methodological quality of included meta-analyses [16]. AMSTAR-2 has 16 items, including seven critical domains and nine non-critical weaknesses. The overall confidence level for the evaluation results is divided into 4 levels: high (no or one non-critical weakness), moderate (more than one non-critical weakness), low (one critical flaw with or without non-critical weaknesses), and critically low (more than one critical flaw with or without non-critical weaknesses). The study reached critical low-quality assessment and would not be included in a meta-analysis [17]. V.H.T.H. resolved discrepancies through discussion with the two reviewers until a consensus was reached. The P.R.I.S.M.A. flowchart was used regularly to ensure a valid research strategy [18].

We extracted the following data from each eligible study: prevalence of PTSD, heterogeneity, subgroups analysis; first author, year of publication, sample size, number of studies, and type of the study.

2.5 Strategy for Data Synthesis

The prevalence in studies was collected based on the confidence interval, and then STATA (version 17.0) software was used for analysis [19]. A random-effects model was used to conduct a meta-analysis of the data. The level of heterogeneity was assessed using the I^2 Index and assigned one of the following values: <25% (none); 25-50% (moderate); 50-75% (high); and >75% (very high) [20]. We used Egger's test to assess publication bias in each systematic review ($p < 0.05$).

3. Results

3.1 Study Selection

Through searching databases with keywords, a total of 264 systematic reviews were found. After removing duplicate records, and screening the titles and abstracts, there were 32 relevant records to this umbrella review. After reading full-text articles by two independent reviewers, 11 records finally met the inclusion and exclusion criteria used to estimate post-traumatic stress disorder’s prevalence. The P.R.I.S.M.A. flowchart was used to summarize the screening and selecting studies processes [18] (Figure 1).

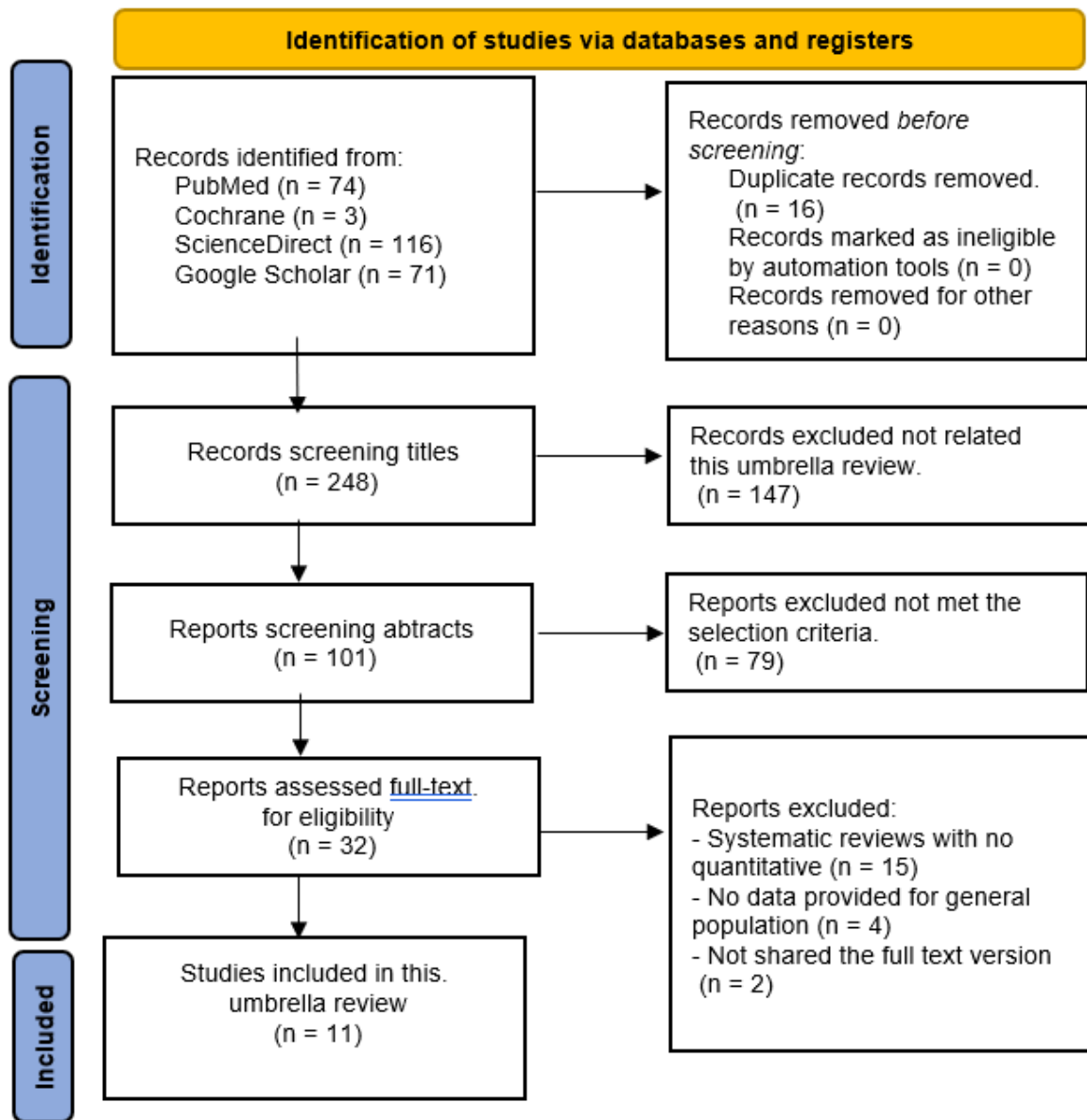


Figure 1 Meta-analysis selection process.

3.2 Prevalence of PTSD in the General Population

Table 2 illustrates the information and characteristics of the studies. The methodological quality of studies was based on AMSTAR 2, which showed that 50% of the studies were of moderate quality, 44.44% were of low quality, and 5.56% were of critically low quality (see Appendix). The studies were conducted in 2020 and 2021, with sample sizes ranging from 3015 individuals to 65278 individuals. The PTSD's prevalence in the general population in systematic reviews fluctuated between 15.0% and 27.1% (Table 1). Figure 2 shows the pooled of PTSD's prevalence among the general population during COVID-19. The heterogeneity among the researchers is reported at a 40.44% rate ($p = 0.18$) and classified as moderate (25-50%). The random effects model has been used to estimate that the PTSD prevalence in the general population was 19,34% (95% CI: 16.29-22.38; $I^2 = 40.44\%$; $p < 0.001$) (Figure 2). Egger's test analysis showed no publication bias among studies included in the meta-analysis with $p = 0.108$ (Figure 3).

Table 2 Specifications of studies included in the umbrella review.

Main Author (Year)	Study population	No. Studies	Effect	Total	PTSD's prevalence (95% CI)	Heterogeneity	Quality assessment
Yan-Jie Zhao [21] (2020)	General Population	5	1164	3015	19.2 (4.6-54.2)	$I^2 = 99.6\%$ $p = 0.63$	Moderate
Liqing Zhang [10] (2020)	General Population	12	6363	74656	15.0 (11.0-20.0)	$p < 0.001$	Low
J Mary Cénat [22] (2020)	General Population	9	8380	26253	22.4 (7.6-50.3)	$I^2 = 99.6\%$	Moderate
J Mary Cénat [23] (2021)	General Population	8	NA	11737	17.5 (14.1-20.9)	$I^2 = 79.2\%$ $p < 0.001$	Low
Dan Qiu [24] (2020)	General Population	39	22711	65278	27.1 (20.0-35.7)	$I^2 = 99.8\%$ $p = 0.928$	Moderate
Gayathri Delaneroll [25] (2022)	General Public	19	NA	19428	25.0 (18.2-34.5)	$I^2 = 99.6\%$	Low
Fang C. Fan [26] (2021)	General Public	18	NA	51721	15.7 (10.3-23.2)	$I^2 = 99.7\%$ $p < 0.001$	Low
Surapon Nochaiwong [27] (2021)	General population	28	18425	56447	24.1 (17.1-31.1)	$I^2 = 99.8\%$ $p < 0.001$	Critically low
Ninik Yunitri [28] (2021)	The population at large	36	20953	91890	17.3 (12.2-23.3)	$I^2 = 99.8\%$	Low
Peter Phiri [29] (2021)	The public	19	NA	NA	23.2 (10.5-35.9)	$I^2 = 99.9\%$ $p < 0.001$	Moderate
Jessica E. Cooke [30] (2020)	General population	8	NA	9232	23.9 (14.0-33.8)	$I^2 = 99.9\%$	Moderate

Abbreviations: Not available (NA).

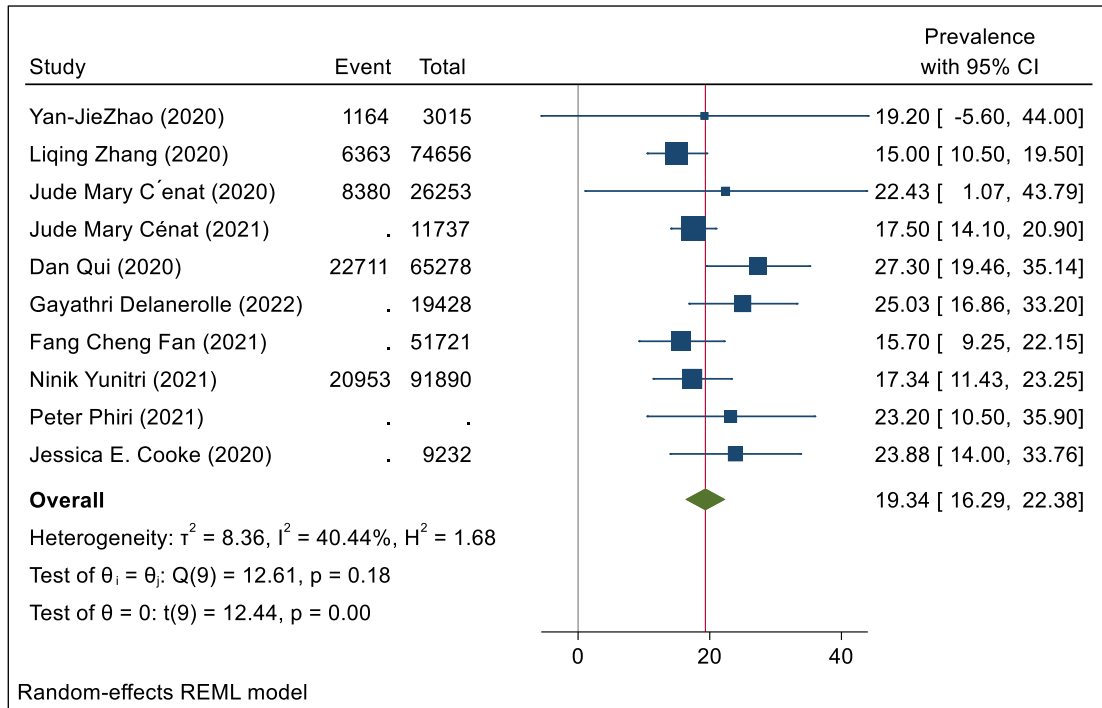


Figure 2 Forest plot of the pooled estimate of P.T.S.D.’s prevalence among the general population during COVID-19.

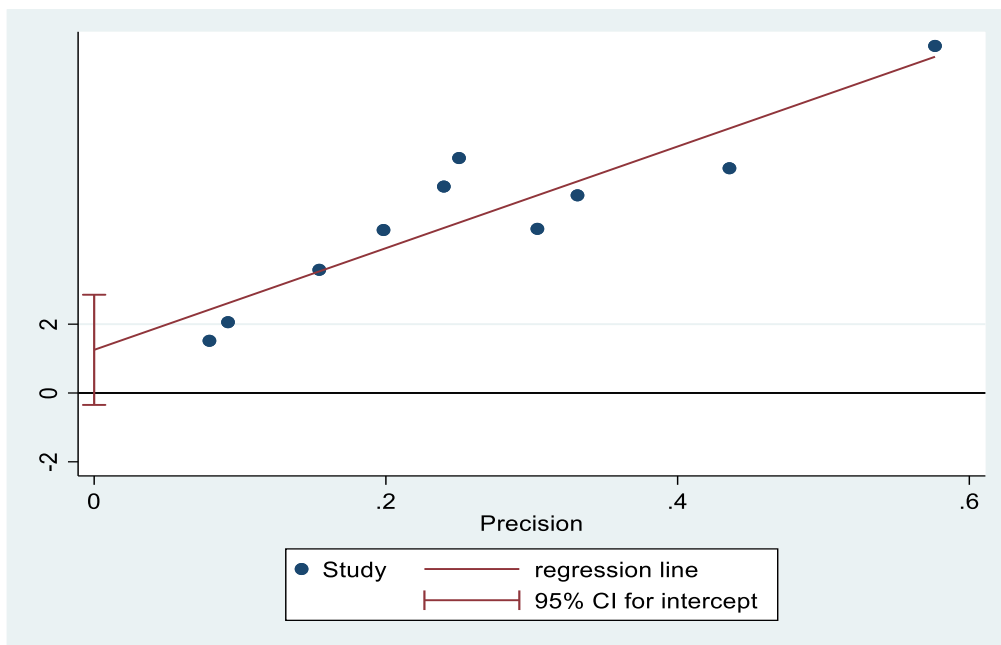


Figure 3 Publication bias based on Egger’s test.

3.3 Subgroups Analysis

Two systematic reviews reported the estimated proportion of PTSD according to specific regions, and these data were selected for this study for subgroup analysis. Figure 3 gives information about PTSD’s prevalence in the regional world WHO. The Americas is the highest prevalence of PTSD among the general population with a value of 27.75% (95% CI: 18.55-28.05; $I^2 = 88.41\%$; $p < 0.001$).

In contrast, the prevalence of PTSD in Europe and Southeast Asia appears to be relatively low 18.26% (95%: 8.96-25.57; $I^2 = 76.99\%$; $p = 0.04$) and 14.72% (95%: 7.67-21.77; $I^2 = 87.29\%$; $p = 0.01$) respectively. Although the forest plot indicates differences in PTSD rates across regions, these differences are not statistically significant ($p = 0.06$) (Figure 4). The prevalence of PTSD in the general population analyzed by subgroup using scales showed the highest rate when using PTSD Checklist-Civilian Version (PCL-C (16.00%; 95% CI: 11.52-20.49) (Figure 4). On the other hand, the lowest one was 12.14% (95% CI: 9.21-15.07) according to PTSD Checklist for DSM-5 (PCL-5). There was no statistically significant difference between the small subgroups across the survey tools ($p = 0.33$) (Figure 5).

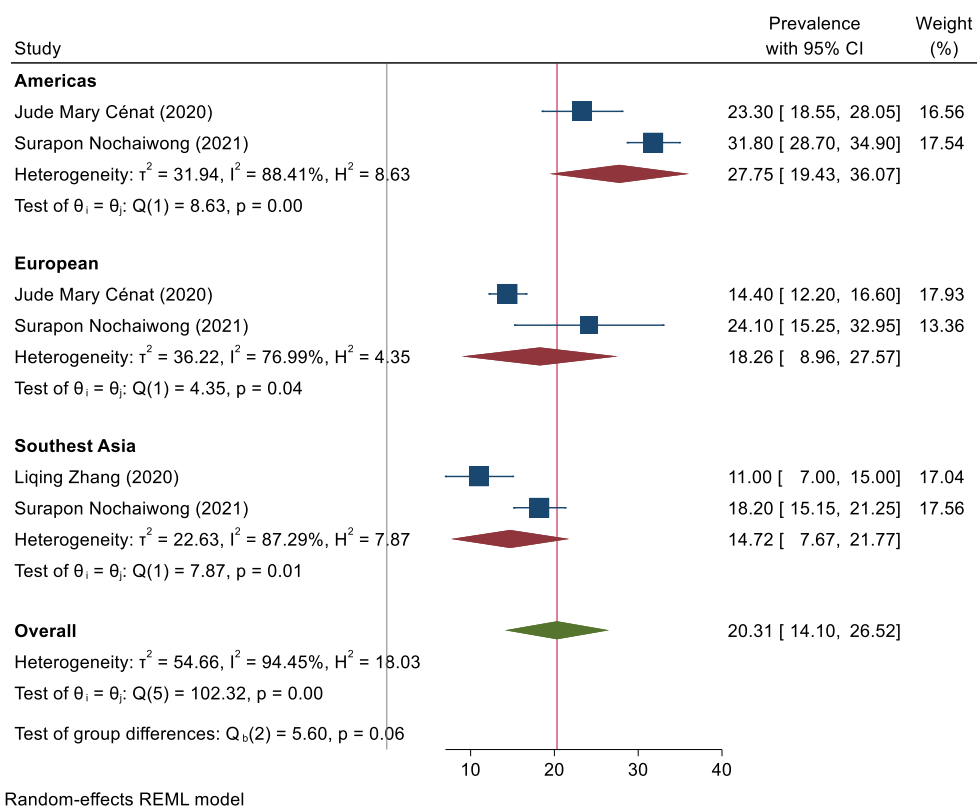


Figure 4 Forest plot of the pooled estimate of PTSD prevalence among the general population during COVID-19 by regions.

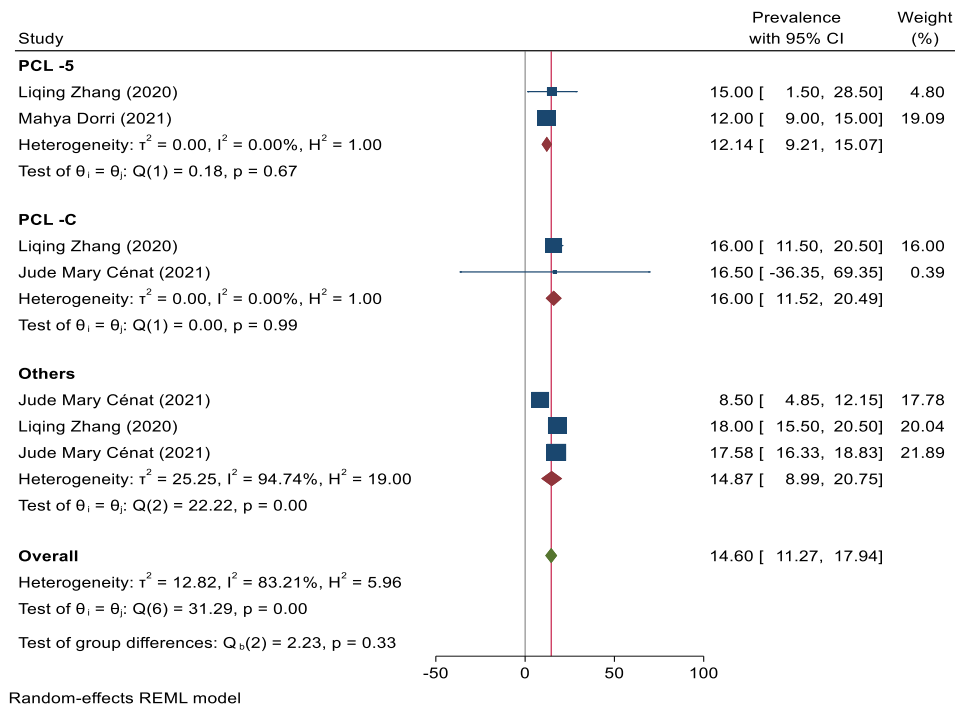


Figure 5 Forest plot of the pooled estimate of PTSD prevalence among the the general population during COVID-19 by scales.

4. Discussion

The estimated prevalence of post-traumatic stress disorder in the general population during the COVID-19 pandemic is 19.34%. The COVID-19 pandemic has significantly impacted the mental health of the population in general and post-traumatic stress in particular [5]. Previous systematic studies have shown the prevalence of post-traumatic stress in the general population to range from 7% to 53.8% [21]. A mental disorder study among the general population during the three pandemics, S.A.R., MERS, and COVID-19 showed that the prevalence of PTSD in the general population during the three pandemics was estimated to be 18% (95% CI: 14%-22%) [21], lower than the prevalence in our study. Compared with the umbrella review study on PTSD in healthcare workers, the estimated rate of PTSD recorded was 13.52% (95% CI: 9.06-17.98%, $p = 0.008$) [21]. The study by N. Yunitri et al. also showed that the prevalence of PTSD in the general population tends to be higher than that in healthcare workers [21]. Prolonged social distancing measures have led to changes in the general population’s daily habits and an increase in mental health disorders. Although not directly exposed to COVID-19 like healthcare workers, isolated individuals begin to have negative thoughts about issues such as their ability to transmit the disease, their future, and the economic situation of their families. In particular, vulnerable groups are at risk of anxiety, obsession, depression, and potential diagnosis of post-traumatic stress disorder (PTSD). The risk factors for the increased prevalence of PTSD in the general population are female, younger age group (≤ 40 years), chronic/mental illness, unemployment, student status, and frequent exposure to social media/news related to COVID-19 [4]. The unpredictable nature of the disease and its high infection rate, conflicting news, fear of infection, and restrictions imposed by governments [31], resulted in a higher prevalence of PTSD in the public than in healthcare workers. Meanwhile, a study

by Dan Qiu et al showed that PTSD rates in the general population were similar to those among healthcare workers [24].

Based on the subgroup analysis, we obtained some interesting results. However, we also found that the difference between the results of the subgroup analyses was not statistically significant. The Americas is the highest prevalence of PTSD among the general population with a value of 27.75% (95% CI:19.43-36.07%; $I^2 = 88.41\%$). The previous meta-analyses have shown that Asia has a lower prevalence of PTSD than Europe and the Americas [10, 28]. Another study has suggested no regional differences in PTSD rates, similar to ours [24]. During the pandemic, Asian countries immediately implemented strict disease prevention strategies such as wearing masks, social distancing, and controlling and isolating infected patterns [32]. Meanwhile, European and American countries had high infection rates due to the government and the public's delayed implementation of disease prevention measures [33]. Although the epidemic was more severe in the Americas and European countries, and the implementation of epidemic prevention measures in Asia seems more effective, the rate of PTSD is highly independent. It could be argued that the number of studies included in the pooled analysis is insufficient to conclude the appearance of differences. The PTSD scales used in the studies included in our meta-analysis were all validated and highly sensitive in detecting PTSD. The PTSD prevalence rate among the studies using different scales resulted in similar outcomes, approximately 14%. The different measurement scales used in research may lead to bias in the study results, although it has not been demonstrated in this study. Many authors also suggested no difference in prevalence rate among studies using different questionnaires [10, 24, 28]. However, it is recommended that studies use stress after-event measurement scales (such as IES-R, PCL-5/C) which will be more meaningful than self-reported scales. The results of our subgroup analysis did not show the difference between groups, possibly due to the insufficient number of studies included in the analysis, heterogeneity of studies, research methodology, and the quality of the studies.

4.1 Strengths and Limitations of This Review

Using a thorough and rigorous methodology, we established a current overview of database information on the worldwide prevalence of PTSD among the general population during the COVID-19 pandemic. The umbrella reviews search was thorough and included preprint reporting data and published peer-reviewed papers to present all pertinent literature, reduce bias, and provide the most recent data. Given the anticipated findings, research will help policymakers monitor and evaluate current mental health programs and strengthen advocacy efforts for mental health. We used a random-effects model to estimate the pooled data more cautiously to account for biases from various assessment measurement tools and societal norms across nations. We also performed subgroup analyses to assess the impact of various factors on our findings. Finally, the sensitivity analyses supported the major findings, indicating the validity of our results.

There were some limitations to this umbrella review and meta-analysis. First, the inability to access some studies' complete texts and the heterogeneity of the studies. Second, because not all of the included studies provided this information, it was not possible to conduct a subgroup analysis based on participant characteristics (such as sex, history of mental disease, and quarantine status).

5. Conclusions

In conclusion, this umbrella review and meta-analysis provide a comprehensive global perspective and evidence regarding the prevalence of PTSD within the general population during the COVID-19 pandemic. The results indicate a relatively high overall prevalence of 19.34% (95% CI: 16.29-22.38%). These findings underscore the significant burden of mental health issues and psychosocial impacts of the COVID-19 pandemic worldwide. It emphasizes the need for multidisciplinary approaches, improvement of screening systems, and preventive measures. Practical interventions such as offering mental health counseling, raising awareness about mental illness and prevention strategies, and utilizing social media platforms for outreach can effectively address these challenges.

The level of heterogeneity among the studies included in this review was moderate, and no publication bias was detected. Despite conducting several subgroup analyses, the findings did not clearly distinguish between the groups. This may be due to the limited number of studies available for analysis, the heterogeneity of the included studies, and variations in research methodologies. Therefore, further research is necessary to better understand the long-term impact of the COVID-19 pandemic on the mental health of the general population worldwide. Future studies could focus on subgroups such as age, sex, income, and history of mental disease. In addition, meta-regression can be regarded as an extension of traditional meta-analysis. The following step of the integrative method could help better comprehension of whether and which factors at the study level influence the measures of effect.

Author Contributions

Conceptualization, V.H.T.H; G.L.M; methodology, V.H.T.H; T.N.T.H; N.D.T; software, T.N.T.H; formal analysis, T.N.T.H; N.D.T; data curation, T.N.T.H; N.D.T; writing—original draft preparation, T.N.T.H; N.D.T; writing review and editing, V.H.T.H, G.L.M; visualization, T.N.T.H; N.D.T; supervision, V.H.T.H; G.L.M. All authors have read and agreed to the published version of the manuscript.

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Competing Interests

All authors declare that they have no conflict of interests.

Additional Materials

The following additional materials are uploaded at the page of this paper.

1. Appendix.

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