# TECHNICAL COMMENTARY

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# Prevalence in disaster survivors

## Introduction

Prevalence represents the overall proportion of individuals in a population who have the disorder of interest. It is different from incidence, which represents only the new cases that have developed over a particular time period. Point prevalence is the proportion of individuals in a population who have the disorder at a given point in time (e.g., at one-month post-trauma), while period prevalence is the proportion of individuals in a population who have the disorder over specific time periods (e.g., one to two months post-trauma). Lifetime prevalence is the proportion of individuals in a population who have ever had the disorder and lifetime morbid risk also includes those who had the disorder but were deceased at the time of the survey. This topic presents the evidence on prevalence rates in people exposed to disasters. Please also see the related incidence and risk factor topics.

## Method

We have included only systematic reviews (systematic literature search, detailed methodology with inclusion/exclusion criteria) published in full text, in English, from the year 2010 that report results separately for people with PTSD. Reviews were identified by searching the databases MEDLINE, EMBASE, and PsycINFO. When multiple copies of reviews were found, only the most recent version was included. We prioritised reviews with pooled data for inclusion.

Review reporting assessment was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist that describes a preferred way to present a meta-analysis[1]. Reviews with less than 50% of items checked have been excluded from the library. Note that early reviews may have been guided by less stringent reporting checklists than the PRISMA, and that some reviews may have been limited by journal guidelines.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from randomised controlled trials (RCTs) may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large or if there is a dose dependent response. We have also taken into account sample size and whether results are consistent, precise and direct with low associated risks (see end of table for an explanation of these terms)[2]. The resulting table represents an objective summary of the available evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

## Results

We found three systematic reviews that met our inclusion criteria[3-5].

- Moderate to low quality evidence found the mean prevalence of PTSD following public health disasters (SARS outbreaks) was around 14%, after natural disasters (earthquake, hurricanes) mean prevalence was around 18%, and after man-made disasters (war, terrorism) mean prevalence was around 24%.
- Moderate quality evidence found the prevalence of PTSD in adults exposed to earthquakes was between 4.1% and 67.7% and between 2.5% and 60% in children. For adults, being female, having low education level or socio-economic status, prior trauma, being trapped, and experiencing fear, injury, or bereavement during the disaster were related to greatest risk of PTSD. For



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children, being older, having higher education, being trapped, experiencing fear, injury, or bereavement, and witnessing injury/death during the earthquakes were related to greatest risk of PTSD.

- Moderate quality evidence found the prevalence of PTSD in children and adolescents after tsunamis was between 6.0% and 70.7%. After hurricanes the prevalence was between 9.0% and 36.7%, after cyclones and tornadoes the prevalence was between 1.0% and 90.0%, after fires the prevalence was between 9.0% and 36.7%, after floods the prevalence was between 2.05% and 37.0%, after ship sinking the prevalence was between 50.0% and 89.5%, and after the 9/11 attack the prevalence was between 2.3% and 35.0%.



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*Naushad VA, Bierens JJ, Nishan KP, Firjeeth CP, Mohammad OH, Maliyakkal AM, ChaliHadan S, Schreiber MD*

## A Systematic Review of the Impact of Disaster on the Mental Health of Medical Responders

**Prehospital and Disaster Medicine 2019; 34: 632-43**

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| | |
|---|---|
| **Comparison** | **Prevalence of PTSD after disasters.** |
| **Summary of evidence** | **Moderate to low quality evidence (unclear sample size, appears inconsistent and imprecise, direct) finds the mean prevalence of PTSD following public health disasters is around 14%, after natural disasters it is around 18%, and after man-made disasters it is around 24%.** |
| **Prevalence after disasters** | |
| 15 studies, N not reported<br>Total mean prevalence = 20.5%, range = 0.6% to 90%<br>Public health disasters (mostly hospital staff during SARS outbreaks): mean prevalence = 13.9%, range = 2.9% to 20%<br>Natural disasters (mostly doctors and nurses during earthquakes and hurricanes): mean prevalence = 18.2%, range = 6.6% to 24%<br>Man-made disasters (mostly responders to the World Trade Centre disaster, terrorist attacks in London and Norway, and the Israel-Gaza war): mean prevalence = 24%, range = 0.6% to 90% | |
| **Consistency in results**‡ | Appears inconsistent |
| **Precision in results**§ | Appears imprecise |
| **Directness of results**‖ | Direct |

*Tang B, Deng Q, Glik D, Dong J, Zhang L*

## A Meta-Analysis of Risk Factors for Post-Traumatic Stress Disorder (PTSD) in Adults and Children after Earthquakes

**International Journal of Environmental Research and Public Health 2017; 14: 1537**

# Prevalence in disaster survivors

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|---|---|
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| **Comparison** | **Prevalence of PTSD after an earthquake.** |
| **Summary of evidence** | **Moderate quality evidence (large sample size, appears inconsistent and imprecise, direct) finds the prevalence of PTSD in adults exposed to earthquakes is between 4.1% and 67.7% and between 2.5% and 60% in children. For adults, being female, having low education level or socio-economic status, prior trauma, being trapped, and experiencing fear, injury, or bereavement during the disaster were related to greatest risk of PTSD. For children, being older, having higher education, being trapped, experiencing fear, injury, or bereavement, and witnessing injury/death during the earthquakes were related to greatest risk of PTSD.** |
| **Prevalence after an earthquake** | |
| 15 studies, N = 22,931<br>Adults: prevalence of PTSD ranged from 4.10% to 67.07%<br>Children: prevalence of PTSD ranged from 2.50% to 60.00%<br>For adults, the significant predictors of PTSD were being female, low education level or socio-economic status, prior trauma, being trapped, and experiencing fear, injury, or bereavement during the disaster.<br>For children, the significant predictors of PTSD were being older age, higher education level, being trapped, experiencing fear, injury, or bereavement, and witnessing injury/death during the earthquakes. | |
| **Consistency in results** | Appears inconsistent |
| **Precision in results** | Appears imprecise |
| **Directness of results** | Direct |

*Wang CW, Chan CL, Ho RT*

## Prevalence and trajectory of psychopathology among child and adolescent survivors of disasters: a systematic review of epidemiological studies across 1987-2011

**Social Psychiatry and Psychiatric Epidemiology 2013; 48: 1697-720**

View review abstract online

| | |
|---|---|
| **Comparison** | **Prevalence of PTSD in children and adolescents after a disaster.** |

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|---|---|
| **Summary of evidence** | **Moderate quality evidence (large sample, appears inconsistent and imprecise, direct) finds the prevalence of PTSD after earthquakes is between 2.5% and 95.0%, after tsunamis it is between 6.0% and 70.7%, after hurricanes it is between 9.0% and 36.7%, after cyclones and tornadoes it is between 1.0% and 90.0%, after fires it is between 9.0% and 36.7%, after floods it is between 2.05% and 37.0%, after ship sinking it is between 50.0% and 89.5%, and after the 9/11 attack it is between 2.3% and 35.0%.** |
| **Prevalence in children and adolescents after a disaster** | |
| Overall N ~ 16,500<br>Earthquakes: 35 studies, prevalence of PTSD ranged from 2.5% to 95.0%<br>Tsunamis: 11 studies, prevalence of PTSD ranged from 6.0% to 70.7%<br>Hurricanes: 15 studies, prevalence of PTSD ranged from 9.0% to 36.7%<br>Cyclones and tornadoes: 7 studies, prevalence of PTSD ranged from 1.0% to 90.0%<br>Fires: 6 studies, prevalence of PTSD ranged from 9.0% to 36.7%<br>Floods: 5 studies, prevalence of PTSD ranged from 2.05% to 37.0%<br>Ship sinking: 3 studies, prevalence of PTSD ranged from 50.0% to 89.5%<br>9/11 attack: 2 studies, prevalence of PTSD ranged from 2.3% to 35.0% | |
| **Consistency in results** | Appears inconsistent |
| **Precision in results** | Appears imprecise |
| **Directness of results** | Direct |

## Explanation of acronyms

N = number of participants, SARS = severe acute respiratory syndrome



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## Explanation of technical terms

* Bias has the potential to affect reviews of both RCT and observational studies. Forms of bias include; reporting bias – selective reporting of results; publication bias - trials that are not formally published tend to show less effect than published trials, further if there are statistically significant differences between groups in a trial, these trial results tend to get published before those of trials without significant differences; language bias – only including English language reports; funding bias - source of funding for the primary research with selective reporting of results within primary studies; outcome variable selection bias; database bias - including reports from some databases and not others; citation bias - preferential citation of authors. Trials can also be subject to bias when evaluators are not blind to treatment condition and selection bias of participants if trial samples are small[6].

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† Different effect measures are reported by different reviews.

Prevalence refers to how many existing cases there are at a particular point in time. Incidence refers to how many new cases there are per population in a specified time period. Incidence is usually reported as the number of new cases per 100,000 people per year. Alternatively some studies present the number of new cases that have accumulated over several years against a person-years denominator. This denominator is the sum of individual units of time that the persons in the population are at risk of becoming a case. It takes into account the size of the underlying population sample and its age structure over the duration of observation.

Reliability and validity refers to how accurate the instrument is. Sensitivity is the proportion of actual positives that are correctly identified (100% sensitivity = correct identification of all actual positives) and specificity is the proportion of negatives that are correctly identified (100% specificity = not identifying anyone as positive if they are truly not).

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) that allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. Less than 0.4 represents a small effect, around 0.5 a medium effect, and over 0.8 represents a large effect[6].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[7]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship



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between variables. They can provide an indirect indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. $I^2$ is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity. $I^2$ can be calculated from Q (chi-square) for the test of heterogeneity with the following formula[6];

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed[8].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C that allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.



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