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Research Article

Keywords: Stress Disorders, Post-Traumatic, Disasters, Natural Disasters, Mental Health, Prevalence, Iran

Posted Date: October 1st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10910817/v1

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Additional Declarations: No competing interests reported.

Trauma- and Stressor-Related Disorders Following Community-Wide Disasters in Iran: A Systematic Review and Meta-Analysis

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Abstract

Background: Iran is highly vulnerable to natural and human-made disasters, including earthquakes, floods, and war-related events. Such community-wide disasters may lead to considerable psychological consequences, particularly post-traumatic stress disorder (PTSD). This systematic review and meta-analysis aimed to estimate the prevalence of trauma- and stressor-related disorders following community-wide disasters in Iran.

Methods: This study followed PRISMA guidelines and was registered in PROSPERO. PubMed, Scopus, ScienceDirect, Cochrane, and PsycINFO were searched for eligible studies published before January 2026. Studies were included if they assessed trauma- and stressor-related disorders among populations exposed to community-wide disasters in Iran. Random-effects meta-analysis was performed and subgroup analyses were conducted by time since exposure, disaster type, and age group where possible.

Results: Seventeen studies including 9,066 participants met the inclusion criteria. All included studies reported PTSD; no eligible study reported other trauma- and stressor-related disorders. The pooled prevalence of PTSD was 35.7% (95% CI: 28.2%–44.0%). PTSD prevalence was higher in short-term studies than in long-term studies (44.0% vs. 27.6%). By disaster type, the pooled prevalence was 44.7% following earthquakes, 30.7% following floods, and 24.2% following war-related exposures. Considerable heterogeneity was observed across analyses. Meta-regression did not identify time since exposure or disaster type as statistically significant moderators.

Conclusion: PTSD is common following community-wide disasters in Iran, particularly during the first year after exposure and after earthquakes. These findings support the integration of early screening, referral pathways, community-based mental-health services, and long-term

psychological follow-up into disaster preparedness and recovery programs in Iran. Future research should use longitudinal designs and assess trauma- and stressor-related disorders beyond PTSD.

Keywords: Stress Disorders, Post-Traumatic; Disasters; Natural Disasters; Mental Health; Prevalence; Iran

1. Introduction

While disasters are a common global phenomenon and affect populations worldwide, certain regions experience a disproportionately higher rate of natural and human-made disasters, resulting in a greater cumulative burden of social, economic, and psychological challenges that may persist long after the events took place(1, 2).

Iran, being among the ten countries that are most vulnerable to disasters globally, experiences more than 30 of the 40 recognized types of natural disasters within its borders. Among these tragic events, earthquakes and floods are more frequent and have historically resulted in considerable human, economic, and infrastructural losses(3). The traumatic impact of such events is demonstrated by the 2003 Bam earthquake, which claimed more than 40,000 lives, and the 2019 floods, which led to the destruction of approximately 65,000 houses(4-6).

Located within an arid and semi-arid climatic zone, Iran is highly vulnerable to environmental hazards such as dust and sand storms, and very prone to severe and extreme droughts(7, 8). Nevertheless, exposure to distress in Iran is not limited to natural disasters. The country has also experienced many human-made disasters, including the Iran–Iraq War (1980–1988) and the recent armed conflicts in 2025 and 2026(9-12). Such events have resulted not only in human and economic losses but also in lasting psychological consequences for affected populations(4, 13, 14).

Over the past two decades, an increasing number of studies have examined the psychological consequences of natural and human-made disasters. Evidence consistently shows that, in the short term, disaster exposure is associated with an increased prevalence of mental health problems, including post-traumatic stress disorder (PTSD), anxiety, depression, somatic symptoms, and nightmares. Notably, PTSD remains the most universally investigated form of psychopathology in the aftermath of disasters(2, 15-18). Studies further indicate that the burden of these psychological consequences is not distributed equally, with individuals from developing countries and those exposed to mass violence showing a greater vulnerability to poor mental health outcomes(19).

Therefore, the present study was conducted to systematically review the occurrence of trauma-related disorders following community-wide disasters in Iran. Specifically, this review examines the occurrence of these disorders across different regions of the country and across a wide range of natural and human-made disasters over time. By combining the available evidence, the study aims to identify factors associated with the development of trauma-related disorders and to give insights that may inform disaster preparedness, mental health interventions, and post-disaster management strategies.

2. Method

This study follows the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)(20) and is registered in the PROSPERO repository. (ID: CRD420261434335)

2.1. Eligibility

Eligible studies needed to include participants from the general population exposed to natural or human-made disasters. Studies conducted exclusively among professional groups involved in disaster response or recovery, including healthcare professionals, firefighters, rescue teams, and other first responders, were excluded. No age-related eligibility criteria were imposed, and both pediatric and adult populations were included in the review.

This systematic review and meta-analysis focuses on trauma- and stressor-related disorders following community-wide disasters in Iran. For the purpose of this review, disasters were defined as events affecting a whole community or population rather than isolated personal or individual traumatic experiences. Accordingly, studies examining the psychological consequences of community-wide disasters, including wars, earthquakes, floods, droughts, and other large-scale natural or man-made disasters, were eligible for inclusion. Studies addressing individual-level traumatic events, such as rape, assault, accidents, burns, isolated fire incidents, medical or health-related trauma, or other personal traumatic exposure, were excluded.

Studies were eligible if they reported the prevalence of trauma- and stressor-related disorders, including post-traumatic stress disorder (PTSD), acute stress disorder, adjustment disorder, or related symptoms assessed using validated diagnostic criteria or standardized assessment instruments. Studies were required to provide sufficient quantitative data to estimate the prevalence of trauma-related disorders or to calculate effect sizes.

No restrictions were imposed regarding the interval between disaster exposure and outcome assessment.

Only studies conducted among populations residing in Iran were included. Studies published in English or Persian were eligible for inclusion.

2.2. Search strategy and study selection

Utilizing search databases such as PubMed, Scopus, ScienceDirect, Cochrane, and PsycINFO, in collaboration with an expert research librarian, we conducted a search aiming to identify eligible studies published before January 2026. The literature search strategy and study selection procedure, and the terms used in our systematic search are illustrated in Table 1. The complete Boolean search strings for each database are provided in Supplementary Material 1.

The flowchart demonstrating the search process, including the steps taken to filter and select studies, is presented in Fig.1.

Table 1. The search strategy and keywords

Question	Keywords
Population: **Survivors of natural and human-made disasters in Iran, including those affected by earthquakes, floods, wars, and other large-scale disasters.**	Iran [Title/abstract] Iranian [Title/abstract]
Exposure: **Exposure to natural or human-made disasters.**	Disaster* [Title/abstract] [Mesh Terms] Crisis [Title/abstract] War [Title/abstract] Earthquake [Title/abstract] Flood [Title/abstract] Drought [Title/abstract] Storm [Title/abstract] Conflict [Title/abstract]
Outcome: **Incidence and prevalence of trauma- and stressor-related disorders, including post-traumatic stress disorder (PTSD), adjustment disorder, and other trauma-related psychological outcomes.**	Trauma-related disorder* [Title/abstract] Stressor-related disorder* [Title/abstract] Posttraumatic stress disorder [Title/abstract] Post-traumatic stress disorder [Title/abstract] PTSD [Title/abstract] Acute stress disorder [Title/abstract] Adjustment disorder [Title/abstract] Traumatic stress [Title/abstract] Mental health [Title/abstract]

The primary search was conducted by a librarian. After removing duplicated studies, the first and second authors assessed eligibility and continued the selection process, reviewing abstracts and full-texts. Disagreements were resolved through discussion and, when necessary, judgment by a third senior reviewer (corresponding author).

2.3. Data analysis

We performed the meta-analysis using Comprehensive Meta-Analysis Software, version 3(21). For each included study, the prevalence of any trauma and stressor-related disorder was calculated using the number of participants affected and the total sample size. When prevalence was reported as a percentage, the number of cases was derived from the reported prevalence and sample size, where necessary.

The pooled prevalence of trauma and stressor-related disorders was estimated with corresponding 95% confidence intervals. Because substantial methodological and clinical heterogeneity was expected across studies, including differences in disaster type, time elapsed since exposure, study population, sampling method, and PTSD assessment instrument, random-effects models were used as the primary method of analysis. Fixed-effect estimates were also calculated for comparison, but interpretation was based primarily on random-effects models.

Heterogeneity across studies was assessed using Cochran's Q statistic, the I^2 statistic, and the between-study variance estimate (τ^2). Given the expected diversity of disaster contexts and study designs, subgroup analyses were conducted where sufficient data were available.

Subgroup analyses were performed according to disaster type, including earthquake, flood, and war, and according to time elapsed since disaster exposure, categorized as short-term assessment within one year after the disaster and long-term assessment more than one year after the disaster. The one-year cutoff was an a priori operational epidemiological cutoff. It distinguishes studies conducted within the first post-disaster year from those assessing longer-term or more persistent PTSD symptoms. This is consistent with evidence that a substantial proportion of PTSD recovery occurs within the first year and that PTSD symptoms present at one year may indicate a more persistent course(22, 23). Where data allowed, further subgroup analyses were conducted by age group, including adult and pediatric/adolescent samples. Meta-regression analyses were also performed to explore whether time since exposure and disaster type were associated with differences in prevalence across studies.

2.4. **Risk of bias assessment**

Risk of bias was assessed using the Joanna Briggs Institute Critical Appraisal Checklist for Studies Reporting Prevalence Data(24, 25). The checklist includes nine items assessing the appropriateness of the sample frame, sampling method, sample size, description of study subjects and setting, coverage of data analysis, validity and reliability of outcome measurement, appropriateness of statistical analysis, and acceptability of response rate. Each item was rated as "yes," "no," "unclear," or "not applicable." For the purpose of summary classification, studies were categorized as low risk of bias if they scored 7–9, moderate risk if they scored 4–6, and high risk if they scored 0–3. Risk-of-bias assessment was performed independently by two reviewers (the first and second author), and disagreements were resolved through consultation with a third reviewer (corresponding author).

3. Results

3.1. Search characteristics

The database search yielded 1,558 potentially relevant records. After the removal of 94 duplicate studies, 1,464 records remained for title and abstract review. Following this primary screening, 1,425 studies were excluded, and 39 full-text articles were assessed for eligibility. Of these, 17 studies met the predefined inclusion criteria and were included in the systematic review and meta-analysis, including a total of 9,066 participants (see Fig. 1 and Supplementary Material 2).

All included studies investigated the prevalence of post-traumatic stress disorder (PTSD) among disaster survivors, whereas no other trauma- and stressor-related disorders were reported. Among the eligible studies, eight assessed short-term PTSD outcomes, while nine evaluated long-term PTSD outcomes. With respect to disaster type, nine studies examined PTSD following

earthquakes, five investigated war-related PTSD, and three focused on PTSD associated with flood-related disasters.

Detailed information about the studies can be found in Table 2.

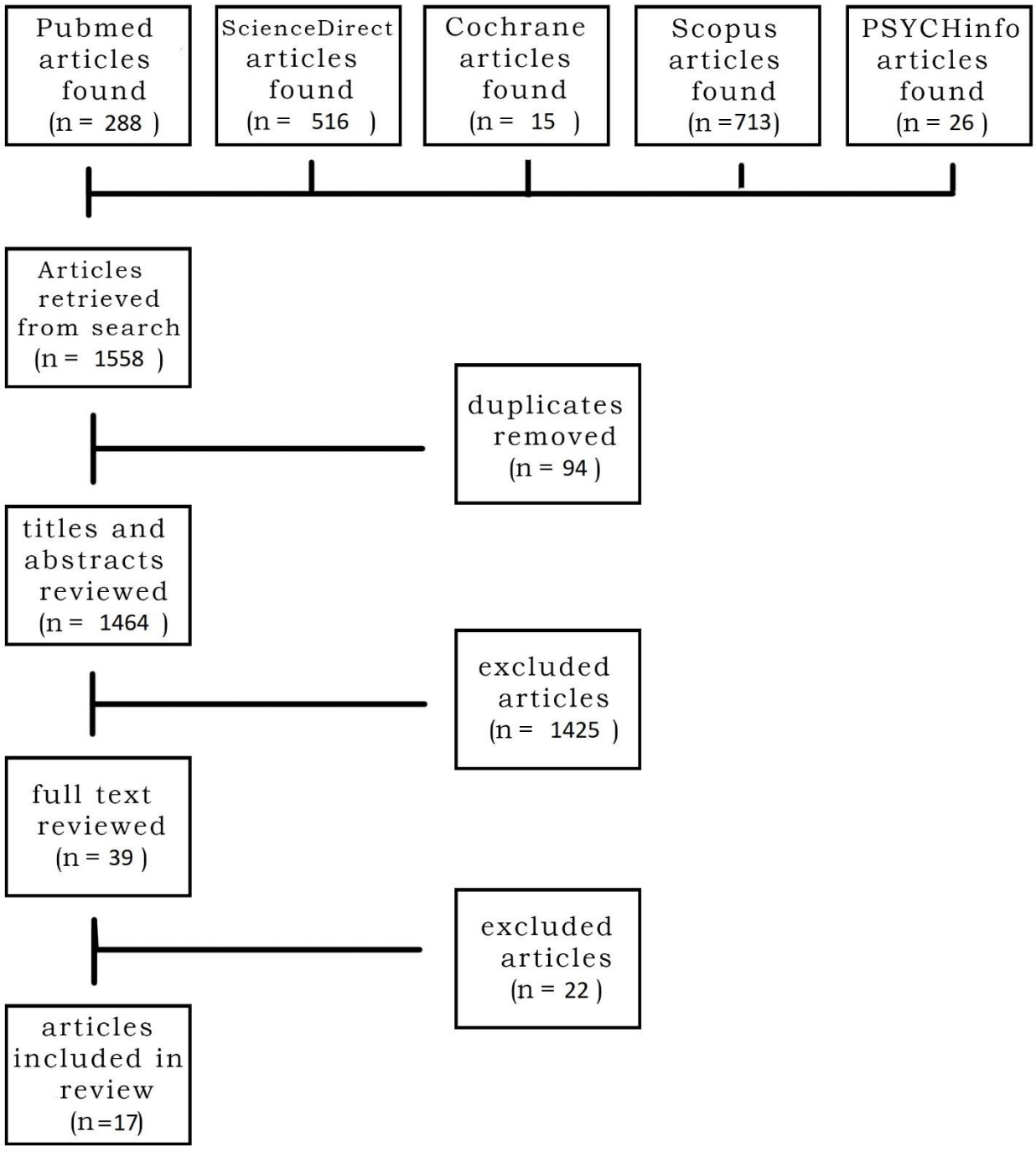


Fig 1. The Flow-chart of Studies

Table 2. Studies evaluating trauma and stressor-related disorders following community-wide disasters in Iran

First Author	Year	Year of event	Time since exposure	Total sample size	prevalence	population	Disaster
HaghShenas(26)	2006	2003	40-52 days after the event	154	0.807	adults	Earthquake (Bam)
Hashemian(27)	2006	1980-1988	16 years after the event	153	0.144	adults	War (Iran-Iraq)
Mousavi(28)	2006	2003	7-9 months after the event	284	0.451	adolescents	Earthquake (Bam)
Parvaresh(29)	2009	2003	4 months after the event	433	0.460	Children and adolescents	Earthquake (Bam)
Ziaaddini(30)	2009	2003	10 months after the event	466	0.667	adolescents	Earthquake (Bam)
Mohammadkhani(31)	2013	2003	10 months after the event	1000	0.200	adolescents	Earthquake (Bam)
Hemmati(32)	2015	1980-1988	27 years after the event	78	0.256	Children and adolescents	War (Iran-Iraq, landmine explosions)
Khateri(33)	2017	1980-1988	29 years after the event	350	0.329	adults	War (Iran-Iraq, sulfur mustard exposure)
Seyedin(34)	2017	2012	3 months after the event	380	0.640	adults	Flood (Neka and Behshahr)
Nobakht(35)	2019	2017	3-4 months after the event	255	0.487	Young adults	Earthquake (Kermanshah)
Rafiey(36)	2019	2012	3 years after the event	600	0.200	adults	Earthquake (Varzaghan)

Divsalar(37)	2020	2003	12 years after the event	1500	0.387	adults	Earthquake (Bam)
Rostamizadeh(13)	2020	1980-1988	31 years after the event	227	0.163	adults	War (Iran-Iraq, Bombardment)
Abdolhadi(38)	2022	2003	17 years after the event	800	0.434	Children, adolescents and adults	Earthquake (Bam)
Bastami(39)	2024	2019	Within one year after the event	470	0.128	adults	Flood (2019 flooding)
Masoudnia(40)	2024	1980-1988	36 years after the event	245	0.351	Children, adolescents and adults	War (Iran-Iraq)
Shabani(41)	2024	2019	4-5 months after the event	1671	0.248	adults	Flood (2019 flooding)

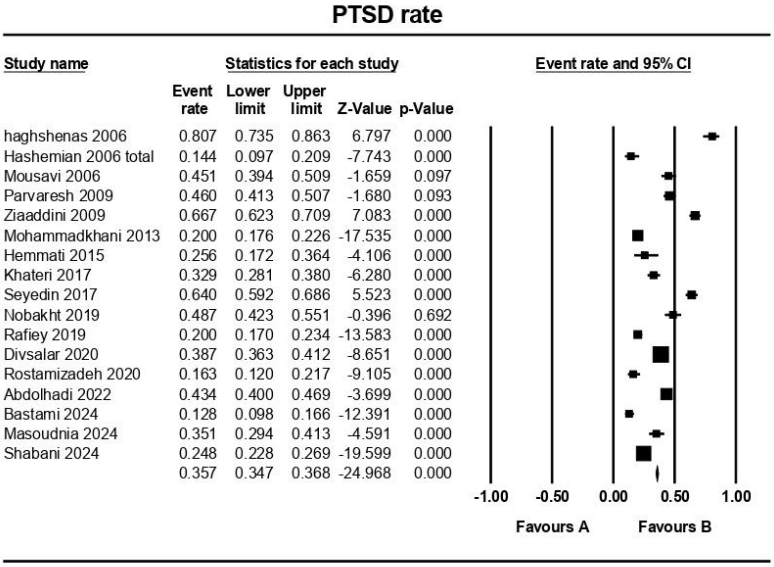
3.2. Overall pooled prevalence of PTSD

Seventeen studies were included in the overall meta-analysis of PTSD following community-wide disasters in Iran. This analysis included all eligible studies regardless of disaster type, participants' age group, and time elapsed since disaster exposure.

The pooled prevalence of PTSD using the random-effects model was 35.7% (95% CI: 28.2%–44.0%). The corresponding fixed-effect estimate was 35.7% (95% CI: 34.7%–36.8%). Individual study estimates ranged from 12.8% to 80.7%.

Considerable heterogeneity was observed across the included studies, $Q(16) = 847.635$, $p < 0.001$, $I^2 = 98.112\%$, with an estimated between-study variance of $\tau^2 = 0.514$. Given the considerable heterogeneity between studies, the random-effects model was used as the primary estimate for interpretation.

The forest plot illustrating the pooled prevalence of PTSD analyses is shown in Fig.2.



Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	17	0.357	0.347	0.368	-24.968	0.000	847.635	16	0.000	98.112	0.514
Random effects	17	0.357	0.282	0.440	-3.311	0.001					

Fig 2. The forest plot of analyses of the Overall pooled prevalence of PTSD

3.3. Subgroup analysis

3.3.1. Time since exposure

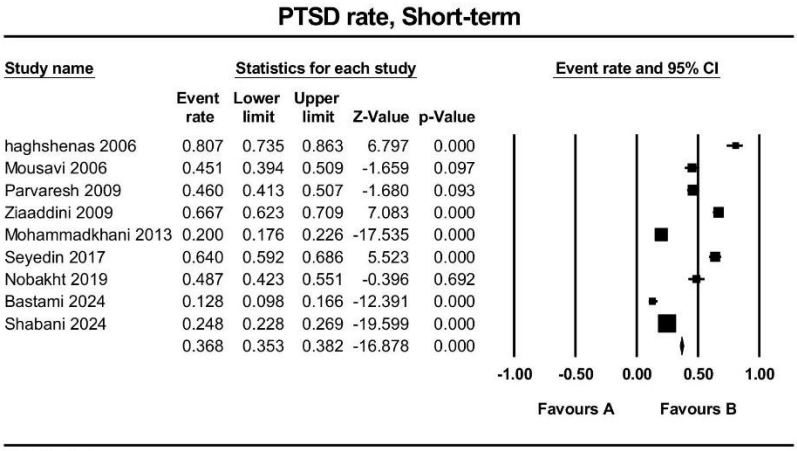
3.3.1.1. Pooled prevalence of PTSD in short-term studies

Nine studies assessed PTSD within one year after exposure to community-wide disasters. This subgroup included studies across different disaster types and age groups, but was restricted to short-term post-disaster assessments.

Using the random-effects model, the pooled prevalence of PTSD in short-term studies was 44.0% (95% CI: 29.9%–59.1%). The corresponding fixed-effect estimate was 36.8% (95% CI: 35.3%–38.2%). Individual study estimates ranged from 12.8% to 80.7%.

Considerable heterogeneity was observed among the studies, Q(8) = 692.897, p < 0.001, I^2 = 98.845%, with an estimated between-study variance of τ^2 = 0.859. Therefore, the random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in short-term studies analyses is shown in Fig.3.



Meta Analysis

Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	9	0.368	0.353	0.382	-16.878	0.000	692.897	8	0.000	98.845	0.859
Random effects	9	0.440	0.299	0.591	-0.775	0.438					

Fig 3. The forest plot of analyses of the pooled prevalence of PTSD in short-term studies

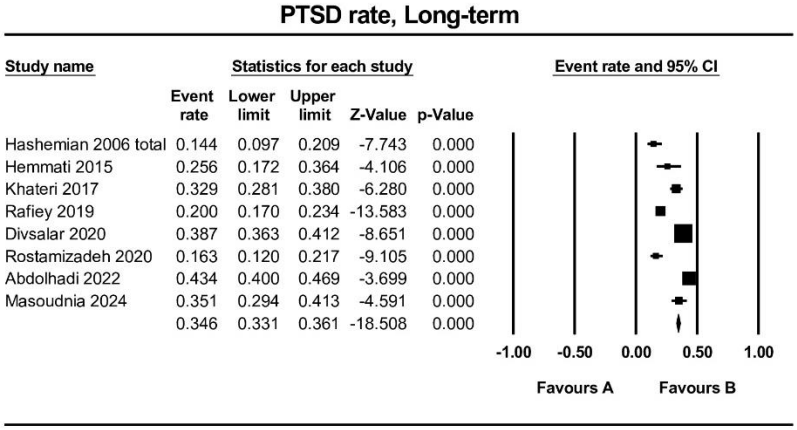
3.3.1.2. Pooled prevalence of PTSD in long-term studies

Eight studies assessed PTSD more than one year after exposure to community-wide disasters. This subgroup included studies across different disaster types and age groups, but was restricted to long-term post-disaster assessments.

Using the random-effects model, the pooled prevalence of PTSD in long-term studies was 27.6% (95% CI: 21.2%–35.1%). The corresponding fixed-effect estimate was 34.6% (95% CI: 33.1%–36.1%). Individual study estimates ranged from 14.4% to 43.4%.

Substantial heterogeneity was observed among the long-term studies, Q(7) = 150.697, p < 0.001, I^2 = 95.355%, with an estimated between-study variance of τ^2 = 0.230. Therefore, the random-effects model was used as the primary estimate for interpreting this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in long-term studies analyses is shown in Fig.4.



Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	8	0.346	0.331	0.361	-18.508	0.000	150.697	7	0.000	95.355	0.230
Random effects	8	0.276	0.212	0.351	-5.412	0.000					

Fig 4. The forest plot of analyses of the pooled prevalence of PTSD in long-term studies

3.3.2. Disaster type

3.3.2.1. Earthquake

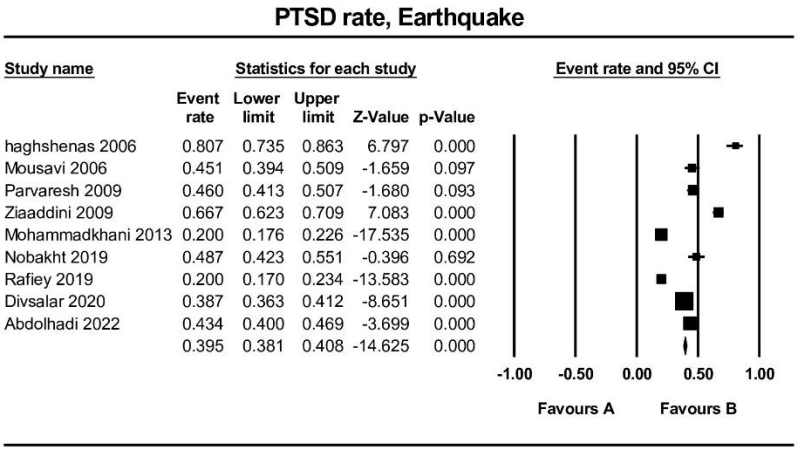
3.3.2.1.1. Pooled prevalence of PTSD following earthquakes

Nine studies were included in the subgroup meta-analysis of PTSD following earthquakes. This analysis included earthquake-related studies regardless of participants' age group and time elapsed since disaster exposure.

Using the random-effects model, the pooled prevalence of PTSD following earthquakes was 44.7% (95% CI: 33.9%–56.1%). The corresponding fixed-effect estimate was 39.5% (95% CI: 38.1%–40.8%). Individual study estimates ranged from 20.0% to 80.7%.

Considerable heterogeneity was observed among the studies, $Q(8) = 468.694$, $p < 0.001$, $I^2 = 98.293\%$, with an estimated between-study variance of $\tau^2 = 0.475$. Therefore, the random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD following earthquakes analyses is shown in Fig.5.



Model	Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	9	0.395	0.381	0.408	-14.625	0.000	468.694	8	0.000	98.293	0.475
Random effects	9	0.447	0.339	0.561	-0.909	0.363					

Fig 5. The forest plot of analyses of the pooled prevalence of PTSD following earthquakes

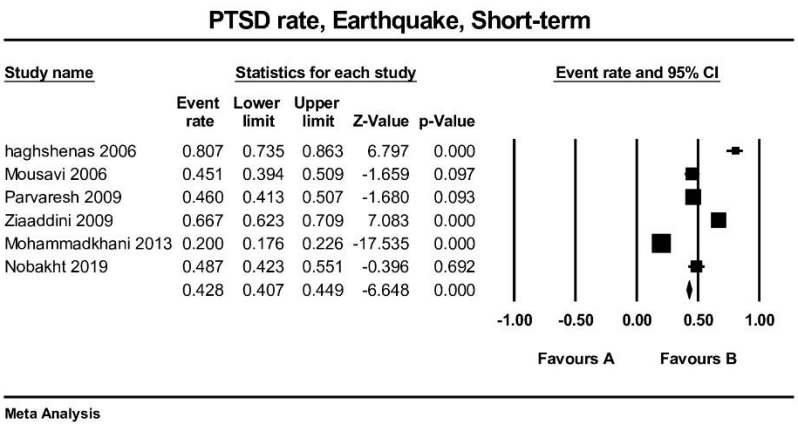
3.3.2.1.2. Pooled prevalence of PTSD in short-term earthquake studies

Six studies were included in the subgroup meta-analysis of PTSD following earthquakes within one year after disaster exposure. This analysis included all age groups.

Using the random-effects model, the pooled prevalence of PTSD in short-term earthquake studies was 51.1% (95% CI: 33.0%–69.0%). The corresponding fixed-effect estimate was 42.8% (95% CI: 40.7%–44.9%). Individual study estimates ranged from 20.0% to 80.7%.

Substantial heterogeneity was observed across the included studies, $Q(5) = 365.386$, $p < 0.001$, $I^2 = 98.632\%$, with an estimated between-study variance of $\tau^2 = 0.873$. Therefore, the random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in short-term earthquake studies analyses is shown in Fig.6.



Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	6	0.428	0.407	0.449	-6.648	0.000	365.386	5	0.000	98.632	0.873
Random effects	6	0.511	0.330	0.690	0.118	0.906					

Fig 6. The forest plot of analyses of the pooled prevalence of PTSD in short-term earthquake studies

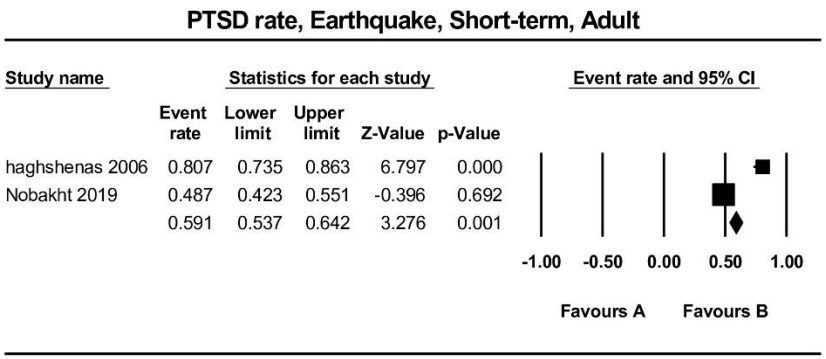
3.3.2.1.3. Pooled prevalence of PTSD in short-term earthquake studies among adults

Two studies were included in the subgroup meta-analysis of PTSD among adults exposed to earthquakes within one year after disaster exposure.

Using the random-effects model, the pooled prevalence of PTSD was 66.4% (95% CI: 31.6%–89.4%). The corresponding fixed-effect estimate was 59.1% (95% CI: 53.7%–64.2%). Individual study estimates ranged from 48.7% to 80.7%.

Substantial heterogeneity was observed between the included studies, $Q(1) = 35.625$, $p < 0.001$, $I^2 = 97.193\%$, with an estimated between-study variance of $\tau^2 = 1.068$. The random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in short-term earthquake studies among adults analyses is shown in Fig.7.



Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	2	0.591	0.537	0.642	3.276	0.001	35.625	1	0.000	97.193	1.068
Random effects	2	0.664	0.316	0.894	0.917	0.359					

Fig 7. The forest plot of analyses of the pooled prevalence of PTSD in short-term earthquake studies among adults

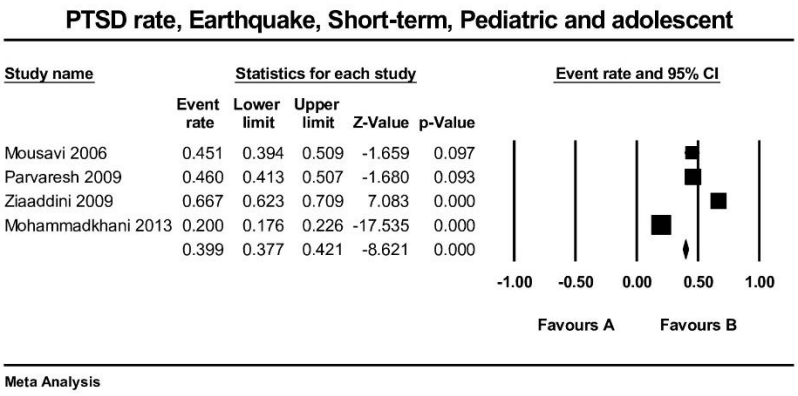
3.3.2.1.4. Pooled prevalence of PTSD in short-term earthquake studies among children and adolescents

Four studies were included in the subgroup meta-analysis of PTSD among children and adolescents under 18 years of age who were exposed to earthquakes within one year after disaster exposure.

Using the random-effects model, the pooled prevalence of PTSD was 43.4% (95% CI: 23.3%–66.0%). The corresponding fixed-effect estimate was 39.9% (95% CI: 37.7%–42.1%). Individual study estimates ranged from 20.0% to 66.7%.

Substantial heterogeneity was observed across the included studies, $Q(3) = 288.904$, $p < 0.001$, $I^2 = 98.962\%$, with an estimated between-study variance of $\tau^2 = 0.889$. The random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in short-term earthquake studies among children and adolescents analyses is shown in Fig.8.



Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	4	0.399	0.377	0.421	-8.621	0.000	288.904	3	0.000	98.962	0.889
Random effects	4	0.434	0.233	0.660	-0.556	0.578					

Fig 8. The forest plot of analyses of the pooled prevalence of PTSD in short-term earthquake studies among children and adolescents

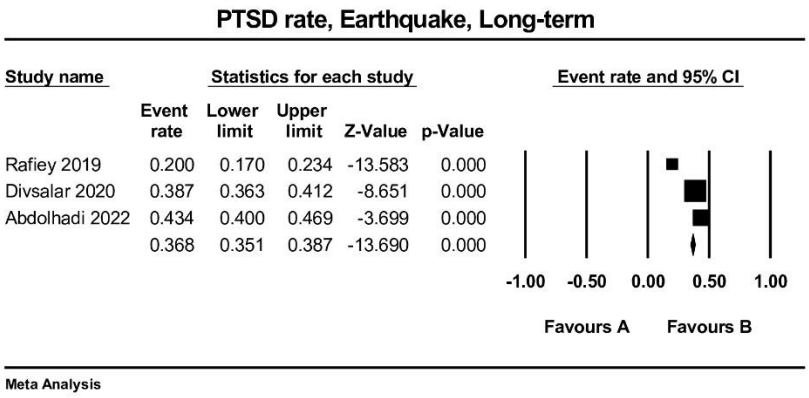
3.3.2.1.5. Pooled prevalence of PTSD in long-term earthquake studies

Three studies were included in the subgroup meta-analysis of PTSD among adults exposed to earthquakes more than one year after disaster exposure. No eligible long-term earthquake studies were identified among children and adolescents.

Using the random-effects model, the pooled prevalence of PTSD was 33.2% (95% CI: 22.5%–46.1%). The corresponding fixed-effect estimate was 36.8% (95% CI: 35.1%–38.7%). Individual study estimates ranged from 20.0% to 43.4%.

Substantial heterogeneity was observed across the included studies, $Q(2) = 85.592$, $p < 0.001$, $I^2 = 97.663\%$, with an estimated between-study variance of $\tau^2 = 0.222$. The random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD in long-term studies among adults analyses is shown in Fig.9.



Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	3	0.368	0.351	0.387	-13.690	0.000	85.592	2	0.000	97.663	0.222
Random effects	3	0.332	0.225	0.461	-2.530	0.011					

Fig 9. The forest plot of analyses of the pooled prevalence of PTSD in long-term earthquake studies

3.3.2.2. Flood

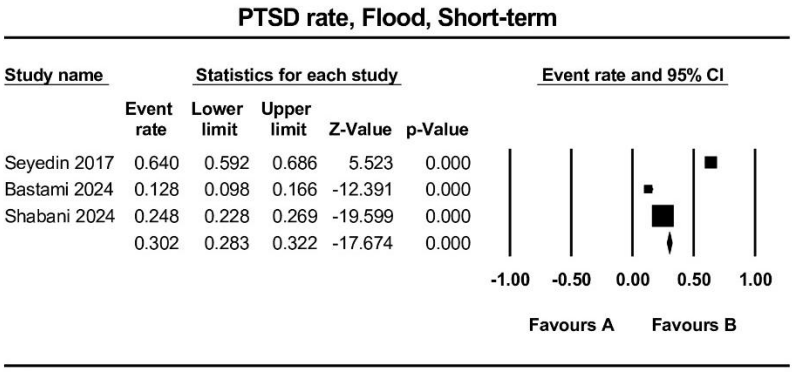
3.3.2.2.1. Pooled prevalence of PTSD following floods

Three studies were included in the subgroup meta-analysis of PTSD following floods. All flood-related studies assessed adult populations within one year after disaster exposure; therefore, no additional subgroup analyses by age group or follow-up period were possible for flood studies.

Using the random-effects model, the pooled prevalence of PTSD following floods was 30.7% (95% CI: 11.1%–61.1%). The corresponding fixed-effect estimate was 30.2% (95% CI: 28.3%–32.2%). Individual study estimates ranged from 12.8% to 64.0%.

Substantial heterogeneity was observed across the included studies, $Q(2) = 255.838$, $p < 0.001$, $I^2 = 99.218\%$, with an estimated between-study variance of $\tau^2 = 1.240$. The random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD analyses following floods is shown in Fig.10.



Model		Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	3	0.302	0.283	0.322	-17.674	0.000	255.838	2	0.000	99.218	1.240
Random effects	3	0.307	0.111	0.611	-1.259	0.208					

Fig 10. The forest plot of analyses of the pooled prevalence of PTSD following floods

3.3.2.3. War

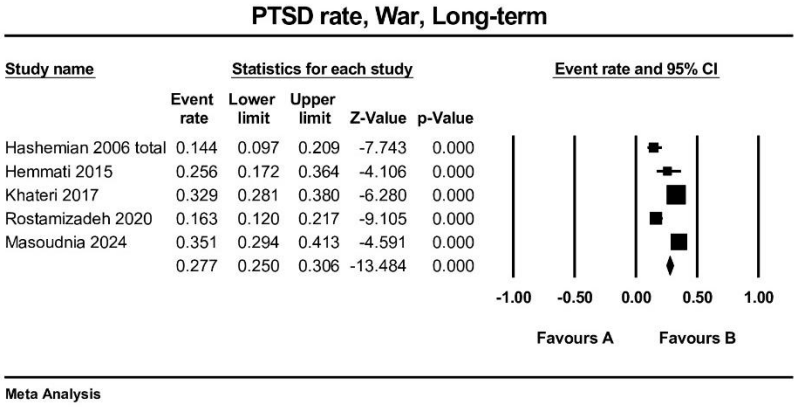
3.3.2.3.1. Pooled prevalence of PTSD following war

Five studies were included in the subgroup meta-analysis of PTSD following war-related community-wide exposure. All included war-related studies assessed PTSD more than one year after exposure. One study was conducted among adolescents, while the remaining studies were conducted among adults or mixed populations; therefore, a single pooled analysis was performed.

Using the random-effects model, the pooled prevalence of PTSD following war was 24.2% (95% CI: 16.8%–33.5%). The corresponding fixed-effect estimate was 27.7% (95% CI: 25.0%–30.6%). Individual study estimates ranged from 14.4% to 35.1%.

Considerable heterogeneity was observed across the included studies, $Q(4) = 38.422$, $p < 0.001$, $I^2 = 89.589\%$, with an estimated between-study variance of $\tau^2 = 0.239$. The random-effects estimate was used as the primary pooled estimate for this subgroup.

The forest plot illustrating the pooled prevalence of PTSD following wars analyses is shown in Fig.11.



Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-square
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared
Fixed	5	0.277	0.250	0.306	-13.484	0.000	38.422	4	0.000	89.589	0.239
Random effects	5	0.242	0.168	0.335	-4.881	0.000					

Fig 11. The forest plot of analyses of the pooled prevalence of PTSD following wars

3.4. Meta-regression

3.4.1. Time since disaster

A univariable random-effects meta-regression was conducted to examine whether time since disaster exposure was associated with PTSD prevalence. Time since disaster was entered as a categorical moderator comparing short-term studies, defined as assessments within one year after disaster exposure, with long-term studies, defined as assessments more than one year after disaster exposure.

The meta-regression showed a positive association between short-term assessment and PTSD prevalence on the logit event-rate scale; however, this association did not reach statistical significance, $\beta = 0.7350$, SE = 0.3773, 95% CI: -0.0044 to 1.4745, $Z = 1.95$, $p = 0.0514$. The overall test of the moderator was also not statistically significant, $Q = 3.80$, $df = 1$, $p = 0.0514$.

Substantial residual heterogeneity remained after including time since disaster in the model, $\tau^2 = 0.5827$, $I^2 = 98.22\%$, $Q = 843.59$, $df = 15$, $p < 0.001$. The R^2 analogue was 0.00, indicating that time since disaster did not explain a meaningful proportion of the between-study heterogeneity.

Supplementary Material 3 represents the meta-regression analysis of time since disaster exposure and PTSD prevalence

3.4.2. Disaster type

A univariable random-effects meta-regression was conducted to examine whether disaster type was associated with PTSD prevalence. Earthquake studies were used as the reference category, and war and flood were entered as dummy-coded covariates.

The overall test of the model did not show a statistically significant association between disaster type and PTSD prevalence, $Q(2) = 5.12$, $p = 0.0772$. Compared with earthquake studies, war-related studies showed a significantly lower PTSD prevalence on the logit event-rate scale, $\beta = -0.9444$, $SE = 0.4306$, 95% CI: -1.7884 to -0.1004, $Z = -2.19$, $p = 0.0283$. Flood-related studies also showed a lower coefficient compared with earthquake studies, but this difference was not statistically significant, $\beta = -0.6006$, $SE = 0.5081$, 95% CI: -1.5964 to 0.3953, $Z = -1.18$, $p = 0.2372$.

Substantial residual heterogeneity remained after including disaster type in the model, $\tau^2 = 0.5682$, $I^2 = 98.17\%$, $Q(14) = 762.95$, $p < 0.001$. The R^2 analogue was 0.00, indicating that disaster type did not explain a meaningful proportion of the between-study heterogeneity.

Supplementary Material 4 represents the meta-regression analysis of disaster type and PTSD prevalence.

3.5.Risk of bias assessment

The risk of bias assessment of the 17 included studies is presented in Table 3. Overall, 13 studies were classified as having low risk of bias and four studies as having moderate risk of bias. None of the included studies was classified as having high risk of bias.

Table 3. The risk of bias assessment of the included studies

Study	Q1. Appropriate sample frame	Q2. Appropriate sampling method	Q3. Adequate sample size	Q4. Subjects and setting described	Q5. Sufficient data coverage	Q6. Valid method for PTSD identification	Q7. Standard and reliable measurement	Q8. Appropriate statistical analysis	Q9. Adequate response rate	Total score	Overall risk of bias
Hagh-Shenas et al., 2006	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Unclear	7/9	Low
Hashemian et al., 2006	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9/9	Low
Mousavi et al., 2006	Unclear	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Unclear	5/9	Moderate
Parvaresh et al., 2009	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Unclear	6/9	Moderate
Ziaaddini et al., 2009	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9/9	Low
Mohammadkhani et al., 2013	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear	7/9	Low
Hemmati et al., 2015	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	7/9	Low

Khateri et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9/9	Low
Seyedin et al., 2017	Yes	Yes	Yes	Yes	Yes	Unclear	Unclear	Yes	Yes	7/9	Low
Nobakht et al., 2019	Unclear	No	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	6/9	Moderate
Rafiey et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9/9	Low
Divsalar et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	8/9	Low
Rostamizadeh et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	8/9	Low
Abdolhadi et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	8/9	Low
Bastami et al., 2024	Unclear	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear	6/9	Moderate
Masoudnia et al., 2024	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	7/9	Low
Shabani et al., 2024	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9/9	Low

4. Discussion

This systematic review and meta-analysis evaluated the prevalence of PTSD following community-wide disasters in Iran, including earthquakes, floods, and war. Unlike previous studies that evaluated a wide range of traumatic exposures, the present study exclusively examined collective disasters affecting communities rather than individual traumatic events. Across 17 included studies, the overall pooled prevalence of PTSD was 35.7% using a random-effects model. This finding indicates a significant burden of PTSD among populations exposed to community-wide disasters in Iran.

In general, the overall prevalence observed in this study is consistent with previous Iranian and international evidence, although differences in scope should be considered. Two previous meta-analyses are the most relevant for comparison with the present study. The first is the recent meta-analysis by Imani et al. (2024)(14), which examined the epidemiology of PTSD in Iran from 2019 to 2024 and reported an overall pooled prevalence of 31.87%. Although that review was not limited to community-wide disasters, its estimate is close to the pooled prevalence found in the present study. The slightly higher prevalence in the present review can be explained by its narrower focus on community-wide disasters, including survivors of earthquakes, floods, and war, rather than the individual traumas.

The second relevant review is the meta-analysis by Sepahvand et al. (2019)(4), which reported higher PTSD prevalence estimates for war and earthquake-related exposures in Iran than those observed in the present study. This difference may be partly due to the search periods of the two reviews. Sepahvand et al. was published before several recent studies became available, while the present review included studies published from 2019 onward, which may have caused lower and more stable pooled prevalence estimates.

Differences in search strategy and database coverage may also have affected the included studies. Sepahvand et al. searched a wider range of sources, including Iranian databases and local journals, while the present review was restricted to major international databases. Wider database coverage can increase the inclusion of national literature, but it can also cause greater variation in study design, sampling methods, reporting standards, study quality, and risk-of-bias profiles. Therefore, the lower pooled estimates in the present study should not be interpreted as directly contradicting previous evidence, but rather as differences in publication period, database coverage, eligibility criteria, and methodological characteristics of the included studies.

One of the important variations evaluated in the present study is the time since disaster exposure. The pooled PTSD prevalence was higher in short-term studies (defined as assessments within one year after disaster exposure) than in long-term studies (defined as assessments more than one year after exposure). The pooled prevalence was 44.0% in short-term studies and 27.6% in long-term studies. This pattern is consistent with the previous PTSD studies evaluating the effect of time on symptoms and particularly earthquake-related reviews, where PTSD prevalence decreased as the time interval between the disaster and assessment increased(42-44). However, in the present study, meta-regression showed only a borderline, non-significant association between time since disaster and PTSD prevalence. Therefore, the difference between short- and long-term estimates should be interpreted as clinically meaningful but not statistically confirmed by meta-regression.

Among disaster types, earthquake-related studies showed the highest pooled prevalence of PTSD. The pooled prevalence following earthquakes was 44.7% among all age groups and follow-up periods. In short-term earthquake studies, the prevalence increased to 51.1%, suggesting that earthquakes may have a particularly high early psychological burden. This finding is broadly consistent with previous evidence from Iran and Pakistan, where Hosseinnejad et al.(43) reported a pooled PTSD prevalence of 60.2% among Iranian earthquake survivors. The estimates reported internationally showed a lower pooled PTSD incidence (23.66%)(42), suggesting that PTSD prevalence after earthquakes may be higher among Iranians than in many global reports. This may reflect the severity of major Iranian earthquakes, particularly the Bam earthquake, as well as differences in exposure intensity, loss, displacement, recovery resources, and assessment methods.

Age-specific findings in earthquake studies showed a high PTSD burden in both adults and younger populations. In short-term earthquake studies, the pooled prevalence was 66.4% among adults and 43.4% among children and adolescents. Although the adult estimate was higher, it was based on only two studies and had a wide confidence interval, so it should be interpreted cautiously. These findings emphasize that both adults and younger survivors require systematic post-disaster mental-health screening and enough recovery resources. Future Iranian studies should include specific data across all ages to clarify whether age modifies PTSD risk after disasters.

The pooled prevalence of PTSD following floods was 30.7%. All flood studies included in the present review were short-term adult studies, so further subgroup analyses by time or age were not possible. This estimate is very close to the global flood meta-analysis by Golitaleb et al.(45) which reported a pooled PTSD prevalence of 29.48% among flood victims. The similarity between the present estimate and the global flood literature strengthens the credibility of the flood-related finding.

War-related studies showed the lowest pooled prevalence among the disaster subgroups, with a pooled PTSD prevalence of 24.2%. This estimate should not be interpreted as evidence that war is less psychologically harmful than earthquakes or floods. All war-related studies in the present study were long-term assessments, and most were conducted among adults, with only one adolescent study. Therefore, the lower pooled estimate may partly reflect the longer time since exposure rather than the type of disaster itself. This issue was also reflected in the meta-regression analysis. Although war-related studies showed significantly lower PTSD prevalence than earthquake studies in the dummy-coded comparison, the overall disaster-type moderator test was not statistically significant, and disaster type was partly confounded by time since exposure. Therefore, the apparent difference between war and earthquake studies should be interpreted cautiously.

Significant heterogeneity was observed across most analyses. This was expected because the included studies were broadly different in disaster type, time since exposure, age group, study population, sample selection, geographical setting, and PTSD assessment methods. Differences in exposure severity may also cause part of the heterogeneity. For example, survivors may differ in bereavement, injury, house destruction, displacement, loss of livelihood, witnessing death, and access to post-disaster support. Previous meta-analyses have similarly reported very high heterogeneity in PTSD prevalence following earthquakes, wars and floods, indicating that

heterogeneity is common in disaster mental-health research rather than unique to the present study(4, 14, 42, 45).

The high heterogeneity has important implications for interpretation. The overall pooled prevalence should not be interpreted as a single fixed estimate that explains PTSD in all disaster-affected populations in Iran. Rather, it should be interpreted as an overall summary of PTSD burden across diverse disaster contexts. The subgroup analyses provide more clinically meaningful estimates by separating studies according to disaster type, timing of assessment, and age group, where possible.

The findings have practical implications for disaster mental-health policy in Iran. First, PTSD screening should be integrated into disaster response systems, especially in the first year after all community-wide disasters. Second, long-term follow-up is necessary because PTSD remains present in a significant proportion of survivors more than one year after exposure. Third, Similar to assessments, mental-health services should not be limited to the immediate aftermath of disasters; they should continue during the reconstruction and recovery period. Finally, future disaster preparedness programs in Iran should include psychological first aid, referral pathways, community-based mental-health services, and targeted support for high-risk groups such as bereaved survivors, displaced families, injured survivors, women, children, and those with severe property loss.

The risk-of-bias assessment showed that the overall methodological quality of the included studies was acceptable. None of the studies was judged to have a high risk of bias, and all studies were classified as low or moderate risk. Overall, the absence of high-risk studies increases the confidence in the findings, but the moderate risk of bias in four of the studies highlights the need for cautious interpretation. Future studies in Iran should use clearly defined sampling frames, probability-based sampling methods, reasonable sample-size justification, transparent response-rate reporting, and validated PTSD measures, preferably combined with clinical diagnostic assessment where possible.

This review has several limitations. First, considerable heterogeneity was observed across the included studies, limiting the precision and generalization of pooled estimates. Second, the distribution of studies across subgroups was uneven. All flood studies were short-term adult studies, while all war-related studies were long-term studies. Therefore, the independent effects of disaster type, age group, and time since exposure could not be fully separated. Third, some studies relied on self-report screening instruments rather than clinician-administered diagnostic interviews. Finally, the limited number of studies in some subgroups reduced statistical power for subgroup and meta-regression analyses.

Despite these limitations, the present study provides a focused synthesis of PTSD prevalence after community-wide disasters in Iran. By excluding individual traumatic exposures and focusing on disasters affecting whole communities, this review offers a more specific estimate of the mental-health burden associated with collective disasters. The findings show that PTSD is common after disasters in Iran. Future research should report results by age and gender, focus on the results based on the severity of trauma exposure, and conduct longitudinal follow-up to better understand the trajectory of PTSD after disasters in Iran.

5. Conclusion

This systematic review and meta-analysis found that PTSD is highly prevalent following community-wide disasters in Iran. Across 17 included studies, more than one-third of disaster-exposed participants had PTSD, indicating a considerable mental-health burden after earthquakes, floods, and war-related exposures. Although the review was designed to examine trauma- and stressor-related disorders more broadly, all eligible studies reported PTSD, showing that the available evidence in Iran remains mainly focused on PTSD rather than other trauma-related outcomes.

The findings suggest that PTSD prevalence is specifically high during the first year after disaster exposure, but clinically important levels of PTSD persist for many years. Earthquake-related studies showed the highest pooled prevalence, while flood- and war-related estimates were also significant. However, comparisons between disaster types should be interpreted cautiously because of considerable heterogeneity, uneven subgroup distribution, and overlap between disaster type and time since exposure.

These results highlight the need to integrate mental-health care into all phases of disaster management in Iran. Early PTSD screening, psychological first aid, referral pathways, community-based mental-health services, and long-term follow-up should be included in disaster preparedness and recovery programs. Particular attention should be given to vulnerable groups, including children and adolescents, women, injured survivors, bereaved individuals, displaced families, and those who have experienced severe property loss or limited social support.

Future studies are needed on floods, war-related exposures, children and adolescents, and other trauma- and stressor-related disorders beyond PTSD. Such evidence is essential for developing targeted interventions and improving disaster mental-health policy in Iran.

Declarations

Abbreviations

CI: Confidence interval; df: Degrees of freedom; IRB; Institutional Review Board; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PROSPERO: International Prospective Register of Systematic Reviews; PTSD: Post-traumatic stress disorder; SE: Standard error

Ethics approval and consent to participate

The study was approved by the ethics committee of Iran University of Medical Sciences institutional review board (IRB: IR.IUMS.REC.1404.793) and all methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors have no conflicts of interest to report.

Funding

The authors disclose receipt of the following financial support for the research, authorship, and/or publication of this article: This study was funded by Iran University of Medical Sciences to MS (Grant no: 1404-3-75-35490).

Authors' contributions

SM, MB, and MS made substantial contributions to the conception and design of the work. SM, AM, and ANA have substantial contributions in data gathering. SM analyzed and interpreted the data. SM, AM and MS have major contributions to writing the manuscript. All authors read and approved the final manuscript.

Acknowledgments

Not applicable.

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Supplementary Files

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- SupplementaryTable1.searchstrings.docx
- SupplementaryTable3.MetaregressionanalysisoftimesincedisasterexposureandPTSDprevalence.docx
- SupplementaryTable4.MetaregressionanalysisofdisastertypeandPTSDprevalence.docx
- Supplementarymaterial2.fulltextarticles.xlsx