

ASSESSING SOME LONG TERM CONSEQUENCES OF A NATURAL DISASTER*

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Social scientists have conducted numerous studies during the last decade into a natural disaster's impact on a community. This research (Barton, 1970; Taylor, Zurcher, and Key, 1970; and Yutzy and Haas, 1970), which has primarily studied the relatively short term effects of a disaster, debunks many commonly held myths about how victims and various elements of a community behave in the face of this type of crisis. Quarantelli and Dynes (1972), who comprehensively reviewed the relevant research and studied nearly 100 disasters, concluded that disaster victims typically behave heroically during a disaster. Contrary to the common belief that people flee in panic in the face of a disaster, Dynes and Quarantelli reported that a majority of the inhabitants do not leave the area even when sufficient warning and evacuation orders are given. Prior to Hurricane Carla (Moore, 1964), for example, half a million people left the coastal areas of Texas and Louisiana; but, despite the recognized threat and four days prior warning, the majority of residents never left their own areas. Thirty five percent of the people remained in their own homes and twenty-two percent stayed in the homes of friends and relatives within the threatened area. Dynes and Quarantelli also report that disaster victims are usually not stunned into debilitating psycholog-

ical shock. Those who are physically able spontaneously organize and assist the rescue efforts, reroute congested traffic, barricade unsafe bridges, and even administer emergency first aid to injured victims. Many non-victims who live in the vicinity of the disaster rush to the scene to help in the rescue and evacuation efforts and they voluntarily house and feed displaced victims.

The extant disaster literature also provides evidence that during the emergency period the stricken communities coalesce (Barton, 1970; and Fritz, 1961). Differences in class, race, rank, and age dissolve as the people work side by side to remove the dead, locate the missing, and clear the debris. The people participate as equals in this historic event and they are soon bound together by their common fate which gives rise to a community *esprit de corps*. Even the victims, themselves, develop a high morale. They now have a unique story to tell and to retell to willing listeners; those victims who did not lose loved ones, and they usually are the vast majority, consider the grief of those who lost kin and conclude that they are fortunate; and, the victims are genuinely comforted and uplifted by the support and spontaneous out-giving from friends and even strangers. This warm support and spontaneous help reaffirms their faith in humanity and provides an ample foundation for an optimistic new beginning.

It should be mentioned, however, that not all researchers have reported observing an utopian mood in the wake of a disaster.

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Robert J. Lifton (1969) reported, in contrast to Janis (1951),¹ that an utopian mood did not occur after the atomic bombing of Hiroshima. According to Lifton, most survivors of the atomic bomb showed selfish behavior and a loss of moral standards despite their tradition steeped in community service and helpfulness to fellow countrymen. A technician interviewed almost twenty years later still remembered “a girl in the rain . . . she had no clothing on . . . except her panties . . . she . . . crouched on the ground and she asked me for help, putting her hands in a position of prayer . . . I wanted to do something for her, but she was stark naked . . . so I was at a loss . . .” (p. 50). Many survivors of Hiroshima wandered aimlessly stunned in a state of psychological shock. One victim reported, “all the people were going in that direction and so I suppose I was taken into the movement and went with them . . . I could not make any clear decision in a specific way . . . I lost myself and was carried away . . .” (p. 25).

It is unlikely that the panic, the confusion, and the psychological shock suffered by the survivors of Hiroshima is attributable to any defect in the Japanese culture. And it is also unlikely that the absence of the post-disaster heroic syndrome is attributable to the extreme destruction. The panic, confusion, and psychological shock probably occurred because the first atomic bomb blast, in contrast to a natural disaster or even conventional bombing, was totally beyond the survivors' comprehension. A physicist, for example, who was covered with falling debris and temporarily blinded recalled “my body seemed all black, everything seemed dark, dark all over. Then I

thought, the world is ending . . .” A Protestant minister reported similarly feeling “that everyone is dead. The whole city is destroyed . . . all of my family must be dead — it doesn't matter if I die . . . this is the end of Hiroshima — of human kind . . . this is God's judgement on man . . .” (p. 22). In short, the entire atomic bomb experience left the survivors groping unsuccessfully for words with which they could comprehend the unnatural order. This inability to comprehend their fate and to understand their plight probably accounted for the survivors' general inability to cope and their atypical unheroic behavior.

The extant disaster research which pertains to the victims' behavior in the face of disaster and for the first few days following the catastrophe can probably be properly summarized by saying that the victims behave in accordance with the best of human tradition when they comprehend what happened to them and can reasonably predict their fate. However, whether or not this heroic syndrome and general optimism sustains these victims further down the road is another, largely unanswered question.

Drabek, Key, Erickson, and Crowe (1973) conducted one of the few studies of a disaster's long term impact on individuals. They fortuitously used systematic interviews obtained prior to the Topeka tornado as a basis for assessing family functioning three years after the disaster. The most salient finding of the Drabek et al. study was that three years after the disaster the victims still maintained an utopian mood. They reported fewer symptoms of emotional disorders, they were just as physically healthy as the non-victim controls; and, they frequently reminisced about the help and the offers to help that they had received. The majority of this help and the most significant help came from close friends and relatives with whom the victims, in contrast to the controls, increased their affiliation. Concurrently the victims, in comparison to the controls, tended to extricate themselves from civic organizations and activities. Drabek et al. concluded that the

¹ Reviewers of an earlier version of this paper raised questions about the validity of the observations by Lifton (1969) compared with that reported by Janis (1951); they also questioned treating wartime situations in the same category as civilian catastrophes. Lifton did interview survivors and his account is not purely speculative. While a wartime bombing obviously differs in many respects from a natural disaster, both are certainly major crisis events for the participants and along some lines are analytically comparable.

victims' informal helping networks were essential in fostering and maintaining their durable, extremely therapeutic utopian mood.

The study presented in this paper further researched the long term impact of a natural disaster. In this case the disaster was a rain-induced flash flood that swept through Rapid City, a community in southwestern South Dakota, in the late evening and early morning of June 9 and 10, 1972. Rapid City, with a population of approximately 42,000 people who live nestled against a range of low mountains, was in the direct path of the flood. The disaster did in excess of 100 million dollars in property damage and killed 237 people. By any standards this flood was one of the country's major natural disasters.

METHODOLOGY

All obtainable data that is routinely collected by the city, county, state, or various businesses and might reflect either economic or social post-flood changes was gathered. This data consisted of police arrest records, school attendance, unemployment figures, number of divorces, county health statistics and other quantified information that was systematically maintained as a normal business or government procedure. Such routinely collected data is not, of course, particularly sensitive to a victim's post-disaster psychological state; but, this technique of assessing a disaster's impact did offer three advantages: (1) Routinely collected public records have not previously been extensively used to assess a disaster's impact; (2) The data is inherently more objective and thereby more reliable than a victim's subjective opinions and, (3) The technique respects the victims' right to privacy and does not impose on these people for the sake of rather sterile and cold scientific inquiry.

This study examined post-disaster economic and social changes for the community, as a whole, and for some randomly selected victim families. These victim families were selected

from the 550 such families temporarily housed after the disaster in mobile homes placed on public trailer sites by the Department of Housing and Urban Development (HUD), an agency of the federal government. Fifty families were initially sampled but 15 of these families were dropped from the study because, quite consistent with the community's normal 40% rate of transience per year, they had left town. Of the 35 remaining families, 24 were White, 10 were Indian, and one family was Negro.

FINDINGS

The disaster's most detectable impact was on the city budget which jumped from five million dollars allotted for 1972 to 32 million for 1973. The bulk of this budget increase was flood-related federal dollars that poured into the city to facilitate the post-disaster recovery. During this time the amount of money on deposit at the local banks climbed from a monthly mean of 93 million for the 12 months prior to the flood to a mean of 121 million for the 13 months after the disaster. The dollar value of building permits issued in Rapid City concurrently increased from a monthly mean of \$733,700 for the year prior to the flood to a mean of \$1,950,700 for the next thirteen months. All of these variables are, of course, related to the reconstruction of the flood damaged buildings.

The disaster also had a decided impact on the employment market. The average available work force for the three summer months of 1971 was 25,200 people, but this available work force increased to an average of 27,233 workers for the three months after the flood. However, in these first months after the flood sufficient jobs were not available and the jobless ranks swelled by roughly 1500 people as unemployment shot from 3.9% to 10.4%. The available work force swelled again during the summer of 1973 to a monthly average of 27,417 people; but, during this summer, a full

year after the flood, most of these potential workers found jobs and the unemployment rate stabilized at a monthly average of 3.2%.

The disaster's impact on the cost of living was also examined. Comparisons from the American Chamber of Commerce Research Agency of the cost of living index for Rapid City and Sioux Falls, South Dakota, did not reveal any significant price increases in Rapid City for food, utilities, or housing. The finding that the cost of rental housing did not increase after the flood was so inconsistent with local hearsay that the want ads in the local paper were examined for a comparison of pre- and post-disaster rent prices. The want ads did not substantiate the common belief that there was a significant post-disaster increase in rent prices.

A host of variables were examined to detect community-wide social and personal changes that occurred after the flood. There was no significant increase in the reported number of attempted or actual suicides or single car accidents, which is a variable that could be interpreted as a suicidal gesture. Nor was there any significant increase in juvenile delinquency arrests, citations for driving while intoxicated, automobile accidents, infant deaths, scarlet fever, strep throat, hepatitis, or prescriptions for tranquilizers.

Changes among several variables did indicate, however, that some significant social and personal alterations occurred after the flood. In the 17 months after the disaster the number of divorces and annulments increased by 125 as compared to the previous comparable months and jumped from a former record of 34 in a month to 47 in one month. This increase in the number of divorces and annulments per month was statistically significant ($t = 3.14$, $df = 16$, $p < 0.005$). In the nine months after the flood the number of non-terminated conceptions also increased. The number of conceptions in July of 1972 was 14 fewer than in July 1971, but the number of conceptions increased by an average of 10.6 per month for the next eight

months, which was a statistically significant change ($t = 2.14$, $df = 7$, $p < 0.025$). Concurrent with these social alterations was a statistically significant increase in arrests for public intoxication. In the ten months following the disaster the average number of arrests for public intoxication increased from 230 to 286 per month ($t = 2.12$, $df = 9$, $p < 0.05$). There was also an increase in the number of families receiving Aid to Dependent Children (ADC) from the State Welfare Department. The average number of families receiving ADC for the four quarters prior to the flood was 855. In the four comparable quarters after the disaster the number of families receiving ADC was consistently higher and the mean increase was 41 families.

The disaster's impact on the 35 randomly sampled victim families was also examined from both the economic and social perspectives. These families had four sources of financial assistance after the flood. The Rapid City Disaster Foundation, a quickly formed non-profit corporation that distributed donated money, gave \$1,430,000 to victim families and businesses. However, the board of directors voted to destroy its records when the organization dissolved a year after the flood which made it impossible to identify the victims that actually received money. The Small Business Administration (SBA), a federal agency, loaned money to adult flood victims at 1% interest. This money was intended for replacing personal property and the first \$2500 of the loan was forgiven. The victims could also turn to the Church Disaster Response, a coalition of local churches who pooled their donated money to help flood victims. In addition to these directly flood related sources of financial help, Urban Renewal bought extensive property in the flood-plain to establish a green belt and also paid money to any person who had to relocate as a result of Urban Renewal's purchase of rented living quarters.

Of the 35 sampled families, 80% received an SBA loan, 71% were contacted by Urban

Renewal who determined that 15 families were eligible for money, and 43% obtained money from Church Disaster Response. Of the ten Indian families, nine collected \$32,000 from the Small Business Administration, nine received \$13,332 from Urban Renewal, and eight families collected \$4,674 from Church Disaster Response. The ten Indian families received a total of \$50,406 for an average of \$5,040 per family, which exceeded their reported average yearly income by almost \$1,500. Eighteen of the 24 White families received \$169,600 from SBA. 15 families collected \$40,022 from Urban Renewal, and seven families drew \$874 from Church Disaster Response. One family did not receive any money from any of these sources. The 23 families that received money obtained a total of \$210,496 for an average of \$9,152 which was nearly equal to their reported average income for 1971.

Following the disaster the victims housed in HUD public trailer parks were not more frequently involved in activities that were a liability to the community's welfare, e.g. these victims were not more frequently arrested for public intoxication, driving while intoxicated, moving vehicle violations, or any other offense; they did not make more visits to the community mental health center or the state welfare office; and, they were not more frequently delinquent on their personal property taxes.

These families did, however, manifest some personal symptoms of stress. They made significantly more visits in search of jobs to the local State Employment Security Office in the 12 months after the flood than they had in the same months prior to the disaster ($t = 2.36$, $df = 36$, $p < 0.025$), and their children were more frequently absent from school during the year following the flood ($t = 2.05$, $df = 21$, $p < 0.025$). There was also a strong but not statistically significant trend among the members of the Indian families to spend more days in the Public Health Hospital during the year after the flood as compared to the previous year ($t = 1.31$, $df = 26$, $p < 0.11$) and to make more visits to

that facility's outpatient clinic ($t = 1.36$, $df = 26$, $p < 0.10$).

DISCUSSION

Rapid City, as a community, did not experience a major mental health crisis after the flood. There was no rash of attempted suicides, no line of distressed victims at the door of the mental health center, and there was not even an increase in prescriptions for tranquilizers. In fact, if the articles in the local paper about the guardmen's superhuman response, the heroic acts of particular victims, and the city's miraculous recovery are indicators, then the community, in general, experienced the typical post-disaster utopian mood.

Yet, some marked changes did occur in the disaster's aftermath. There was an increase in arrests for public intoxication, divorces and annulments, non-terminated conceptions, and requests for Aid to Dependent Children. All of these variables can be interpreted as indices of social stress; but, there are several reasons to believe that this stress was experienced by only a small segment of the community and to conclude that the stress was not directly precipitated by the disaster.

The social stress that occurred after the flood was probably felt primarily among a segment of the lower socio-economic categories. It is, after all, the lower socio-economic categories who are generally arrested for public intoxication and it is the lower socio-economic categories who request ADC. Both public intoxication and requests for ADC increased after the flood while the number of prescriptions for tranquilizers, which is a variable that presumably would reflect stress among the middle and upper-middle categories, did not increase. Even the increase in non-terminated conceptions can, according to an official in the South Dakota State Division of Vital Statistics, be attributed to a disproportionately high number of births among minority group women. The only variable among this set of markedly changed social

indicators that does not clearly affix this stress to the lower socio-economic categories is the increase in divorces and annulments.

Not only did this social stress occur primarily among a segment of the lower socio-economic categories but the stress was likely induced by and possibly restricted to the deluge of transient, relatively rootless people who, according to the Job Placement Supervisor of the local South Dakota Employment Security Office, inundated the community in the months following the flood. These people came to Rapid City with less than adequate financial resources and without any assurances of finding jobs in the recovery work. Most of these transients did not find immediate work and the unemployment rate shot upward. Moreover, each of these indices of social stress, i.e. public intoxication arrests, indices of social stress, i.e. public intoxication arrests, divorces and annulments, non-terminated conceptions, and requests for ADC, rose with the unemployment rate. By the summer of 1973 the job market finally absorbed this swelled work force and each of these indices of stress concurrently abated. Clearly, the most plausible conclusion is that these changes were precipitated by this influx of lower socio-economic, transient people who could not find steady employment.

Examination of the routinely collected data for the 35 randomly selected HUD trailer park families revealed that these families generally received substantial financial help from most of the available sources; yet, they suffered some stress in the months following the flood. This stress was not unburdened on the community via more arrests, delinquent personal property taxes, increased visits to the community mental health center, or more demands on the welfare caseworkers. The stress was generally absorbed more personally through heightened unemployment, increased school absenteeism, and more days in the hospital and more visits to the outpatient clinic by the Indian members of the sample.

The stress induced by living in these HUD

post-disaster trailer parks was not, however, unique to Rapid City. Essentially the same debilitating effects of HUD trailer parks were observed in Buffalo Creek, West Virginia (Harshbarger, 1973; and Morris, 1974) and in Wilksbarre, Pennsylvania (Feld, 1973; and McGee, 1973) following disasters in those communities. These indices of stress among the families housed in HUD public trailer parks is in such sharp contrast with the almost invariably reported post-disaster utopian mood that the HUD trailer parks, themselves, are suspect as a source of stress. The very composition of the HUD trailer parks, therefore, warrants examination.

After the Rapid City flood HUD temporarily housed 1270 families in either private rental housing, mobile homes located on private lots, or mobile homes parked on public trailer sites. The more affluent families generally found private rental housing or placed a HUD mobile home on a private lot. The less affluent flood victims tended to be placed on a first-come, first-served basis in HUD trailers on public sites. This procedure placed White, Indian, and Negro families together into almost instantly created and totally unplanned racially integrated neighborhoods. These neighborhoods generally became permeated with such racial tension that the Rapid City Chief of Police instituted systematic patrols of these trailer parks. This racial tension almost certainly played a large role in precipitating the stress among the disaster victims who were housed in the HUD public trailer parks.

This study initially sought to assess the disaster's impact; but, it found that the federal disaster relief program, itself, has a considerable long term impact on the stricken community and the disaster victims. The federal disaster relief program provides considerable help through emergency clearance of debris, temporary housing, and low interest loans; but, according to the findings of this study, the program has some negative effects. These negative aspects are not, however, inherent in the

federal relief program and they probably can be avoided. Specifically, the stress among a segment of the lower socio-economic categories probably occurred because excessively large numbers of transient people came to Rapid City with the expectation of finding jobs in the widely publicized federally financed recovery work. Thus, this stress could have been avoided by news releases that played down the massive federal financial aid and emphasized the relatively high rate of unemployment. Similarly, the stress precipitated by the HUD trailer parks probably could have been mitigated by proper attention to the disaster victims' psychological needs. These victims desire to talk about their grief; they want solace for their losses; and, they need to plan for the future. In short, the disaster victims need the therapeutic strengths of their natural helping networks, which other research (Drabek et al., 1973) has shown to be essential in facilitating a positive post-disaster recovery. However, the HUD temporary housing program destroys the victims' natural helping networks and it more or less isolates the people in racially tense trailer parks. Thus, this stress probably could be ameliorated if the HUD temporary housing program would relocate neighborhoods rather than individual families and would institute a low visibility program that simply put isolated individuals in contact with an effectively functioning helping network.

Beyond detecting several sources of post-disaster stress and suggesting ways to mitigate this stress, this study also provides evidence that routinely collected data such as police arrests, births, marriages, etc. is a reasonably effective technique for studying the impact of a

disaster on a stricken community and on selected disaster victims. Moreover, this technique can be used by researchers to assess the impact of other disasters that have occurred within the last decade and it can provide a basis for comparing the impact of these various natural disasters.

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