

## Psychosocial Consequences of Natural Disasters in Developing Countries: What Does Past Research Tell Us About the Potential Effects of the 2004 Tsunami?

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January 2005

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- **Purpose.** This fact sheet presents a review of the empirical research on the mental health consequences of natural disasters, with a focus on findings for disasters that occurred in the developing world. Findings for human-caused disasters are not included in this summary. First, I describe the characteristics of the studies that have been conducted to date and summarize the range and magnitude of the effects that have been observed in the samples, often by comparing results for developing countries to those for developed countries. Then, I discuss the experiential, demographic, and psychosocial factors that most often have influenced individual-level outcomes across these studies. All articles reviewed were quantitative in method and published, in English, between 1981 and 2004.
- **The Data.** As part of a larger database on disaster research, data were available for 121 distinct samples composed of 52,061 individuals who experienced 62 different natural disasters around the world.
  - Of these samples, 63 (52%) resided in the *USA*, 21 (17%) resided in *other developed countries*, and 37 (31%) resided in *developing countries*. See Table 1 for a list of the studies in the third category. Fifteen of these samples were located in Southeast or South Central Asia (China, India, the Philippines, Taiwan, Thailand), with the remainder residing in Turkey ( $n = 4$ ), Latin America ( $n = 11$ ), and Eastern Europe ( $n = 7$ ). Japanese samples ( $n = 5$ ) were classified in the second group (other developed countries).
  - By far, most of the samples experiencing natural disasters in developing countries were composed of *adult survivors* ( $n = 27$ , 76%), with smaller proportions composed of *youth* ( $n = 7$ , 19%) and *rescue/recovery workers* ( $n = 3$ , 8%). Proportionally, the distribution of sample types for these countries was the same as in developed countries, although the numbers are fewer.
  - Four types of natural disasters have been studied in developing countries. Earthquakes composed 68% of the agents, hurricanes/cyclones 14%, floods 11%, and volcanoes 8%. No tsunamis have been studied. However, many of these events (e.g., the Armenian earthquake, Marmara Turkey earthquake, Mexican mudslides) occurred suddenly without warning and resulted in high death tolls and massive displacements and thus are relevant to understanding the potential consequences of the impact of the 2004 Indian Ocean tsunami.
  - Each sample was coded on several methodological variables to provide a crude accounting of the quality of the studies.
    - Procedures used to draw the sample of participants influence the validity of a study, especially in terms of how well the sample represents the afflicted

population. Probability and census samples are high in representativeness and thus are preferred. Only 19% of the samples studied in developing countries were high in representativeness, compared to 42% and 47% of the samples studied in the USA and other developed countries, respectively.

- Larger samples provide greater power and precision than smaller samples and allow for more advanced multivariate analyses, and thus are preferred. The median *N* of the samples in developing countries was 218, intermediate to the median *N*'s for the USA (162) and other developed countries (240). Mean *N*'s (423, 442, 436 for USA, other developed countries, and developing countries, respectively) did not differ.
- On average, studies in developing countries began 10 months postevent (median = 6), compared to 7 months in the USA (median = 4) and 14 months in other developed countries (median = 6). Seven (19%) of the developing-country studies provided information on the acute aftermath by beginning data collection no later than 2 months postevent. Four of these studies described consequences of the 1999 earthquake in Taiwan (Kuo et al., 2003; Liao et al., 2002, 2004; Yeh et al., 2002), a fifth an earthquake in India (Sharan et al., 1996). Comparatively, 35% and 25% of the samples residing in the USA and other developed countries were studied within the first two months.
- Longitudinal studies involving multiple timepoints provide information on the course of recovery that cross-sectional studies cannot and thus are generally preferred. Only 4 (11%) of the studies conducted in developing countries were longitudinal in design. Liao et al. (2004) studied outcomes 1 and 18 months after the 1999 earthquake in Taiwan, Watanabe et al. (2004) studied the same event at 6 and 12 months, and Wang et al. (2000) studied outcomes 3 and 9 months after an earthquake in China. In what appears to be the only study in a developing country with more than two waves of data collection, Norris et al. (2004) studied outcomes at 6, 12, 18, and 24 months after floods and deadly mudslides in Mexico. Longitudinal studies composed a higher proportion of studies in the USA (27%) and other developed countries (38%), although they were less common than cross-sectional studies in all locations. On average, longitudinal studies collected their last data at 14, 21, and 16 months, respectively, in the three locations.
- **Outcomes.** These frequencies reflect the extent to which these outcomes were examined as well as the extent to which they were observed.
  - **Specific psychological problems** were identified in 89% of the developing-country samples after natural disasters. Posttraumatic stress or PTSD was found in 81% of these samples, depressive symptoms or major depressive disorder were found in 57% of the samples, and anxiety or generalized anxiety disorder was found in 19% of the samples.
  - **Non-specific distress**, assessed by means of global indices of psychological and psychosomatic symptoms, was identified in 35% of the same samples.
  - **Health problems and concerns**, such as self-reported somatic complaints, verified medical conditions, increased taking of sick leave, elevations in physiological

- indicators of stress, declines in immune functioning, sleep disruption, increased use of substances (primarily if previously a problem drinker), and (if previously disabled) relapse and illness burden, were identified in 22% of the same samples.
- **Magnitude of Effects.** To provide a rough estimate of the overall impact of the disasters studied, each sample's results were classified on a 4-point scale of severity from *minimal* (1) to *very severe* (4).
    - The 37 samples in developing countries showed more severe effects overall ( $M = 2.9$ ,  $SD = 0.8$ ) than did samples from the USA ( $M = 2.1$ ,  $SD = 0.8$ ) and other developed countries ( $M = 2.5$ ,  $SD = 0.8$ ). Disaster location alone explained 15% of the variance in severity of effects, which is quite substantial. The mean for natural disasters in developing countries was higher, in fact, than the mean for disasters of mass violence in the USA and other developed countries ( $M = 2.6$ ,  $SD = 0.9$ ).
    - A more specific breakdown of the results for samples experiencing natural disasters in developing countries follows.
      - **3% showed minimal impairment**, meaning that the majority of the sample experienced only transient stress reactions. This one study was Yeh et al.'s (2002) study of Taiwan earthquake rescue workers.
      - **32% showed moderate impairment**, wherein prolonged but subclinical distress was the predominant result.
      - **41% showed severe impairment**, meaning that 25% to 49% of the sample suffered from clinically significant distress or criterion-level psychopathology.
      - **24 % showed very severe impairment**, meaning that 50% or more of the sample suffered from clinically significant distress or criterion level psychopathology.
    - Comparatively, 14% and 0% of the samples from the USA and other developed countries, respectively, showed minimal effects; 65% and 67% showed moderate effects; 13% and 19% showed severe effects; and 8% and 14% showed very severe effects. Thus the modal outcomes after natural disasters were *moderate* in developed countries and *severe* in developing countries.
  - **Risk Factors for Adverse Outcomes.** This section focuses on within-sample factors that have been found in previous studies to influence who is most likely to experience serious and lasting psychological distress. For these results, the entire database was used, not only those studies from developing countries. More detail about these risk factors can be found in Norris, Friedman, Watson, Byrne, Diaz, and Kaniasty (2002).
    - **Individual-level severity of exposure** was almost universally important in predicting postdisaster outcomes. Important stressors included bereavement, injury to self or another family member, life threat, panic or similar emotions during the disaster, horror, separation from family (especially among youth), extensive loss of property, and displacement. In general, injury and life threat were most predictive of long term adverse consequences, especially PTSD. As the number of these stressors

increased, the likelihood of psychological impairment increased in many studies. The relevance of this fact for victims of the tsunami should be self-evident.

- **Neighborhood- or community-level severity of exposure** was assessed only occasionally but had modest outcomes, as follows. Personal loss was more strongly related to increases in negative affect, but community destruction was more strongly related to decreases in positive affect, reflecting a community-wide tendency for people to feel less positive about their surroundings, less enthusiastic, less energetic, and less able to enjoy life. Such findings are an excellent reminder that disasters impact whole communities, not just selected individuals.
- **Gender** influenced postdisaster outcomes in many samples; almost always, women or girls were affected more adversely than were men or boys. The effects occurred across a broad range of outcomes, but the strongest effects were for PTSD, for which women's rates often exceeded men's by a ratio of 2:1. The effects of gender appeared to be greatest within samples from traditional cultures and in the context of severe exposure.
- **Age** often influenced disaster victims' outcomes. Samples of children generally exhibit more severe distress after disasters than do adults. Older adults were at greater risk than were other adults in only a small minority of adult samples where age differences were observed. In every American sample where they were differentiated from older and younger adults, middle-aged adults were most adversely affected. Some research suggests that middle-aged adults are most at risk because they have greater stress and burden even before the disaster strikes and assume even greater obligations afterwards. Cross-cultural research suggests that the effects of age may differ across countries according to the social, political, economic, and historical context of the setting involved.
- **Ethnicity** shaped the outcomes of disaster victims in several USA and Australian samples. Among youth, results for ethnicity were not entirely consistent, but among adults, minority status was associated with greater risk for adverse outcomes. There is little explanatory research available, but the disproportionate risk of ethnic minorities appears to follow both from differential exposure to more severe aspects of the disaster and from culturally specific attitudes and beliefs that may impede seeking help.
- **Socioeconomic Status (SES)**, as manifest in education, income, literacy, or occupational prestige, has often affected outcomes of disaster victims, with lower SES most often being associated with poorer outcomes.
- **Family Factors** influenced outcomes in several different ways.
  - **Married status** was a risk factor for women in a few studies. Husbands' symptom severity predicted wives' symptoms more strongly than wives' symptom severity predicted husbands'. Marital stress has been found to increase after disasters.
  - **Being a parent** also adds to the stressfulness of disaster recovery and, especially for events involving uncertain threats, mothers were especially at risk for substantial distress.

- **Family environment** is critical for children, who tend to be highly sensitive to postdisaster distress and conflict in the family. Parental psychopathology was typically the best predictor of child psychopathology in child studies. Less irritable, more supportive, and healthier parents had healthier children.
- **Predisaster Functioning and Personality** influenced outcomes in many samples. Persons with predisaster psychiatric histories were disproportionately likely to develop disaster-specific PTSD and to be diagnosed with some type of postdisaster disorder. Other research suggests that a “neurotic,” as opposed to stable and calm, personality increases the likelihood of postdisaster distress and that “hardiness” decreases the likelihood of postdisaster distress.
- **Secondary Stressors**, when measured, were almost always important. Both life-event stress (discrete changes) and chronic stress have been strong predictors of survivors’ health outcomes. In part, the long-term effects of *acute* stressors (the individual-level aspects of exposure outlined above) on psychological distress operate through their effects on *chronic* stressors, such as marital stress, financial stress, and ecological stress. Attention needs to be paid to stress levels in stricken communities long after the disaster has happened and passed.
- **Psychosocial resources** were likewise important in all relevant studies.
  - **Ways of coping** influenced symptom outcomes in several studies, but the findings were not always consistent across them. Avoidance coping and blame assignment were consistently problematic, but other ways of coping were sometimes helpful and sometimes not.
  - **Beliefs about coping** were far more important than ways of coping. What matters, apparently, is not how individuals actually cope but rather how they perceive their capabilities to cope.
  - **Self-efficacy, mastery, perceived control, self-esteem, hope, and optimism** were all related positively, strongly, and consistently to mental health.
  - **Social support** appears to be especially important for disaster recovery.
    - **Social embeddedness** -- the size, activeness, and closeness of the survivor’s network – is related strongly and consistently to mental health.
    - **Received social support** is the actual helping behavior that emerges in response to stress. Although it usually is related positively to mental health, the findings are not entirely consistent, in part because levels of help received are confounded with need. Received support is important primarily because it protects and replenishes other resources, such as perceived social support.
    - **Perceived social support** is the most thoroughly researched social resource. With few exceptions, disaster survivors who subsequently believed that they were cared for by others and that help would be available, if needed, have fared better psychologically than disaster survivors who believed they were unloved and alone.

- ***The Social Support Deterioration Model***, which has been tested across several disasters, indicates that declines in perceived social support account for a large share of victims' subsequent declines in mental health. A variant of the original model showed that support *received* after the disaster offset the detrimental effects of disaster exposure on subsequent levels of *perceived* (expected) social support. Attending to the social needs of disaster victims could go a long way towards protecting them from long-term adverse psychological consequences.
- ***Summary and Conclusions.***
  - ***More and better research on disasters in developing countries is needed.*** A substantial amount of research pertinent to understanding the range, magnitude and duration of the effects of disasters has been published over the past 25 years. Many of the samples included in this review of the research on natural disasters (37 of 119) resided in developing countries, such as Taiwan, India, the Philippines, and Thailand. This accumulating research base, especially given the recent studies on the 1999 earthquakes in Taiwan and Turkey, allows the effects of catastrophic disasters in these regions to be understood better than ever before. A list of these studies may be found in Table 1.
    - Progress notwithstanding, research on natural disasters in developing countries is rare relative to the frequency with which such disasters occur in those countries. Averaging almost 200 incidents annually, Asia dramatically leads the rest of the world in disaster frequency, followed by the Americas (111 events annually, on average). There is a critical need for additional research in such areas of the world, especially on children, for which too few studies exist to even begin to extrapolate general principles. We know little about how culture shapes the psychological impact of disasters.
    - Mechanisms for supporting international researchers financially are also advised, as are approaches for mentoring them. Many of the studies conducted in developing countries were not optimal in terms of their sampling strategies and designs. A plethora of tsunami studies of questionable quality will do little to advance knowledge.
    - That only four of the identified studies in developing countries were longitudinal in design points to a critical need for longitudinal research that can inform us about the course of recovery under low-resource conditions. Longitudinal research on natural disasters in the developed world predicts strong recovery for most people, but we know very little about recovery under more harsh conditions.
  - ***The effects of the tsunami on mental health are likely to be quite severe.*** The research to date strongly suggests that natural disasters in developing countries often produce severe effects on the public's mental health. In fact, the modal sample-level outcome after natural disasters in developing countries was *severe*, whereas the modal outcome after natural disasters in developed countries was *moderate*. This general finding from the research base may reflect the fact that disasters tend to be more destructive when they occur in the

developing world. Many of the samples from developing countries survived disasters where death tolls were measured in thousands or even tens of thousands. The difference may also attest to the ability of government services and other resources to make a difference in the lives of disaster victims. Moreover, the victims of the 2004 tsunami are likely to have experienced multiple intense stressors that have been found to predict adverse outcomes, such as bereavement, threat to life, extensive property damage, financial loss, and displacement.

- ***Even after very serious disasters, individuals differ in the risk for adverse psychological outcomes.***
  - Risk factors for adults include: severe exposure to the disaster, especially injury, threat to life, and extreme loss; living in a highly disrupted or traumatized community; female gender; age in the middle years of 40 to 60; little previous experience relevant to coping with the disaster; ethnic minority group membership; poverty or low socioeconomic status; the presence of children in the home; psychiatric history; secondary stress; and weak or deteriorating psychosocial resources.
  - With a few modifications – primarily the deletion of age -- this risk-factor model holds reasonably well for children and adolescents.
- ***Implications for intervention.*** Several implications for intervention can be drawn from the research on disasters. There is a critical need for research that tests the impact of postdisaster psychosocial interventions.
  - Families are extremely important systems and constitute the most important unit for postdisaster treatment and intervention efforts, especially with children. Interventions for children may be of limited effectiveness if the family is not considered as a whole. In fact, providing care and support to their overly stressed parents might be among the most effective ways to provide care and support to the children affected by disaster.
  - We should educate survivors, and those who come into contact with them, that avoidance and blame assignment are rarely effective coping strategies. Otherwise, however, the specific ways of coping matter much less than do people's perceptions of themselves as able to cope and control outcomes. It may be more important for disaster workers to reassure survivors that they do, in fact, have what it takes to meet the demands faced.
  - A focus on self-efficacy does not mean that mental health services are not needed, but rather that such services should be delivered in a way that provides resources without threatening them. Some people are more likely to accept help for "problems in living" than to accept help for "mental health problems." In exercising our good intentions to help victims, we must not inadvertently rob them of the very psychological resources they need to persevere over the long term.
  - Naturally occurring social resources are particularly vital for disaster victims. Professionals and outsiders are important sources of assistance when the

level of need is high, but they must not and cannot supplant natural helping networks. People should not abandon their routine social activities because these keep people informed about the relative needs of network members, provide natural forums for sharing experiences, and preserve a sense of social embeddedness. It also might be helpful to educate the public about the reasons significant others may not always be able to provide them with the quality or quantity of interpersonal support they expect.

- Individual-focused interventions are not always necessary. They should be reserved for those persons who are most distressed, who had weak psychological and social resources to begin with, or who suffered particularly dire resource losses. Resources must be invested in order to acquire new ones, and thus people who need such services the most may be least likely to seek them. Outreach to such persons, and to the communities in which they are most likely to live, is essential.

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**Table 1. Studies of Natural Disasters in Developing Countries**

First Author and Year of Publication	PILOTS ID	Country	Agent	Event Year	Sample Type
Armenian, 2000	22383	Armenia	Earthquake	1988	Adult
Assanangkornchai, 2004	18298	Thailand	Flood	2000	Adult
Basoglu, 2002	16884	Turkey	Earthquake	1999	Adult
Basoglu, 2004	18243	Turkey	Earthquake	1999	Adult
Bokszczanin, 2002	25273	Poland	Flood	1997	Youth
Caldera, 2001	23340	Nicaragua	Hurricane	1998	Adult
Chang, 2002	24456	Taiwan	Earthquake	1999	Adult
Chang, 2003	25728	Taiwan	Earthquake	1999	Rescue
Chen, 2002	25283	Taiwan	Earthquake	1999	Youth
De la Fuente 1990	10822	Mexico	Earthquake	1985	Adult
Durkin, 1993	04377	Chile	Earthquake	1985	Adult
Goenjian, 1995	06107	Armenia	Earthquake	1988	Youth
Goenjian, 2001	23393	Nicaragua	Hurricane	1998	Youth
Howard, 1999	21740	Philippines	Volcano	1991	Adult
Karanci, 1999	24481	Turkey	Earthquake	1999	Adult
Kuo, 2003	25373	Taiwan	Earthquake	1999	Adult
Laor, 2002	25373	Turkey	Earthquake	1999	Youth
Liao, 2002	24574	Taiwan	Earthquake	1999	Rescue
Liao, 2004	26279	Taiwan	Earthquake	1999	Adult
Lima, 1990	10741	Colombia	Volcano	1985	Adult
Lima, 1990	10821	Ecuador	Earthquake	1987	Adult
Lima, 1991	02281	Colombia	Volcano	1985	Adult
McFarlane, 1993	11535	China	Earthquake	1988	Adult
Najarian, 1996	07041	Armenia	Earthquake	1988	Youth
Najarian, 2001	06091	Armenia	Earthquake	1988	Adult
Norris, 2001	15858	Mexico	Hurricane	1997	Adult
Norris, 2002	24927	Poland	Flood	1997	Adult
Norris, 2004	18521	Mexico	Flood/mudslides	1999	Adult
Sattler, 2002	16997	Dom. Rep.	Hurricane	1998	Adult
Scott, 2003	17168	Colombia	Earthquake	1999	Youth
Sharan, 1996	07053	India	Earthquake	1993	Adult
Suar, 2002	16889	India	Earthquake	1998	Adult
Wang, 2000	22485	China	Earthquake	1998	Adult
Watanabe, 2004	18116	Taiwan	Earthquake	1999	Adult
Yang, 2003	25846	Taiwan	Earthquake	1999	Adult
Yeh et al., 2002	25191	Taiwan	Earthquake	1999	Rescue

Rescue includes recovery workers as well as first responders. PILOTS ID is the identification number for the abstract and citation in the PILOTS database, which can be accessed at [www.ncptsd.org](http://www.ncptsd.org). Full citations follow.