

Distress and Disasters: Positive Outcomes of the Great Midwestern Floods of 1993

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The 1993 flooding of the Midwestern United States was of long duration, spatially extensive, and economically damaging. Estimated property losses exceeded \$12 billion, and millions more were suffered in indirect losses (IFMRC 1994; Myers and White 1993). Fifty people were killed. At least 26,000 people were evacuated from their homes, and approximately 100,000 buildings were affected. The floods set hydrological records throughout the Midwest, and many rivers exceeded all recorded levels. In addition, some communities were inundated more than once, while others were under water for prolonged periods (Tobin and Montz 1994). The impacts of this disaster were far-reaching, and recovery took a long time for many communities. Nevertheless, there have been some positive outcomes from these floods, including a renewed appreciation of flooding and the need for community preparation. During the 1990s, the Federal Emergency Management Agency (FEMA), for instance, refocused attention on the National Flood Insurance Program (FEMA 2003), adopted new initiatives such as Project Impact (FEMA 1998), and expanded its response strategies (Yen and Yen 1996). While these programs have met with mixed success, the shared goal of minimizing flood losses and being prepared is admirable.

Another area that has taken on greater significance has been a focus on the psychological stress associated with living in hazard-prone environments. Indeed, it is disasters such as the 1993 floods that have promoted new research initiatives and guided novel responses to mental health concerns, so much so that stress and anxiety are now recognized as significant outcomes of flooding.

Furthermore, the acceptance of mental health issues has taken on a global perspective that is intricately linked with concerns of vulnerability, marginalization, and resilience. This paper reviews some of the concerns regarding mental health and flooding, and examines changes that have occurred since 1993. It also places such work in a wider context. As we shall see, this new emphasis has led to many positive outcomes, namely: (i) the development of proactive mental health intervention strategies; (ii) the refinement of vulnerability measures with the incorporation of stress variables; (iii) a broader application of stress concerns to include a global perspective; and (iv) the application of such studies to all disasters. However, it should be noted that this is not a definitive review, but merely an indication of prevailing directions of such research.

Distress

Natural disasters rarely lead to major breakdowns in mental health or severe, incapacitating emotional breakdown (Baisden 1979). Nevertheless, while sweeping mental illness may not be the norm, hazard victims can experience considerable stress, increased anxiety levels, and depression that may be prolonged and disabling. Such psychological traits can, in turn, exacerbate vulnerabilities, increase losses, and compromise recovery efforts. In some cases, hazardous conditions can create extreme psychological distress leading to post traumatic stress disorder (PTSD). PTSD is defined by the National Mental Health Association as “[A]n extremely debilitating condition that can occur after exposure to a terrifying event or ordeal in which grave physical harm occurred or was threatened” (NMHA 2003).

People who experience PTSD report flashbacks of the event, nightmares, and frightening thoughts, which can lead to sleeplessness, depression, anxiety, irritability as well as outbursts of anger and antisocial behavior. In addition, individuals suffering from PTSD generally avoid stimuli that remind them of the event (American Psychiatric Association 1987). The NMHA (2003) estimates that at least 3.6 percent of U.S. adults have PTSD during the course of a year.

Research has confirmed the association of high incidences of PTSD with natural disasters such as flooding (Madakasira and O'Brien 1987; Wood and Cowan 1991; Norris 2002). However, research findings from the 1980s and early 1990s were somewhat inconclusive and often conflicting with respect to precise impacts. Thus, Solomon and Green (1992) suggested a series of questions that needed to be addressed, including, (i) what psychological problems do result from disaster; (ii) which groups of people are at highest risk for negative effects; and (iii) what factors might modify the impact of exposure to disaster. Such reviews have stimulated research, and more attention has certainly been given to stress and natural disasters in recent years.

Distress and the 1993 Floods

Not surprisingly, given the calls for additional research, the floods of 1993 promulgated several studies into stress and anxiety among survivors. At the state level, the Iowa Department of Public Health released a report showing that two counties (representing two percent of the state's population) experienced increases in admissions to substance abuse programs and nine counties (16 percent of the population) reported increases in admissions to mental health facilities (CDC 2001). Indeed, the floods were so extensive that mental health difficulties were expected. Two examples of such work are briefly reviewed here: Des Moines, Iowa and Hartsburg, Missouri.

Des Moines, Iowa

In 1993, a detailed investigation of stress factors was undertaken of highly exposed flood victims in Des Moines, Iowa (Ollenburger and Tobin 1998; Tobin and Ollenburger 1996). This study involved an in-depth, telephone questionnaire, administered approximately four months after the flood by trained

interviewers from the Center for Family Research in Rural Mental Health at Iowa State University. Three months later, a large-scale control survey was undertaken in Des Moines and surrounding communities, conducted by the same group (data provided by Director, Dan Hoyt, personal communication). Both surveys included questions on personal and family characteristics, socio-economic traits, details on flood experiences, individual lifestyle, physical and mental health status, and several regular measures of stress.

The Des Moines metropolitan area had experienced many small floods, especially in the neighborhoods of Valley Junction and Frisbee Park, from Walnut Creek, the Raccoon River, or the Des Moines River. However, the flooding was particularly severe in 1993. Many buildings stood under ten feet of water, and a number of homes and businesses were completely destroyed (Tobin and Montz 1994). By the end of summer, 2,100 residences and 350 businesses had been inundated, and total losses in Des Moines were estimated to be \$716 million (Bryson 1994).

Post-Disaster Stress and Anxiety Responses to Flooding. As would be anticipated, the highly exposed flood group responded to the disaster with various levels of stress, manifested in forms of depression and anxiety. Many respondents reported trouble sleeping, hands trembling enough to bother them, loss of appetite, feeling weak all over, shortness of breath, and wondering if anything was worthwhile anymore, all indicators of stress. However, the data showed that when individuals had simply been inconvenienced for only a short time by the flood, their stress responses were minimal compared to individuals who had experienced extensive damage to their home and property. Thus, degree of exposure and flood severity appeared to be important factors influencing stress.

Another measure of stress was determined from previous mental health status, as measured by the extent of medication taken for anxiety and depression. While there was an overall increase in the use of such medications, there was also a significant difference in usage based on gender. Only 1.8 percent of the men and 5 percent of the women took medication to help them sleep before the flood; yet, following the flood, 4.4 percent of the men and 12.4 percent of the women took such medication. Indeed, women were significantly more likely than

Table 1. Risk Factors for PTSD (Highly Exposed Group) Des Moines, Iowa

VARIABLE	B	S.E.	Wald	df	Sig.	Exp(B)
Age (over 65)	-1.31	0.5762	5.1748	1	.0229	0.2696
Sex	0.98	0.5066	3.7265	1	.0536	2.6590
Minority	0.34	0.6527	0.2778	1	.5982	1.4106
Health (excellent)			11.5291	2	.0031	
Health (good)	1.68	0.6212	7.2800	1	.0070	5.3442
Health (fair/poor)	1.98	0.6346	9.7014	1	.0018	7.2185
Constant	-0.70	0.7538	0.8625	1	.3531	

N = 106; $p=.0032$; $\chi^2=17.78$; $df=5$

men to require sleep medication after the flood. Similarly, 4.4 percent of the men and 5.8 percent of the women took medication to calm their nerves before the flood,, while after the flood these percentages increased to 6.2 and 12.4, respectively.

Indicators of Possible Post Traumatic Stress Disorder. Following the flooding, it was found that 71 percent of the highly exposed cohort exhibited signs of possible PTSD. It should be emphasized that women, particularly those who had families and those with less formal education, were more likely to show signs of PTSD than any other group. To extend this analysis, a logistic regression model was used to determine risk factors that might lead to PTSD following the flooding (Table 1). The model estimations, determined in four iterations, explained 74 percent of the presence of PTSD among individuals in the high flood exposure area.

Several characteristics helped explain the high incidence of PTSD symptoms, age, gender, socio-economic traits, and prior physical health. Overall, females, minority respondents and those in poor or fair health were much more likely to experience PTSD symptoms than males, non-minorities and those individuals in excellent health. Thus, while minority respondents were more likely than non-minority members to exhibit PTSD symptoms, minority females in poor or fair health comprised the group most likely to show such symptoms.

Age also played a role. Younger individuals were more likely to exhibit PTSD symptoms than individuals 65 years of age or older. This pattern was not consistent with some earlier disaster research results that identified older individuals as more “seasoned” by previous flood experience. Others, however, have found a positive correlation with age.

It is possible that younger individuals, especially middle-aged groups, would have had the burden of family concerns, such as the care of young children or the elderly, which would increase their anxiety related to the flood consequences.

To test whether flood severity was the key factor in creating the incidence of PTSD among this population, a similar analysis was conducted on the control group. This group included individuals who had varying degrees of exposure to the floods. The level of exposure was coded into three categories: no exposure, minimal exposure (including loss of services but no damage to home, property or person), and high exposure (including damage or loss to property, home, job and/or personal injury). Table 2 describes the logistic regression model with the inclusion of the exposure variable predicting PTSD among the control group. All of the independent predictors are defined the same as in Table 1. This time the model explained eighty percent of the variance correctly, demonstrating that level of exposure was the most significant predictor for PTSD. Individuals with a high level of exposure were much more likely to exhibit PTSD as compared with those with no exposure, and individuals with minimal exposure were more likely to exhibit symptoms of PTSD when compared with those individuals who lived in the community but were not directly affected by the floods.

Factors Mitigating Symptoms of Extreme Post-Disaster Stress. In this study, two significant predictors decreased the severity of PTSD; maintenance of employment and the perception of positive outcomes from the flood experience. The presence of insurance to help cover losses, good or excellent prior health, and the presence of family

Table 2. Risk Factors for PTSD in Different Flood Level Exposure Areas (Control Group) Des Moines, Iowa

VARIABLE	B	S.E.	Wald	df	Sig.	Exp(B)
Age (over 65)	-0.02	0.1724	0.0139	1	.9061	0.9799
Sex	0.21	0.1518	1.8842	1	.1699	1.2317
Minority	1.08	0.2549	17.9317	1	.0000	2.9433
Health (excellent)			7.2885	2	.0261	
Health (good)	0.58	0.2277	6.4877	1	.0109	1.7858
Health (fair/poor)	0.25	0.1573	2.5591	1	.1097	1.2861
Exposure (none)			44.8171	2	.0000	
Expose (high)	6.33	0.9864	41.2051	1	.0000	562.1779
Expose (minimal)	5.88	1.0031	34.3207	1	.0000	356.4786
Constant	-7.09	0.9920	51.1090	1	.0000	

N = 1,735; p=.0000; df=7; $\chi^2=571.08$

and friends near enough to help the recovery process were also important variables.

A large percentage of the respondents felt that there were significant positive outcomes as a result of the flooding. For instance, 80 percent of respondents reported there was more cooperation and helping in the neighborhood following the flood, 68 percent had made new friends, 59 percent felt the floods brought their family closer together, and 42 percent indicated they became more involved in their community (Table 3). More men than women indicated that they became more involved in the community, made new friends, and found more cooperation and helpfulness in the neighborhood. However, women were more likely to suggest that the flooding brought the family closer together. However, the long-term consequences of these outcomes need to be studied in detail.

Hartsburg, Missouri

A similar study was conducted in Hartsburg, MO, a small town flooded by the Missouri River (see Tobin and Ollenburger 1994). The town is situated on a broad floodplain one mile from the river. The two floods arriving in late July and August of 1993 completely devastated the community and 3,000 acres of surrounding agricultural land. As local levees failed and water surged through the town, Hartsburg experienced the full force of the Missouri River. Little could be done to combat the flooding. Although attempts were made to sandbag some residences, these usually proved inadequate. Forty-two of the

fifty structures in the downtown were flooded and remained under more than eight feet of water for many days.

A regression model was used to analyze the influence of the independent variables on the dependent variable of stress immediately following the flood. Based on data similar to that in Des Moines, the analysis employed the following variables: community homogeneity, age, mental health status prior to the flood, flood familiarity, gender, extent of flood damage, number of people living in the household, physical health status, years of education, and physical mobility. Results showed high, multiple levels of stress symptoms. There were five significant predictors of stress: gender, physical health status, mental health status, flood damage, and years of education (Table 4).

These results support previous research regarding personal traits as predictors of stress. Individuals who indicated their physical health prior to the flood, was fair or poor, as opposed to excellent or good, were more likely to experience higher levels of stress after the flood. Likewise, individuals who had suffered from depression or anxiety prior to the flood were more likely to exhibit symptoms of stress after the event than individuals who had no history of depression or anxiety. However, physical mobility was not statistically significant, although there was a trend for those less mobile to show higher levels of stress. Given these findings, all three health variables should be further developed and refined within the model.

Gender was a significant predictor of stress, with women respondents reporting higher levels of stress

Table 3. Positive Outcomes from the Midwest Floods (Highly Exposed Group) Des Moines, Iowa

Positive Outcome		YES	NO
More Cooperation/Helping in Neighborhood ¹	Total	80%	20%
	Males	85%	15%
	Females	76%	24%
Made New Friends ¹	Total	68%	32%
	Males	78%	22%
	Females	60%	40%
Brought Family Closer Together ²	Total	59%	41%
	Males	57%	43%
	Females	61%	39%
More Involved in the Community ²	Total	42%	58%
	Males	52%	48%
	Females	33%	67%

¹ $\chi^2 = 6.42$, $df=1$, $p < .02$

² $\chi^2 = 5.9$, $df=1$, $p < .02$

than men during the post-hazard period. While this supported other findings, it is not necessarily easy to explain. It is possible that men were reluctant to admit to personal stress from such physical events, but clearly more information is needed to test these ideas. In contrast to Des Moines, level of education was also a significant variable in the model. Those with higher levels of education showed greater levels of stress than those with less education. It is not easy to interpret this outcome, since stress is not confined to those with more years of education.

Interestingly, other personal traits, such as age and number of people living in the household, were not significant predictors of stress in Hartsburg. Indeed, the correlation between age and stress was negative, indicating that increasing age corresponded to less stress. Once again, more explanation is needed. As in Des Moines, it is possible that older adults were less stress prone in hazardous environments because of greater hazard experience. However, this was not the case in Hartsburg, where prior-experience was rather limited.

Of the two flood variables, only flood damage proved to be statistically significant. Perhaps not surprisingly, individuals who suffered damage to their properties or homes experienced significantly higher levels of stress than those who lived in the community but who did not experience personal losses. On the other hand, personal experience with similar types of floods proved to have little, if any,

effect on stress. It should be pointed out, however, that this last variable was not very well defined in Hartsburg and needs to be tested under more rigorous conditions.

Thus, the Des Moines and Hartsburg studies produced similar results regarding stress and disasters. Flood exposure, gender, and age, as well as prior physical and mental health traits were all significant predictors of stress. Many of these findings support previous research, although it is apparent, as research into distress has grown, that more complex relationships among variables often exist. Some of these relationships are discussed below.

Important Variables In Stress Research

The study of risk factors of PTSD from flooding and natural hazards has increased substantially over the last ten years with attention focusing on different factors including environmental stressors, demographic variables, personality traits, psychiatric history, dissociation, cognitive and biological systems, and genetic or familial risk (Halligan and Yehuda 2000), many of which have proven to be significant in predicting stress following natural disasters.

Exposure and Experience

As in Des Moines and Hartsburg, other studies have demonstrated that exposure to an event leads

Table 4. Predictors of Post-Hazard Stress Hartsburg, Missouri

Variable	B	Beta	T
Community Homogeneity	0.18	0.07	0.93
Age	0.00	-0.01	-0.12
Flood Familiarity	0.05	0.05	0.65
Mental Health Status	0.71	0.34	4.40***
Gender	0.56	0.23	2.89**
Flood Damage	0.15	0.19	2.29*
No. of People in Household	0.02	0.02	0.23
Health Status	0.35	0.24	2.56*
Years of Education	0.09	0.22	2.61**
Physical Mobility	-0.10	-0.08	-0.96
Constant	-2.47		-2.56*

N = 128; F = 6.20; df = 10; p < .001

*p < .05; **p < .01; ***p < .001

to high levels of stress (Halligan and Yehuda 2000), with higher degrees of exposure associated with greater levels of PTSD (Norris and Murrell 1988; Solomon et al. 1989; Tapsell et al. 2002). As Norris (2002) points out, “severity of exposure is nearly always predictive of post-disaster symptoms.” Thus, those individuals who experience bereavement, injury to self or family member, life threat, horror, property damage and financial loss often exhibit mental health problems (Norris 2002). However, Norris suggests that it is time to move beyond the “dose-response” paradigm that has dominated this research, proposing that research now focus on family and community processes that foster resilience or impede recovery. In other words, we know that exposure and stress are related so what can be done?

In contrast, prior experience of traumatic events can operate in different ways. If activity during previous events had been successful, then self-confidence may be boosted, and stress reduced. Mocellin (1999) discusses the positive effects that might stem from using adequate coping mechanisms to deal with such stressful experiences. For instance, many people sandbagged their properties during the 1993 floods; if such efforts were successful, then these individuals may have less stress leading up to future flood events. This of course may constitute a false sense of security and exacerbate stress if such activities fail in future floods. Alternatively, if the prior hazard experience had been problematic and mitigation activities a failure, then stress may be aggravated and lead to unfavorable responses in

future events. So, prior experience may be a positive or negative outcome depending on circumstances.

Age

There is a substantial literature that addresses relationships between age and hazard-induced stress (Bolin and Klenow 1982-1983; Cutrona et al. 1986; Huerta and Horton 1978; Krause 1987; Phifer and Norris 1989; Russell and Cutrona 1991). Many of these studies suggest that older individuals may experience more stress and relatively greater personal loss than younger persons during disasters. However, research has produced conflicting results. The issue of age is complicated by physical and mental health conditions that significantly influence stress responses (Ollenburger and Tobin 1998; Tobin and Ollenburger 1994). For instance, individuals in poor health and who have mobility difficulties are restricted in the actions they can take to mitigate hazard losses, which can lead to higher stress levels. Furthermore, middle-age groups may have greater responsibilities in a disaster, sometimes termed the burden perspective, which entail looking after children and elderly, thus contributing toward stress. However, this is still not the complete story because Tapsell et al. (2002) note that there are perceived significant stress impacts from flooding on children, the elderly, and women. In fact, recent studies indicate that children are also prone to high levels of PTSD in many natural disasters (Norris 2002). Further research is necessary in this area.

Gender

Gender remains an important dimension of stress studies. Research has demonstrated that women suffer higher levels of stress and anxiety after natural disasters than do men. Women experience heightened risk exposures as a result of various social and cultural norms, including gender inequity and overall social roles (Enarson 2001; Fothergill 1996; Solomon et al. 1987; Steinglass and Gerrity 1990; Tapsell et al. 2002). In a review of the literature, Halligan and Yehuda (2000) showed that the prevalence of PTSD is almost twice as high in women as in men, especially when associated with violent activities. Nevertheless, although gender has been shown to be a significant factor in predicting stress levels, with women exhibiting higher stress responses than men (Solomon et al. 1987; Tobin and Ollenburger 1994), recent research emphasizes that

it is the cumulative effect of family environment, care-taking roles, health, mobility, and age which probably more clearly defines issues for women (Stehlik et al. 2000; Waite 2000). Women are more likely to live in poverty and have fewer economic alternatives to cope with the effects of a hazardous event. In addition, elderly individuals may have heightened risk factors due to health difficulties and limitations in mobility. Since the life expectancy for women is longer than for men, aging and gender issues are very much interconnected. In future floods, therefore, more attention needs to be directed at these vulnerable groups.

Family Living Environments

Family living arrangements and demographics can also affect stress, reflecting social support needs and levels of social capital. For instance, women living alone are more likely to be divorced, separated or widowed, whereas men living alone are more likely to be single. Men who live alone are more likely to be younger and women living alone are more likely to be older. In addition, divorced women are more likely to head households of two or more individuals. This reflects the trend of men being more likely to remarry and women, as they age, being less likely to remarry. Also, women are primarily responsible for childcare responsibilities, especially after a divorce. However, as demonstrated by Waite (2000) in Kurdistan disasters, simple assumptions regarding female-headed households should be avoided, because not all female-headed households are more vulnerable than male-headed households.

Prior Health Status

Three groups of variables pertaining to health have been identified with respect to stress: physical health characteristics, physical mobility, and mental health status (Canino et al. 1990). As shown in the 1993 studies, those in poor physical or mental health prior to the flood were more likely to experience stress after the event than those in good health. Overall, health has a significant bearing on how well survivors of flooding cope with disastrous events. Once again, though, these variables are interrelated with other factors (Norris 2002). For example, increasing age is often equated with poorer health, and females often indicate poorer health. While there is a vast and growing literature on floods, natural hazards, and health, more research is necessary to

determine how these variables work together to affect stress.

Economic and Education Status

Socio-economic status has been an important predictor of stress (Green 1988) with lower levels of education and income correlating with high risk factors (Halligan and Yehuda 2000). The relationship is complex because of the association of gender and age with economic factors. The economics of aging, for instance, place many women in extremely vulnerable positions, which influences their ability to cope with the unexpected consequences of natural disasters. This economic vulnerability of women, who may be the sole support for themselves and/or for their children, has been described as the feminization of poverty (Ollenburger and Moore 1998). It reflects the economic position of women throughout the life cycle from teenage unemployment to the loss of economic support when divorced or widowed. The cumulative effects of unpaid care-taking roles, part-time employment histories, lack of consistent benefits and economic losses due to divorce or widowhood are exacerbated throughout life, leaving many older women with little or no economic security for their later years. Consequently, natural disasters can perpetuate the poverty trap for women as demonstrated by some of the recent research looking at women and other marginalized groups in hazardous areas (see for example, Cutter 1995; Enarson and Morrow 1998; Khondker 1996; Melick and Logue 1985-1986; Rivers 1982; Wiest et al. 1992). The issue of education is also unclear. In Hartsburg, there was a positive correlation between stress and higher levels of education, whereas most other researchers have found the opposite to be true as discussed by Halligan and Yehuda (2000). Again, more refined research may establish a better relationship between education and flood stress.

Cognitive and Psychological Traits

Other factors that influence post-flood behavior and may determine levels of stress are psychological and cognitive (Halligan and Yehuda 2000). Studies have shown that people with a more positive outlook on life experience lower levels of stress than those with a more pessimistic attitude (Burton et al. 1993; Tobin and Ollenburger 1994). While the precise measurement of this variable is still unclear, these parameters undoubtedly have a bearing on how

quickly survivors recover. Unfortunately, long-term studies of disaster survivors are not common. Perhaps, the best known of these is the work of Gleser et al. (1981) and Green et al. (1990, 1991) looking at the Buffalo Creek floods of 1972. They demonstrated that PTSD can be long lasting and far reaching. Anniversaries of flood disasters can also be traumatic experiences in themselves and stressful for some. Johannes (1996) discussed this problem in Kansas and put forward several suggestions for dealing with them.

Other psychological traits associated with stress have been addressed by Waelde et al. (1998). They looked at flooding in Northern California of 1997 and showed both short- and long-term stress reactions. However, of equal concern were the coping strategies of residents, 27 percent of whom undertook potentially dangerous activities by trying to get closer to the flood. If this is a prevailing issue in other disasters, then clearly people could be putting themselves in danger.

It is through studies such as these that new ideas have emerged regarding flood impacts and mitigation. Two are highlighted below; academic research into vulnerability, and practical programs to alleviate post-disaster stress.

Distress, Vulnerability and Resilience

The World Health Organization's constitution states "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (1948). Thus, as pointed out by Mocellin (1999), good mental health is important because healthier populations are more able to take advantage of economic opportunities offered by development projects. Hence, one can argue that community and individual resilience is enhanced by sound mental health and conversely that vulnerability is exacerbated by poor mental health. The identification of these stress variables, therefore, has furthered the exploration of vulnerability and resilience.

Concepts of human vulnerability in relation to natural hazards, especially floods, are particularly important. In this regard, natural hazards research has made tremendous progress, moving the rhetoric from one concerned predominantly with natural phenomena and the "technological fix," to one that

pays attention to processes of the human-use system, specifically the complex web of social, political, and economic forces. Most recently hazard research has focused on vulnerability and the role it can play in exacerbating or ameliorating the effects of disasters (Wisner et al. 2004). Indeed, it is the combination of risk and vulnerability that reflects the degree to which societies or individuals are threatened by, or alternatively protected from, the impacts of natural hazards (UNISDR 2001). Vulnerability, then, is a human induced situation that results from public policy and resource availability/distribution, and it is the root cause of many disaster impacts. Indeed, research demonstrates that marginalized groups invariably suffer most in disasters because higher levels of vulnerability correlate with higher levels of poverty, with political disenfranchisement, and exclusion from mainstream society.

The hazards literature has identified many of the components that comprise vulnerability (*e.g.* Wisner et al. 2004; Cutter 1996; Kasperson et al., 1995; Tobin and Montz 1997), but few have established clear measures of vulnerability. The stress studies cited above have helped refine which variables are playing a role in this regard. So far, however, no predictive, scientifically-based model, correlating measures of vulnerability with degree of hazard impact, has been developed. Progress has been made, though, notably through the work of Cutter (1996), Cutter et al., (1999) and Emrich (2000), who have attempted to place models on a quantitative footing. However, these need considerable refining before they can be successfully used for policy making.

Distress and Intervention Strategies

The recognition of stress as an outcome of natural disasters has initiated a range of strategies for ameliorating the effects. Feinberg (1999), for example, discusses the need for crisis intervention to ameliorate the impacts of stress following disasters. He points out that people need time to mourn their losses, to feel less victimized, and to get more control of their lives. However, he goes further, suggesting:

Flood victims may be unique because their recovery can be thwarted as a result of a

seemingly endless amount of time that flooding creates before cleanup can begin. Flood waters sometimes take quite a while to recede and the extended agony of waiting to see what is left after your home has been under water for a month aggravates an exceedingly stressful emotional situation (p. 134).

While this is also true of other disasters—for example, ongoing volcanic eruptions that deposit ash across communities—the sentiment is sound. People cannot get on with the recovery process until the event has gone.

The Center for Mental Health Services has put forward guiding principles for crisis intervention programs (DeWolfe 2000). These differ from some traditional approaches in that they avoid the “stigma” associated with mental health, and yet reach out more actively to survivors. The principles are:

1. No one who sees a disaster is untouched by it.
2. There are two types of disaster trauma: a) individual and b) collective.
3. Most people pull together and function during and after a disaster, but their effectiveness is diminished.
4. Disaster stress and grief are normal responses to an abnormal situation.
5. Many emotional reactions of disaster survivors stem from *problems of living* caused by the disaster.
6. Disaster relief procedures have been called “The Second Disaster.”
7. Most people do not see themselves as needing mental health services following disaster, and will not seek out such services.
8. Survivors may reject disaster assistance of all types.
9. Disaster mental health assistance is often more “practical” than “psychological.”
10. Disaster mental health services must be tailored to the communities they serve.
11. Mental health staff need to set aside traditional methods, avoid the use of mental health labels, and use an active outreach approach to intervene successfully.
12. Survivors respond to active interest and concern.
13. Interventions must be appropriate to the phase of disaster.

14. Support systems are crucial to recovery.

Each of these provides guidelines for emergency workers following flood events, but they also require pre-flood planning and preparation. In addition, other guidelines target specific groups, such as children, recognizing that stress affects different people in different ways. The Red Cross has adopted some of these strategies and now makes mental health an important component of its response strategies. Indeed, Red Cross workers have noted that, “The psychological impact of a disaster can actually be worse than the physical.” Consequently, Red Cross mental health workers are an important part of every operation checking on survivors’ emotional well being while others deliver food and cleanup supplies (Ward 2001).

The response by many states in the U.S. has been equally favorable. For example, in Ohio the Ohio Association of County Behavioral Health Authorities now has a very helpful Disaster Clearinghouse that identifies a whole range of resources for dealing with stress after natural disasters including PTSD (OACBHA 2003). Similarly, the New Jersey Office of Emergency Management focuses attention on mental health and stress, citing FEMA literature (New Jersey Office of Emergency Management 2003). North Carolina, a state that has experienced extensive flooding over the last few years from several hurricanes, now has several websites that address issues of stress, including one to help the elderly (NC DHHS 2000). In Indiana, Project Aftermath, sponsored jointly by FEMA and the Indiana Department of Mental Health and Addictions, is an outcome of these mental health concerns that was set up to provide mental health services on a 24-hour basis immediately after severe flooding in September 2003 (IPFW 2003). Workers also toured flood stricken areas to reach out to those affected using the guidelines put forward by the Center for Mental Health Services.

These approaches now reach well beyond U.S. with the European Union, World Health Organization (WHO 2002) and the Pan American Health Organization (Cohen 2003) all studying the relationship between mental health and disasters. The *Asociacion Mexicana Para Ayuda Mental en Crisis* (2003) takes an active role in Latin America and Mexico, using a Critical Incident Stress Management approach to deal with acute stress and

PTSD. It is important to note, however, that innovative techniques will be required to overcome cross-cultural differences. Mocellin (1999) cites the problem of Papua New Guinea with the use of American debriefing approaches to mental health; something that might also be pertinent in different ethnic groups within the United States. Nevertheless, many guidebooks are now available for mental health workers (see Cohen 2000a; 200b). The World Health Organization (Mocellin 1999) is also developing a program on Disasters and Mental Health to:

- advise national authorities and institutions on strengthening the capacity of mental health systems to respond to disasters;
- make available the necessary generic guidelines and training manuals to support national capacity building; and
- facilitate national training using a comprehensive package of guidelines and training materials.

Conclusion

It is the hazard casualties around the world who face the hardships and realities of repeated “natural” catastrophes such as flooding. Inevitably, it seems the poor suffer most. Marginalized from the heart of society, they are frequently more vulnerable than the wealthy, and they usually have only minimal political power to change the status quo. The post-disaster period, itself, leaves little time for remorse, since individuals must get back to meeting their basic needs. Dwellings and shelters must be repaired; bodies and animal carcasses must be disposed of; and in many instances, food obtained. The continuing resilience of these survivors, therefore, is formidable given the social, economic, and political structures in which they live (Tobin and Montz 1997). However, mental stress remains, and it can be debilitating, recurring during anniversaries of the original event or during times of similar conditions. Heavy storms can increase anxiety for flood survivors.

Research into stress and notably the impact on marginalized groups in disasters has expanded considerably in recent years with significant contributions from Enarson and Morrow (1998), Kreimer and Arnold (2000), and Oliver-Smith and Hoffman (1999). Indeed, gender issues, age, ethnic

characteristics, and socio-economic status have now moved to the forefront of much research as scientists seek to explain differential disaster impacts and roles (Cutter 1995; Enarson 2001; Fothergill 1996). Within this context, some basic assumptions on vulnerability and marginalization have been questioned, including those pertaining to female-headed households (Waite 2000) and family cohesion (Stehlik et al. 2000). Research has demonstrated the importance of examining the interaction effects of different factors to determine disaster impacts. In terms of stress, there remain problems with these studies. To quote Norris (2002):

Even very good studies cannot be definitive. No matter how sophisticated, one study cannot tell us that disasters have (or do not have) implications for mental health, only that the particular disaster under study had (or did not have) an effect on that particular population in that particular place. This simple fact is often forgotten in practice, and the reader should be aware of over-generalized interpretations of specific results (p. 1).

In other words, the models must be further refined. However, current research is promising and has already identified many factors that contribute to increased mental stress. These findings, in turn, have resulted in new initiatives and in many instances a pro-active approach to stress and flood events. Moreover, research into some of the positive outcomes of floods and other natural hazards would also seem to be warranted.

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