Household and Community Recovery After Earthquakes

Robert Bolin

Household and Community Recovery After Earthquakes

Robert Bolin

Program on Environment and Behavior
Monograph No. 56

Institute of Behavioral Science
University of Colorado
1993

Natural Hazards Research and Applications Information Center
Institute of Behavioral Science, #6
Campus Box 482
University of Colorado at Boulder
Boulder, Colorado 80309-0482
Telephone: (303) 492-6819

Published 1994.
Printed in the United States of America.

Library of Congress Cataloging in Publications Data

Bolin, Robert C.
Household and community recovery after earthquakes / Robert Bolin.
p. cm. -- (Program on environment and behavior ; monograph #56)
Includes bibliographical references.
ISBN 1-877943-11-8 : $10.00
1. Earthquakes--California--Whittier. 2. Disaster relief--California--Whittier. I. Title. II. Series.
HV600 1987.W543 1993
363.3'495--dc20 93-38641
CIP

Cover photo: Earthquake damage to a home in Whittier, California, following the 1987 earthquake. Courtesy of the Earthquake Engineering Research Institute.

Table of Contents

List of Figures and Tables

Figures

Tables

Preface

The research presented here is the result of three years of research (e.g., Bolin, 1989; Bolin and Stanford, 1991) funded by the National Science Foundation in the aftermath of the Whittier Narrows Earthquake (October 1, 1987). Until the October 1989 Loma Prieta temblor, Whittier-Narrows was the most recent damaging earthquake in urban California. At a Richter magnitude of 5.9 (hereafter M5.9), Whittier-Narrows fell far short of Loma Prieta's M7.1 mainshock intensity. Nevertheless, the Whittier earthquake had signficant disruptive social and economic impacts over a dispersed area of Los Angeles and adjacent counties. The effects of the Whittier Narrows disaster provide insights into the types of recovery issues that will emerge in the aftermath of a major urban earthquake in California.

Like the earlier study on which this research is based, this project focuses on the community of Whittier, California, which lies east of Los Angeles and is situated near the epicenter of the 1987 earthquake. This report focuses on household and community recovery in Whittier and examines factors and issues that affected recovery processes after the earthquake. This study utilizes a longitudinal research design and presents the findings of two data-collection periods approximately one year apart, beginning two years after the earthquake leveled downtown Whittier. Combined with data gathered from an earlier project on Whittier (Bolin, 1989; Bolin and Stanford, 1991), Whittier recovery has been monitored by the principal investigator from the time of the earthquake until 1992.

The major focus of this research is on individual and household (family) responses to earthquakes. Research findings are also presented on the dynamics of community reconstruction and issues that emerged in Whittier over the course of the research. The primary goal in documenting community reconstruction is to identify and discuss the various issues that have affected recovery processes in Whittier.

The technical approach followed here is consistent with several earlier National Science Foundation-funded studies on family recovery, although the scale of this study has been limited by budgetary constraints. By studying the impacts of this moderate earthquake, I have sought to identify some key social processes and issues that affect recovery from an earthquake in an urban area. This study is limited to a single case study and thus makes no claims to be a comprehensive or definitive study of earthquake recovery. An effort is made to compare Whittier Narrows to existing recovery research on other earthquakes

and to highlight recovery issues that are likely to emerge after other earthquakes in California.

This project is the result of the combined efforts of myself as principal investigator and Helaine Prince-Aubrey, the project research associate who directed much of the data gathering and related analysis activities for this study. I would like to thank the National Science Foundation and project manager William A. Anderson for their support in this and earlier research described here. All conclusions and recommendations are mine and do not necessarily represent the views of the National Science Foundation.

Robert Bolin
Las Cruces, New Mexico

1

Introduction

On October 1, 1987, a moderate-intensity earthquake of Richter magnitude 5.9 (M5.9) rumbled through sections of Los Angeles and adjacent counties. It was one of a series of damaging earthquakes that have stricken various parts of California in the last three decades. This earthquake, known as the Whittier Narrows earthquake, along with the much more powerful 1989 Loma Prieta (M7.1) and the 1992 Landers (M7.5) quakes, are continuing reminders of the widespread earthquake hazard in California. Since 1985, earthquakes of magnitude 5.0 or above have occurred in Southern California at twice the frequency of the previous 40 years, suggesting increasing earthquake hazard in that part of the state.

Virtually the entire population of California is at some risk from damaging earthquakes; both the San Francisco Bay Area and Los Angeles are regions of pronounced seismicity. With population growth in the state and its concomitant urban expansion and population concentration, the number of citizens exposed to earthquake hazards is steadily increasing. This trend pertains not just to California, but to innumerable seismically active areas throughout the world. In order to examine social responses to and recovery from earthquakes, this chapter will address California and global earthquake hazards.

Earthquake Hazards

While the physical risk of earthquakes in seismically active areas is caused by plate tectonics and geomorphological characteristics, the risk of earthquake *disasters* is determined by an interaction of geological and sociological characteristics. Thus, in California and many other regions of the world, human population characteristics and sociocultural practices directly expose millions of people, willfully or unknowingly, to the risk of potentially devastating earthquakes. Where and how people live, the types of structures in which they live

and work, and how they travel all affect their risk to losses from earthquakes (Wijkman and Timberlake, 1988). Of course, these factors also affect the other types of hazards—social, technological, or natural—that people are exposed to as well. Ironically, citizens' awareness of these risks appears to have little relationship to the societal practices that create, maintain, or intensify such risks (see Turner et al., 1986).

The popular media's recent attention to global hazards such as climatic warming and ozone depletion conveys an impression that the planet's physical environment is becoming increasingly hazardous due to ecological degradation and accompanying population growth. There is, of course, concrete evidence that more persons are being exposed to environmental and technological hazards (Misch, 1993). Similarly, natural and technological disasters are impacting more people and producing greater property losses over time (Wijkman and Timberlake, 1988; National Academy of Sciences, 1987).

As Burton, Kates, and White (1978) note, the combined effects of urbanization and population growth are making more people (and property) vulnerable to environmental hazards. Rapid population growth and urbanization in California in relation to the potentially serious earthquake hazard is an ideal-typical example of this collective risk-taking dynamic. The exposure of increasing numbers of residents to earthquakes is simply the unintended consequences of historically grounded trends of population growth and economic expansion.

California's only historical experience with a major earthquake disaster was the 1906 San Francisco earthquake and resultant fire that destroyed more than half the houses and businesses in that city (Bowden et al., 1977). That event, estimated at a Richter magnitude of 7.9 to 8.3, created large-scale social disruption that left an estimated 220,000 homeless (Kates and Pijawka, 1977). It has been estimated that:

> If a repeat of the 1906 earthquake hit San Francisco today, at least 2000 people, and maybe more than 100,000, would die. The figure would largely depend on the time of day and the number of dam failures. But another earthquake in San Francisco is a certainty (Timberlake and Wijkman, 1988).

One scenario has projected that if there were a recurrence of the 1906 San Francisco earthquake today, it could produce property losses of $40 billion (Petak and Atkisson, 1985). The Loma Prieta Earthquake, with its epicenter 60 miles south of San Francisco, created more than $6 billion in losses in only a few seconds of shaking.

The M9.2 Anchorage, Alaska, earthquake of 1964 (Wijkman and Timberlake, 1988) is considered the largest magnitude North American earthquake in historical times (Kates, 1970). However, with a population of a few hundred thousand, the social impacts of the earthquake in Alaska were comparatively

small in absolute terms, with a death toll of 125 and economic losses in the $300 million range (National Academy of Sciences, 1970 and 1987). Due to extensive federal aid and comprehensive centralized planning in the form of urban renewal projects, restoration of residential and commercial sectors in Anchorage was accomplished within a year of the quake, and complete reconstruction in approximately three years (Quarantelli and Dynes, 1989).

Examples from less-developed countries show that earthquake damage to human settlements is as much a function of the nature of those settlements as of the magnitude of the earthquake. For example, in Tangshan, China, a city with a population of more than one million, an M7.6 earthquake destroyed the city and killed more than 242,000 residents (Yong et al., 1988). This death toll was caused by the large number of unreinforced masonry buildings (URM) in Tangshan and the city's location on an alluvial plain subject to liquefaction. In addition to the nature of the dwellings themselves, the death toll was exacerbated by the disaster striking at 3:42 a.m., a time when most people were at home and asleep, thus exposing a greater number of victims to building collapse.

The importance of the time of day of impact is further illustrated by the 1988 Armenian earthquake. The magnitude 6.8 earthquake in the Armenian Soviet Socialist Republic killed approximately 25,000 people, in part because it occurred mid-day when large segments of the population were in factories and multi-storied concrete buildings that collapsed suddenly. A second M5.8 aftershock struck within minutes of the first, causing the collapse of additional buildings. In all, 17% of all habitable buildings in Armenia were destroyed by this relatively "moderate" mainshock and aftershocks (Wyllie and Filson, 1989).

Examples such as these illustrate that it is the patterns of social organization and physical characteristics of human settlements that determine their vulnerability to hazard and not simply the geological characteristics of a locale. What is regarded by many as a "natural" disaster may in fact be the consequence of a great number of intentional or unintentional acts on the part of humans inhabiting an area. While the disaster agent may emanate from natural sources, many of its effects on human settlements may be completely avoided with adequate awareness, knowledge, and planning.

Although major earthquakes (magnitude 7.0 and above) are comparatively infrequent events in contrast to floods, cyclones, hurricanes, and tornadoes, they can produce very large death tolls, particularly when they strike less-developed countries with large, poorly housed populations. For example, this century has seen earthquakes kill 10,000 or more in Guatemala, Argentina, Chile, Morocco, the Soviet Union, Iran, Colombia, India, Ecuador, Venezuela, China, Italy, Peru, Iran, and Mexico (Wijkman and Timberlake, 1988; National Academy of Sciences, 1987). Furthermore, earthquakes are often trigger events for other disasters that may be more devastating that the earthquake itself. Tsunamis,

avalanches, fires, dam breaks, and landslides often contribute significantly to the death and destruction of earthquakes (National Academy of Sciences, 1987).

Earthquakes of even moderate magnitude and intensity can completely overwhelm the ability of less-developed countries (LDCs) to respond with emergency relief or temporary shelter for victims (e.g., Bates, 1982). With economies that fail to keep pace with uncontrolled population growth, along with associated environmental degradation, poor quality housing, large-scale occupancy of hazardous areas, and few fiscal resources, such countries lack the material means and governmental capacity to cope with large-scale earthquake (or other) disasters (Lima et al., 1988). As a result, in LDCs responding to and recovering from an earthquake may present such difficulties that even a return to the *status quo ante* is difficult. Of course, as Wijkman and Timberlake suggest (1988, p. 119), the *status quo ante* in developing countries is typically a tenuous position to begin with, and attempting to return to it may serve only to reproduce past mistakes without reducing risk to residents. As will be discussed in Chapter 2, earthquakes can also provide opportunities to enhance building safety and economic development through adequate planning and resources (Kreimer and Munasinghe, 1991).

Apart from the destruction of lifelines and economic infrastructure in human settlements, earthquakes often create a large population of homeless victims, particularly in less-developed countries. Even the moderate magnitude 6.2 earthquake that struck Managua, Nicaragua in 1972 left 250,000 residents (out of 450,000) homeless (Trainer, Bolin, and Ramos, 1977). The provision of emergency shelter and temporary shelter (Quarantelli, 1982) is of singular importance in post-earthquake situations such as this. It is also a social process that is typically accompanied by a number of socio-cultural and political-economic difficulties, which will be discussed in Chapter 2 (Bolin and Stanford, 1991).

Given the global impacts of earthquakes and the significant potential for major earthquakes in the United States, preparing for and responding to such disasters is a central concern among numerous federal and state agencies. Many of these efforts are organized and funded under the National Earthquake Hazards Reduction Program (NEHRP).

California Earthquake Hazards

From the perspective of policy makers, urban planners, and emergency responders in the U.S., key concerns appear to center on determining earthquake risks and developing appropriate plans to respond. Responses include mitigation, preparedness, emergency response, and recovery. Unfortunately, but perhaps predictably, earthquake hazard mitigation policies are most easily enacted only *after* an earthquake reminds policy makers that hazards persist and do not go

away simply because they are not an active part of social or political consciousness at a given moment (Olson, 1985).

Because California has had a number of significant earthquakes in this century, including the recent highly publicized Loma Prieta temblor in 1989, it has been more active than most states in formulating and implementing policies designed to reduce earthquake hazards (Drabek et al., 1983). However, reducing earthquake hazards can be expensive (e.g., increased building construction and seismic retrofitting costs, restrictive zoning, and lost revenues from relocated businesses). Likewise, because the financial benefits of mitigation are difficult to measure in the face of uncertain risks, earthquake preparedness and mitigation seldom attracts significant political support (Palm, 1985; Comerio, 1990b).

The most significant earthquakes experienced in California include the Longbeach earthquake of 1933 (M6.3), the Kern County earthquake of 1952 (M7.7), and the San Fernando Valley earthquake (Sylmar) of 1971 (M6.4). None of these earthquakes were as destructive as the 1906 San Francisco earthquake, although the Sylmar quake produced almost half a billion dollars in property losses in the Los Angeles area and killed 64 people. More recently, the town of Coalinga, in central California, was heavily damaged by an M6.7 event in 1983 (e.g., Bolin and Bolton, 1986). The 1989 Loma Prieta earthquake (M7.1) was the most damaging earthquake to affect a metropolitan area in northern California since the 1906 San Francisco earthquake. As will be discussed in Chapter 6, it left some 13,000 homeless and heavily damaged Santa Cruz and Watsonville, located near the epicenter in Santa Cruz County (U.S. Geological Survey, 1990).

Urban southern California's most recent damaging earthquake, and the subject of this report, was the Whittier Narrows earthquake (M5.9) of October 1987. While ostensibly moderate in intensity, the Whittier Narrows earthquake managed to create significant pockets of destruction in areas of Los Angeles County. In 1992 the desert areas of southeastern California were struck by a series of powerful earthquakes, although the low population densities of the area limited the human impacts of those temblors.

California's history of relatively frequent earthquakes has caused various agencies and organizations to take an active role in hazard mitigation and disaster preparedness (e.g., Turner, Nigg, and Paz, 1986). Among organizations that have been recently active in mitigation, preparedness, and public education programs are the California Seismic Safety Commission, the state of California Office of Emergency Services, the Bay Area Regional Earthquake Preparedness Project (now part of the Office of Emergency Services), and the Southern California Earthquake Preparedness Project (SCEPP) (Lambright, 1985).

Overview of the Study

This brief review of earthquake hazards draws only a very broad outline of the scope of earthquake risks and some of the issues involved in preparing for and responding to them. Although preparedness and mitigation are important components of overall societal responses to earthquake hazard, an assessment of their effectiveness can only take place after an actual earthquake. The more recent earthquakes in California provide limited but useful test cases for the level of emergency preparedness and response capabilities that exist in that state.

Because of the limited number of significant earthquakes and their comparatively limited damage levels (compared to LDCs), there have been only a few studies on longer-term social responses to California earthquakes. These response and recovery studies, as well as those from other major earthquakes, will be reviewed in Chapter 2. To provide a broader view of earthquake recovery and to highlight recovery issues in other societies, findings from studies of earthquakes in less-developed countries will also be reviewed.

In Chapter 3 the basic methodology of the current study will be reviewed. The research questions and the study's design will be discussed, along with the methodologies utilized to obtain data. Chapter 4 will present a descriptive overview of the Whittier Narrows earthquake of October 1, 1987—the main focus of this research. The event's impacts will be summarized in terms of the types of losses and their distribution. Emergency period responses to the earthquake will also be discussed in that section. Chapter 4 will also include a general chronology of the response and restoration activities and will conclude with a discussion of reconstruction of the central business district in Whittier.

Chapter 5 will present an analysis of two waves of survey data, with a focus on household and community recovery from the effects of the Whittier Narrows quake. Reconstruction issues will also be examined. Major sections of Chapter 5 include: a demographic profile of the victims surveyed, an assessment of aid utilization and household recovery, and a description of the persistent psychosocial impacts of the earthquake.

The Chapter 6 will summarize the major points covered and identify key recovery issues and assess their significance. A general comparison will be made of recovery issues in Whittier to those that emerged following the Loma Prieta earthquake. Lastly, these findings will be placed in the context of general earthquake response and recovery strategies, while addressing their general policy implications. Because of the scale of anticipated earthquakes in urban southern California, the nature of household and community responses to, and recovery from, even a moderate earthquake will be instructive for the assessment of current preparedness and the development of future recovery strategies.

2

The Social Impacts of Earthquakes: A Literature Review

This chapter will review research on shelter, housing, and recovery following earthquakes. Responses to and recovery from earthquakes will be examined from individual (psychosocial), household, and community levels of analysis. This review will examine a body of literature that enhances both the conceptual framework and the methodologies used in this study. While much of the literature on earthquake impacts focuses on less-developed societies, that research has relevance for earthquake disasters in the United States. Many of the same social, political, and economic factors that affect recovery in under-developed countries also affect response and recovery after earthquakes in industrialized societies such as the United States. These include the types of aid programs that are most effective for household recovery, the role of the central government in organizing and funding recovery, and the use of reconstruction as a vehicle for economic development and hazard mitigation. Each of these "less-developed country issues" has implications for earthquake recovery in developed countries as well.

I have divided the discussion of the research literature into three major areas: 1) sheltering and housing of victims, 2) household recovery and community reconstruction, and 3) psychosocial effects of disasters on individuals and families. Each of these areas pertains to aspects of the overall recovery process for victims (e.g., Bolin and Bolton, 1986). My intent in this chapter is to present findings relevant to studying recovery in Whittier, rather than to provide an exhaustive literature review (e.g., Drabek, 1986).

Sheltering and Housing

The acquisition of shelter and housing by disaster victims is a potentially complex social process (Quarantelli, 1982; Bolin and Stanford, 1991) and is a key feature of the recovery process at the household level. Research has identified a number of variables that affect the course and outcome of this process. These factors include household and community characteristics as well as the qualitative nature of disaster impacts. Among these factors are:

- demographic composition of the household, particularly age structure and household size;
- material and fiscal resources available to householders;
- the nature and scale of material losses sustained;
- the proportion of the surrounding community impacted by the disaster;
- housing needs and preferences of victims;
- availability of sheltering and housing alternatives in the community;
- the ability of victims to relocate away from the disaster site; and
- the availability or provision of housing assistance from social networks (Quarantelli, 1985 and 1991; Bolin and Stanford, 1991).

The specific types of victim responses to a disaster in relation to shelter and housing are influenced as well as constrained by general socio-cultural, ecological, historical, and political-economic factors that exist in a community. Among factors that influence victims' post-disaster housing experiences are: the availability of non-hazardous areas on which to locate temporary shelter facilities, the scope of post-disaster reconstruction programs initiated by public and private sources, historically prevalent community practices regarding housing, the extent of governmental housing and aid programs, relocation of business and industry employment sources away from the disaster site, post-disaster land use changes, post-disaster hazard mitigation efforts, political actions, and the promotion of specific class interests in the reconstruction process (Aysan and Oliver, 1987; Bolin and Bolton, 1986; Geipel, 1982; Bates, 1982; Mitchell and Miner, 1978; Oliver-Smith, 1986, 1991; Pantelic, 1991; Trainer, Bolin, and Ramos, 1977).

In discussing the details of post-disaster sheltering and housing, it is useful to follow the taxonomy offered by Quarantelli (1982). In chronological order from disaster impact, the four types of shelter identified by Quarantelli are: emergency shelter, temporary shelter, temporary housing, and permanent housing. Quarantelli (1985) suggests that this classification scheme is necessary in understanding the heterogeneous nature of post-disaster sheltering behavior that typifies community-wide natural disasters. Post-disaster housing should not be thought of as a simple linear process moving through four distinct phases.

Rather, the return to permanent housing is an uneven and complex process in which all types of sheltering arrangements may coexist in the recovering community (Bolin and Stanford, 1991).

Emergency shelter refers to unplanned and spontaneously sought provisional shelter arrangements. Such shelter is utilized in the immediate pre- and post-impact phases of a disaster, and may be occupied for only a matter of hours. Often areas become *de facto* emergency shelters simply because disaster refugees congregate there. As Quarantelli (1982) notes, victims will tolerate relatively primitive conditions in these sheltering arrangements because of their assumed short-term nature, typically only a few hours. In many instances, emergency sheltering arrangements become temporary shelters as some victims find they cannot go elsewhere due to the emergency and thus "settle in" where they are for a longer stay.

When victims seek shelter away from their pre-disaster residence for a period longer than the height of the emergency phase, they are said to be in temporary shelter (Quarantelli, 1985). While this phase of sheltering may be an extension of emergency shelter, particularly among poorer victims, those with adequate social or economic resources often seek out other less public sheltering arrangements, often with relatives or friends (e.g., Bolin, 1982). The distinguishing feature of temporary shelter, according to Quarantelli (1985), is that the duration of occupancy is such that victims will require facilities that provide meals, sleeping arrangements, and (possibly) medical care for a period of days or weeks.

In the case of mass public shelters, a common phenomenon in U.S. disasters, providing for the longer-term needs of homeless disaster victims requires organizational planning and the provision of resources by central authorities or other mass-emergency specialists. Mass temporary sheltering usually mandates the presence of emergency services personnel (i.e., shelter managers) and the availability of food and medical services for disaster victims (Quarantelli, 1985; Bolin and Stanford, 1991). In the U.S., temporary shelters are often preplanned mass-sheltering arrangements in public or other large buildings (e.g., schools or armories) that are organized and managed by the American Red Cross (ARC). Occasionally, tents provided by the military may be used in situations where there are large numbers of homeless victims and an inadequate number of permanent structures in which to house them. These sheltering arrangements are popularly referred to as "emergency shelters," although in Quarantelli's typology they are, in fact, temporary shelters, given their provisions for occupancy often well beyond the actual emergency period. There is ample evidence in the literature that such organized mass shelters will be avoided by victims if they are able to make alternative sheltering arrangements (Quarantelli, 1982; Drabek, 1986).

In situations where a significant portion of a community escapes earthquake damage, victims may be "absorbed" as evacuees into the homes of nonvictims,

usually friends or relatives, although this presupposes the availability of social networks that victims can utilize (Bolin, 1982). As Quarantelli (1982) has noted, it is difficult for emergency planners to anticipate just how many victims may seek temporary shelter in the homes of kin and friends rather than go to public shelters. Consequently, it is correspondingly difficult to anticipate mass shelter needs during disaster contingency planning. Generally, research indicates that public shelters in the United States tend to be under-utilized by victims, although this varies by class and social network factors (Drabek, 1986). However, evidence from the Loma Prieta and Whittier Narrows earthquakes suggest that in the case of areas with pronounced housing shortages, shelter demand could be very heavy (Bolin and Stanford, 1991).

Temporary housing, the third phase, "involves the reestablishment of household routines, but with the understanding that more permanent quarters will be obtained eventually" (Quarantelli, 1985, p. 130). In federally declared disasters in the U.S., temporary housing is provided or funded under the auspices of the Federal Emergency Management Agency (FEMA). While temporary housing programs under FEMA may take several forms, currently (1992) FEMA most often provides victims with cash grants to allow rental housing units to be obtained until some sort of permanent housing can be reestablished at the victim's initiative. These cash grants provide rent subsidies for disaster victims for two or three months, the time depending on whether the victim was a renter or a homeowner at the time of the disaster, respectively (General Accounting Office, 1991). If temporary housing is required for longer periods, FEMA's policy has been to periodically review the eligibility of the victim for continued support—a potentially intrusive process that victims often resist (Golec, 1983). Eligibility is dependent on the victim either actively looking for alternate housing or rebuilding existing housing (Bolin and Bolton, 1986).

In some instances mobile homes are provided by FEMA for temporary housing. This occurs only when existing housing rental stock in a disaster-impacted community is not sufficient to house disaster victims. Research suggests that mobile homes seem to be a problematic form of temporary housing in the U.S. (Bolin, 1982; Golec, 1983; Quarantelli, 1985). Temporary housing such as mobile homes can become permanent housing, although it is seldom planned for or situated with that eventuality in mind (Haas, Kates, and Bowden, 1977; Bolin and Stanford, 1991). Public concerns over temporary housing camps becoming permanent can, in fact, delay the establishment of such camps, as seen in the recent Loma Prieta earthquake (Bolin, 1990).

Permanent housing, as the presumed endpoint of the housing recovery process, is the least studied as well as the least planned-for element of post-disaster housing (Quarantelli, 1985). This lack of planning reflects the individualized *laissez faire* nature of private housing in the United States as well as declining federal support for urban housing programs, particularly those designed for lower-income citizens. Relying heavily on so-called market forces

to "manage" the return to permanent housing has predictable outcomes. Simply put, success in re-establishing permanent housing appears to be strongly associated with the social class of the victims, with higher socio-economic status victims generally returning more quickly to permanent housing than poorer victims[1]. Wealthier victims are also more likely to establish new housing that is equivalent to or better than their pre-disaster residences in terms of size and amenities (Bolin and Bolton, 1986). The Small Business Administration disaster home loan program is most directly involved with permanent housing and is almost exclusively used by those with above-average incomes and reliable employment (Bolin, 1982; Bolin and Bolton, 1986; General Accounting Office, 1991).

As noted above, sheltering and housing disaster victims are best understood as social processes affected by unique combinations of factors in different disasters (nature and distribution of losses and damage), physical environmental factors, historical and cultural patterns of housing and housing preferences, the availability of resources to victims, and decision making by political and economic influentials. From the beginning it is difficult to anticipate how these various forces might conspire to affect sheltering and housing processes after earthquakes. It is clear that pre-disaster housing patterns and other patterns of social inequality will likely be reproduced in post-disaster reconstruction (Bates, 1982; Caporale, 1989). Thus, pre-disaster housing conditions and trends will strongly influence post-disaster patterns of housing return.

Given the class-driven differential rates of housing recovery, all four types of disaster housing and shelter may occur simultaneously in a community. Thus, some victims may still be in emergency or temporary shelter, while others may have already re-established permanent housing (Bolin, 1982). Such circumstances make management and planning of shelters, temporary housing, and housing recovery a major organizational task for emergency services personnel and agency officials.

A number of researchers have discussed problems that may arise in post-disaster housing. Briefly, these housing problems can include: indecisiveness by local planners regarding where to locate temporary housing facilities, organizational delays in the acquisition and deployment of temporary housing units, exclusionary standards for victim eligibility, housing inappropriate to the cultural preferences of victims, poorly situated temporary housing camps, inadequate transportation arrangements for dislocated victims, conflicts among residents of

---

1. A recent phenomenon in U.S. disasters is the growing number of marginally housed or homeless persons who seek shelter in disaster facilities after disasters. Although many of these very poor persons have no permanent housing to begin with, their situation can be made worse by earthquakes, particularly when single-room occupancy hotels are damaged or destroyed, as was the case with the Loma Prieta earthquake.

housing camps, and the hazardousness of the housing itself (Bolin, 1982; Bates, 1982; Davis, 1975; Caporale, 1989; Loizos, 1977; Baldassaro, 1975; Davis, 1977; Raphael, 1986).

As Quarantelli (1985) notes, it is not clear if the reported problems associated with post-disaster housing are the result of the characteristics of the disaster event, the physical nature of the housing, the nature of housing program administration, or other undetermined factors. Problems caused by social responses to disasters that are beyond or in addition to those caused by actual disaster impact are usefully referred to by Quarantelli (1985) as "response generated demands." Thus, the nature of social responses to disasters, particularly in temporary housing, can create further disruptions to individuals and families, prolonging or exacerbating the stresses associated with the disaster (Golec, 1983; Bolin, 1982).

The literature identifies a number of temporary shelter and housing alternatives that are frequently used in the aftermath of physically destructive disasters. In U.S. disasters, victims employ several alternative strategies including living in damaged homes while repairs are made, obtaining apartments or rental homes temporarily, using mobile homes or campers, and "doubling up" with a host family (Bolin, 1982; Raphael, 1986; Drabek, 1986). The latter, while documented in a number of early as well as more recent studies (Instituut voor Sociall Onderzoek, 1955; Young, 1954; Loizos, 1977; Bolton, 1979; Bolin, 1982), appears a viable temporary-housing alternative primarily in societies with extended kin networks and where family privacy is of low saliency. Although not studied extensively in the U.S., Bolin (1982) found that beyond a period of approximately one month, the host-victim relationship could become strained within the confines of a single-family dwelling.

Beyond merely descriptive studies of the variety of post-disaster housing arrangements, researchers have in the last 15 years begun to focus on the dynamics of community and urban reconstruction as a long-term processes involving a complex of social, political, and economic issues.

Recovery and Reconstruction

A multi-site longitudinal study of community recovery after disaster by Haas and others (1977) was the first of several recovery and reconstruction studies that have been conducted over the last two decades. Haas and his colleagues proposed a basic four-stage linear model of the reconstruction process, with each stage possessing specific characteristics: the emergency period, the restoration period, the replacement reconstruction period, and the "commemorative, betterment, and developmental" period (Haas, Kates, and Bowden, 1977, p. xxvii). Each of the first three phases is suggested by Haas and others to last approximately 10 times as long as the preceding phase. For example, a two-

week emergency period will be followed by a 20-week restoration period and a 200-week reconstruction period.

Such a model implies a determinant relationship among the stages, although no causal mechanisms are specified. The linearity and phase occurrence of the model has been contested by others (e.g., Berke, Kartez, and Wenger, forthcoming). Haas, Kates, and Bowden (1977) do note that there may be mitigating circumstances and countertendencies that can lengthen or shorten the reconstruction process and the length of the phases. The authors also discuss the possibility of considerable overlap among the phases (e.g., reconstruction may begin during the restoration phase, and so forth) (Haas, Kates, and Bowden, 1977). In general this recovery model describes community recovery as proceeding in a linear and relatively orderly fashion to an apparently inevitable conclusion of recovery.

Haas' recovery model has been criticized by more recent recovery researchers (e.g., Berke, Kartez, and Wenger, forthcoming). In a multi-site study of community recovery, Rubin, Saperstein, and Barbee (1985) found instances where the four stages occurred out of sequence or simultaneously within the same community. Correspondingly, Quarantelli (1989) argues that the Haas model fails to adequately grasp the heterogeneous and often conflictual nature of the recovery process. Recovery is best seen as a complex social process dependent both on the material conditions rendered by the disaster and the complex array of political-economic and social forces existing in the community both before and after the disaster (e.g., Bates, 1982; Caporale, 1989).

Sheltering and housing of disaster victims is analytically and empirically embedded in the overall process of recovery (e.g., Bolin, 1982). Housing is perhaps the most significant element in recovery to the victim family or household. Research has suggested that housing recovery is relevant when discussing family recovery. Some studies (e.g., Bolin, 1976; 1982) have utilized multi-dimensional modeling in which housing recovery, along with other aspects of recovery, were subject to multivariate analysis to determine which factors best explain recovery. Such models are based on a longitudinal and processual conceptualization of household recovery that includes a complex of explanatory factors (e.g., Bolin, 1982; Drabek and Key, 1984).

Studies of family and household recovery have established that recovery involves a number of dimensions that can be measured reasonably well. Disasters can have a multiplicity of effects on a household, including physical losses to property, injury and/or death, loss of job or livelihood, disruption of social and personal relations, relocation of some or all members of a family, physical disruption or transformation of community and neighborhood, and increased household indebtedness (Drabek and Key, 1984; Bolin and Bolton, 1986; Raphael, 1986). Clearly, understanding recovery as a process involves examining a number of factors that influence its course.

Bolin (1982) developed a model of family and household recovery that included several components: economic, housing, quality-of-life, and emotional recovery. Each dimension was measured using respondents' personal judgments and assessments of their recovery status, and as such, these may be referred to as subjective measures. Recovery, in that study, was examined over a period of two years using repeated measures on a panel of disaster victims. Key to effecting recovery was the ability of household members to access shelter and housing aid, particularly from federal programs. Agency aid and social support were found to be important factors in affecting various recovery outcomes, although the majority of victims in Bolin's (1982) research indicated the aid was inadequate to their needs. Additionally, economic recovery was found to be a precondition of emotional recovery, except in the case of elderly victims (Bolin, 1982; see also Bolin and Bolton, 1986). Older victims recovered more quickly in terms of psychosocial impacts, but were more likely to experience a long-term decline in standard of living. Thus, households may recover more quickly in some dimensions than in others, depending on household demographics, losses, aid received, and social class (Bolin and Bolton, 1986).

Other studies on recovery have utilized "objective" indicators of household recovery, focusing more on specific measures of pre- and post-disaster physical and material circumstances of victims (e.g., Trainer and Bolin, 1978; Bolin and Bolton, 1983; Bates, 1982). In a cross-cultural study, Bolin and Bolton (1983) measured household recovery using three specific variables: house-size recovery, income recovery, and recovery of household conveniences. Each measure consisted of comparisons of pre- and post-disaster house size (number of rooms), aggregate household incomes, and the number of "conveniences" (major appliances, etc.). Such measures provide numerical data on recovery but abjure subjective dimensions of how victims feel about their post-disaster recovery.

Bates (1982; see also Peacock et al., 1987) have developed a "domestic assets index," a quantitative scale used to measure the value of a household's physical assets and employed in an extensive study of the 1976 Guatemalan earthquake. It is based on assets used to perform vital household functions or activities and appears useful as a measure of household recovery after disaster (Peacock et al., 1987). The intent of the domestic assets index is to assess the impact of disaster on households in comparison to nonimpacted households. That is, according to Bates (1982) household assets are continuously changing and a disaster may be expected to have differential impacts superimposed on the existing household change vectors. As Peacock et al. (1987, p. 83) conclude about household recovery after the Guatemalan earthquake of 1976:

> The most important single determinant of household recovery . . . following the . . . earthquake was aid program involvement. Housing programs that were designed by agency personnel and planners to provide temporary housing proved

> to have long-term negative effects on recovery. . . . Temporary houses simply became semi-permanent dwellings, perhaps due to economic and social factors associated with the 'normal conditions of underdevelopment' in Guatemala. Permanent housing programs . . . had exactly the opposite effect in that they not only produced recovery on an average, but resulted in positive increases in . . . domestic assets well above recovery levels because they provided participants with long-term housing that was superior to pre-disaster housing in most cases.

Thus, Peacock and others (1987) found that in Guatemala temporary housing programs inhibited recovery. Further, because of the unequal distribution of permanent housing aid, the net outcome of the earthquake recovery process was an increase in societal inequality (Peacock et al., 1987; Bates, 1982). Social class of the victim households was a determining factor in the type of housing aid received and the levels of recovery attained (see, for example, Bolin and Bolton, 1986; Oliver-Smith, 1986, 1990; Wijkman and Timberlake, 1988). The relative success of permanent housing programs over temporary housing programs could have implications for U.S. disaster relief programs as well (e.g., Comerio, 1992).

Bates' research on the 1976 Guatemalan earthquake and Bolton's research on the 1972 Managua earthquake (Haas, Kates, and Bowden, 1977) amply demonstrate the vulnerability of less-developed countries to the impacts of earthquakes, particularly regarding sheltering and housing of large victim populations (Oliver-Smith, 1991). The task of providing housing for 250,000 after the 1972 quake in Managua was well beyond the capabilities of the Somoza regime and required substantial international financial support, materiel, and expertise (Bolton, 1979). However, because much of the housing provided in Nicaragua as part of the international relief effort was culturally inappropriate;[2] it went unused in spite of a severe housing shortage (Trainer, Bolin, and Ramos, 1977). Evidence from the 1985 Mexico City earthquake suggests that internally developed housing programs that are sensitive to local culture, utilize citizen input, and hire local residents as building laborers may provide a more successful approach to housing recovery (Kreimer and Echeverria, 1991).

As a result of explosive population growth in less-developed countries, increasing numbers are living in areas prone to earthquakes and associated hazards such as mudflows and landslides (Wijkman and Timberlake, 1988). Unchecked population growth is accompanied by deep poverty in significant portions of the population, who lack the resources, materials, and knowledge to build homes that are reasonably safe in an earthquake. The combination of hazardous structures (e.g., those made from adobe) situated in hazardous zones

---

2. Some of the housing was in the form of polystyrene "igloos" in which Nicaraguans refused to live (Bolton, 1979).

contributes to the destruction that earthquakes have caused in LDCs (National Academy of Sciences, 1987; Kreimer and Munasinghe, 1991). While such problems are less pronounced in the United States, populations continue to expand in areas subject to major seismic activity.

The literature suggests that earthquakes can create major recovery problems in developed countries as well (Davis, 1977; Hogg, 1980; Geipel, 1982). Studies on a series of Italian earthquakes since the 1960s illustrate the range of housing and reconstruction problems that can be created by repeated seismic events. Caporale (1989) has argued that problems of recovery and reconstruction reflect not just the nature of damage, but the entire complex of socio-cultural and political-economic characteristics of the social order, especially the historical trends in an area.

Following the Campania-Basilicata disaster, the government of Italy responded by encouraging emigration from the impact zone while heavily subsidizing public reconstruction using a decentralized authority to oversee the process. Caporale notes (1989) that pre-existing cultural forms, specifically familism and clientelism, manifested themselves in the recovery process, leading to greater social inequality, gains in sectarian advantage by certain groups, and major delays in recovery and reconstruction. Increases in social inequality resulted in corresponding increases in political and social conflict as well as unprecedented litigious actions of citizens against officials. Rossi (1982) has likewise indicated that the cultural ethos of a community is a key mediator of recovery processes (see also Geipel, 1982).

Caporale's (1989) study of the Italian earthquakes shows that large amounts of aid and elaborate disaster legislation are not, in themselves, sufficient to insure reconstruction after a major disaster. Political and cultural conflicts over recovery plans and the lack of organizational capacity at the local level can severely inhibit the pace of reconstruction of earthquakes with regional impacts (e.g., Haas, Kates, and Bowden, 1977; Aysan and Oliver, 1987). Central government aid programs and the nature of the authority structure in those programs will necessarily articulate with existing power structures and cultural practices at local levels, sometimes with unintended consequences.

Reconstruction after the Friuli earthquake of 1976 further illustrates how the historical and cultural dynamics of a community can influence the reconstruction process, often slowing it. As Hogg (1980) found, in the village of Venzone in Friuli, there was extensive use of prefabricated housing in providing temporary shelter and housing for victims. These prefabricated buildings altered the spatial and cultural qualities of the village. Hogg writes (1980, p. 182) that in Venzone the reconstruction:

> radically altered the character of the community as a whole. . . . [F]ollowing relocation some wage earners have to spend more time and money commuting . . . to work, or some people find their new neighbors incompatible. The houses

> tend to be small, identical and closely spaced in any one area of prefabricated dwellings, and this can have an adverse psychological effect on the inhabitants.

Hogg notes that the cultural dynamics in Italy were such that inhabitants of the Friuli area were less worried about the speed of reconstruction (see Haas, Kates, and Bowden, 1977) and more concerned about maintaining architectural integrity of style when homes and public buildings were rebuilt. The desire to properly rebuild centuries-old and historically significant buildings slowed reconstruction and resulted in temporary prefabricated homes taking on a near-permanent status. Preservation of historic buildings after U.S. earthquakes is becoming an increasingly contentious issue that can slow building reconstruction and overall recovery (Bolin, 1989).

Alexander's research on the Abruzzo and Umbria (central Italy) quakes of 1984 also illustrates the role of sociocultural and political-economic forces in determining the pace of reconstruction. Laws governing earthquake reconstruction in Italy at the time of Alexander's research required municipalities to file a government-approved General Urban Plan prior to receiving any funds for reconstruction (Alexander, 1986). This in turn required the development of a detailed plan for reconstruction of damaged areas—a time-consuming process. Alexander notes that, lacking such a plan, smaller municipalities often needed several years to produce a reconstruction plan and to obtain approval for it. Such requirements delayed earthquake reconstruction, but also insured that it proceeded in a rational and culturally acceptable manner once it began.

In Italy, concerns with the cultural significance of structures and patterns of joint ownership of multiple-occupancy dwellings required sometimes lengthy consideration and modification of reconstruction plans. Thus, Alexander (1986, p. 61) writes that "a small to medium sized earthquake disaster will generate reconstruction that lasts 12-15 years. A large catastrophe or badly managed situation will generate reconstruction lasting 20-25 years, or even indefinitely if the funds are not well spent."

Greene's (1987) report on reconstruction after the Skopje earthquake (in the former Yugoslavia) provides insights into recovery dynamics in societies with strong traditions of central planning. Greene notes that although Skopje utilized systematically planned reconstruction that incorporates seismic safety concerns within the context of massive national assistance, some sectors had difficulty meeting the redevelopment requirements. Further, the massive influx of aid made Skopje a boomtown, tripling its population, adding to environmental degradation, and creating reconstruction difficulties. Greene (1987) found that 25 years after the quake, reconstruction and redevelopment were not yet complete in all sectors of Skopje. The subsequent disintegration of Yugoslavia as a political entity and ensuing civil war would appear to negate any possibility of a future "top down" earthquake reconstruction program.

In the United States, the Alaska earthquake of 1964 and the Coalinga, California, quake of 1983 have been the focus of reconstruction and recovery research. In the case of the Alaska temblor, the city of Anchorage sustained damages in excess of $250 million (in 1964 dollars) from the largest magnitude earthquake (M9.2) recorded in the U.S. this century (National Academy of Sciences, 1970). The bulk of reconstruction was paid for and managed by the federal government and took place under the aegis of urban renewal projects. Much of the reconstruction was planned through the activities of joint state-federal task forces. The extensive aid and planning, coupled with the relatively small impacted population, resulted in complete restoration of both residential and commercial sectors within a year, and final reconstruction accomplished within three years of impact (Haas, Kates, and Bowden, 1977). Alaska constitutes a key example of how a centrally managed and planned recovery program can be effective in the face of a predominantly free-market ideology.

The Coalinga, California, earthquake of 1983 resulted in major impacts on a relatively small (population 6,000) and geographically isolated community in west central California. The M6.7 earthquake caused $31 million in damages and destroyed 90% of the primarily unreinforced masonry buildings in the central business district (French, Ewing, and Isaacson, 1984). Damage to private homes was extensive enough that FEMA provided some 200 mobile homes as part of their temporary housing program (Bolin and Bolton, 1986). In addition to the temporary housing, FEMA also funded much of the reconstruction of public buildings and infrastructure.

The Small Business Administration (SBA) provided low-interest loans to some individuals and businesses to rebuild; SBA loans to the business sector amounted to $5 million, less than half of the total applied for by commercial entities. Delays and loan refusals inhibited commercial recovery in Coalinga (French, Ewing, and Isaacson, 1984). Private insurance in various forms covered an additional $6 million in losses, while other federal funds were made available for reconstruction through the Economic Development Agency. Today, much of Coalinga's business sector has yet to rebuild due to a weak economy and lack of funding.

Impacts of the Coalinga earthquake on residential housing stock tended to fall along social class lines. Those with lower incomes experienced the greatest proportional losses to their homes (Bolin and Bolton, 1986). A disproportionate number of the lower-income victims were Mexican-Americans, as is often the case in California earthquakes (Bolin and Stanford, 1991). One consequence of the unequal distribution of losses was that, in the course of re-establishing permanent housing, minority victims moved more frequently after the disaster than did Anglo victims. Bolin and Bolton (1986, p. 207) suggest three reasons for this:

> Hispanics lived in the oldest and most damaged housing; they generally rented; and the type of housing they occupied was either unlikely to be repaired or, if it was fixed up, it was likely to be priced out of the market it once occupied. Conversely the earthquake disrupted Anglo employment more than that of Hispanics because Anglos were more likely to work in the destroyed central business district, while Hispanics were employed primarily as agricultural workers.

In Coalinga, the higher losses and fewer resources of Mexican-American victims resulted in their using federal aid and housing programs more than higher socioeconomic status Anglos (Bolin and Bolton, 1986, p. 210). However, Hispanic victims were less likely to have any sort of household insurance, creating a need for government aid if they were to recoup their losses and recover from the disaster. As a supplement to the formal aid, many victims in Coalinga relied on kin groups for social support and instrumental assistance. The same sort of social dynamics in recovery appeared after the Loma Prieta earthquake (Phillips, 1991).

The 1989 Loma Prieta earthquake that struck San Francisco and Santa Cruz County is the most recent major earthquake in California that has been studied regarding shelter, housing, and recovery. That research will be discussed in Chapter 6, which compares the Whittier Narrows earthquake with the more damaging Loma Prieta disaster.

Psychosocial Stress

Earthquakes have physical characteristics that have been found to be particularly stressful to victims. While most natural disasters are preceded either by a warning period or environmental indicators that allow pre-impact measures to be taken, earthquakes do not. The suddenness of earthquakes is a factor implicated in psychosocial distress among victims (Berren et al., 1989). This lack of warning continues to be a major factor in the psychosocial stress that they cause (Bolin, 1988).

As Turner, Nigg, and Paz (1986, p. 421) found in their study of perceptions of earthquake threat in Southern California:

> Although awareness of earthquake threat is almost universal, and earthquakes are viewed with fear when people do think about them, the quality of awareness is low for most people. People are vague about the warnings they have heard, and they readily acknowledge that they do not take most of them seriously.

From Turner, Nigg, and Paz's (1986) research, it is possible to characterize many Southern Californians' attitudes toward predictions of potentially destructive quakes as one of fatalism or resignation coupled with an underlying sense of personal invulnerability. Researchers have suggested that this is a psychological strategy for making the threat of catastrophe more manageable (Turner, Nigg, and Paz, 1986).

The literature on psychosocial impacts of disasters indicates that certain characteristics are likely to produce stress and subsequent negative mental health effects. These characteristics include suddenness of disaster impact, scope of impact, rapidity of involvement of a population, intensity of impact, length of warning, threat of recurrence, and exposure to the deaths of others (Berren et al., 1989; Bolin, 1988; Quarantelli, 1985; Warheit, 1985). It follows that severe earthquakes are likely to be inherently stressful due to their physical properties and impact characteristics (Ahearn, 1981; Bolin, 1988).

Virtually all major earthquakes are both sudden and lack any meaningful warning period. In many instances, of course, people are aware of earthquake hazards in their area, but that awareness has little importance to their day-to-day lives (e.g., Turner, Nigg, and Paz, 1986) and does not reduce the terror that a sudden violent shaking of the earth can produce (Raphael, 1986).

While moderate earthquakes may yield limited and scattered destruction and few deaths, as in the case of the Whittier Narrows earthquake, the major earthquakes documented in this century have killed thousands and destroyed entire communities and urban areas (e.g., Wijkman and Timberlake, 1988; Hogg, 1980). Major earthquakes impact large sectors of a population and leave little undamaged; this high proportion of damaged areas increases the likelihood of negative psychological impacts (Warheit, 1988; Quarantelli, 1985).

Quarantelli (1985) maintains that it is the rapidity of involvement of a local population in the disaster that can contribute strongly to psychosocial impacts on victims. Because earthquakes can almost instantly destroy large areas of a community, they are more likely to be perceived by victims as crisis events. Quarantelli (1985, p. 61) maintains that the "[m]ental health effects stem not from how long in some chronological sense people have available to act, but rather from whether they perceive themselves as having to hurry to save threatened values, as being in a 'crisis'." In a matter of a few minutes, thousands or hundreds of thousands can be involved in an earthquake disaster, and the result can be widespread, if transitory, psychological effects on victims (Raphael, 1986).

The Mexico City earthquake of 1985 was a large-scale, intense, and deadly earthquake. The M8.1 quake struck portions of Mexico City, collapsing many large buildings, killing an estimated 10,000 to 20,000 residents, and causing $6 billion in damage (National Academy of Sciences, 1987). The high death toll, combined with severe strains on available housing, created prolonged social and psychological stress for victims. Stewart (1986), in a study of a small group of victims in Mexico City, found significant levels of anger, depression, and tension-anxiety as measured by standardized psychological questionnaires. Symptoms such as phobias, anxieties, fears, depression, and loss of affect have been reported in other earthquakes as well (e.g., Greenson and Mintz, 1972).

The threat of recurrence is a characteristic of earthquakes, and victims are often reminded of that threat in the form of aftershocks, which can be both

physically destructive and psychologically distressing (Bolin, 1988). Situations of chronic threat, as constituted by the hundreds of aftershocks that an earthquake may produce, are identified with increased levels of psychological distress (e.g., Greenson and Mintz, 1972). Such aftershocks may continue for a year or more after a major event and produce relatively enduring negative psychosocial effects (Raphael, 1986; see also Gleser, Green, and Winget, 1981).

The disaster literature indicates that more severe instances of psychic trauma occur as a result of life-threatening situations and/or exposure to the death of others (e.g., Bolin, 1993; Lystad, 1988; Erikson, 1976). Because of the nature of earthquake destruction (e.g., violent ground shaking and collapsed buildings), there is a strong potential for producing traumatic and post-traumatic reactions, including fears, anxieties, and depression (e.g., Lystad, 1988; Raphael, 1986). Victims may be trapped for extended periods in collapsed buildings while awaiting rescue. Rescue workers involved in extricating victims may be exposed repeatedly to the sight of crushed and disfigured bodies—a traumatic experience in its own right.

While there are few studies focusing specifically on the psychosocial impacts of earthquakes (e.g., Stewart, 1986), as disaster agents these seismic events appear to have a significant potential for inducing psychological distress among survivors. The psychosocial impacts of the Whittier-Narrows quake will be examined in Chapter 5 as part of the recovery process.

Household recovery, community reconstruction, and individual psychosocial distress are three linked aspects of the overall recovery process. Psychosocial distress is a consequence of the earthquake impacts on victims, along with the types of post-disaster experiences they endure. Household recovery, particularly the re-establishment of permanent housing, is a fundamental part of an individual's recovery from the emotional distress of the event. Likewise, household recovery is a key part of the overall process of community recovery from the earthquake. Each of these three aspects of recovery is dependent, at least in part, on the other aspects. How these facets of recovery play out in an actual recovery process will be considered in the following chapters.

3

The Whittier Recovery Study

The research reported here is the result of a two-year longitudinal study in Whittier. It was developed out of an earlier cross-sectional study conducted in that community. The initial study (Bolin, 1989), based on a survey of victim households, examined short-term shelter and housing issues after the 1987 earthquake in the Los Angeles area. It also looked at reconstruction issues and activities as they emerged in the first year after the earthquake. The current study is based on that research, but extends it temporally by focusing on household recovery and community reconstruction processes. Findings from the earlier study will be briefly summarized below and will be discussed in Chapter 5 along with the new research. Both research projects were funded under the Earthquake Hazard Mitigation Program of the National Science Foundation.[1]

Initial Research

As noted, this study evolved out of an earlier study that examined the short-term impacts of the Whittier Narrows earthquake on households in Whittier in Los Angeles County, California. Whittier was initially selected due to the concentrated nature of earthquake damage to households and businesses. In the course of that research, it became clear that a longitudinal follow-up study would facilitate an examination of the recovery of households in the larger context of community reconstruction. A prime objective of the current research has been to extend the earlier temporary shelter study into the recovery phase, covering a period of more than three years that began with the October 1, 1987, earthquake and ended with the final site visit in 1991.

---

1. The initial Whittier study was funded by the National Science Foundation under Grant #CES-8803188.

The initial Whittier study was based on a random sample of households drawn from the approximately 2,000 houses that received some damage in the earthquake. In that study (Bolin, 1989) victims were interviewed approximately five months after the mainshock, which was just shortly after the second of two large aftershocks occurred. At the time of data gathering (January 1988), interviews were also obtained from local agencies and city officials involved in sheltering and housing victims. In the course of doing that research, several factors stood out as warranting longer-term investigation.

The household survey showed that many victims experienced persistent and high levels of psychosocial distress. Approximately 35% of the household respondents indicated one or more new symptoms of psychological stress that could be attributed to their earthquake experiences. At least some of that distress was related to problems victims encountered in attempting to repair or rebuild their homes (Bolin, 1989). More than one-fourth of those interviewed opted not to seek aid to repair their homes due to the difficulties involved in the application process.

That study also found that less than one-fifth of the survey respondents had earthquake insurance, and virtually none had all their losses covered by insurance. More than half of those with earthquake insurance had yet to settle their claims four months or longer after the mainshock, and many who had settled thought that the settlement they received was not equitable (Bolin, 1989).

In the course of the initial study in Whittier, a number of community reconstruction and recovery issues were emerging. Reconstruction and redevelopment plans for the destroyed "Uptown" section of Whittier were becoming controversial and engendered opposition in the form of community groups challenging the city on a number of fronts. At the conclusion of data gathering for the first study in 1988, the reconstruction process in Whittier was dominated by conflicts among various interest groups intent on promoting their own versions of how reconstruction should proceed. In addition, efforts to rezone various neighborhoods surrounding the central business district also became a focus of opposition between the city and neighborhood groups. A number of lawsuits were filed by citizen groups against the city in the first year after the earthquake, actions which effectively delayed the implementation of a reconstruction and redevelopment plan.

Research Objectives

Such observations gave impetus to the current study. The main objective of the new research has been to provide a description and analysis of recovery processes of individual households as well as the community. For households, new data were gathered on the long-term psychosocial, economic, and social impacts of the earthquake in order to track household recovery. For the larger community, information was gathered on the various political/economic actors

who were influential in developing and carrying out reconstruction plans for the city of Whittier. This research has also examined the extent to which community reconstruction affected household recovery during the three-year period covered by the two studies.

Research Design and Methods

Because the major interest of this study is in analyzing social processes involved in recovery and reconstruction for households and the larger community, data were gathered from several sources and at two points over two consecutive years. For the household component of this study, a longitudinal panel design was utilized. Due to funding limitations, difficulties in tracking a large sample over two years, and interest in higher-loss households, an initial sample of 100 households was selected.

This study used the same sampling frame as in the first Whittier study described above (Bolin, 1989). The sampling frame consisted of a list of all housing units (apartments and single-family dwellings) within the city limits of Whittier that sustained visible damage as determined by a Red Cross damage assessment team. The list probably underrepresents all damaged households because only external damage was noted. However, the list can be considered a comprehensive compilation of all structures with exterior damage and thus a suitable basic sampling frame.

The sampling frame included a 1-to-3 ranking scale used by Red Cross damage assessors to categorize the extent of damage for each address. The scale is of ascending damage level, with 1 connoting minor, 2 indicating major, and 3 signifying destroyed or condemned as unsafe for occupancy. While the initial Whittier study was based on a random sample drawn from the list of all damaged households, for the current study I opted to draw a random sample from a subset of the initial frame.

The initial sample of 100 households was drawn from a frame that consisted of only those addresses that were categorized as either heavily damaged or destroyed (49% of the original frame of 1,800). A replacement list was drawn from the complete sampling frame. In order to maintain initial sample size, replacements were used in cases where the selected householder could not be contacted for interviewing during the first round of data gathering (8% of the sample of 100).

Heavily damaged or destroyed households were intentionally over-sampled because these households faced the greatest recovery difficulties and were most likely to use federal aid in recovery. Such households may also allow us to better understand the types of housing and recovery difficulties that many victims in a future catastrophic earthquake in Los Angeles will face. Similarly, studying victims with greater losses facilitates an assessment of recovery

program adequacy and allows policy recommendations to be formulated that account for victims with major recovery requirements.

The initial household survey was conducted in June 1989, 20 months after the earthquake. The second survey of the same panel of respondents was conducted in April 1990. Twenty percent of the original panel could not be re-interviewed because 11 had moved and could not be located, six could not be contacted although they had not moved, and three refused to be interviewed a second time. In comparing the respondents who dropped out of the study with the remaining panel of 80 households, no significant differences were found by age, socio-economic status, or level of household damage. In describing the results of the study in Chapter 5, all findings will be based on the final sample of 80 households.

Data were gathered using a survey instrument that was derived from the first Whittier household survey. Questions covered a range of topics including: household composition, pre and post-earthquake housing characteristics, damage assessment, psychosocial symptoms, aid program utilization, post-disaster housing problems, insurance, use of community amenities, and opinions about recovery in Whittier. The second-round interview schedule was shorter than the first because the first-round schedule queried respondents on short-term sheltering and housing activities that did not need to be asked on the second round.

The household survey instrument utilized a structured format with a combination of fixed-choice and open-ended items. Also included was a symptom checklist used in the assessment of the psychosocial status of respondents. The schedule also incorporated a series of Likert scales that have been used to measure recovery in other studies (e.g., Bolin and Bolton, 1986). Open-ended questions supplemented the recovery scales and allowed respondents to provide more in-depth comments on various aspects of the recovery process. In sum, data were gathered on approximately 200 variables derived from a total of 130 questions.

The second source of data for the study came from interviews with key informants from citizens groups and city and state officials who played a role in recovery and reconstruction in Whittier. Most interviews were conducted with representatives from various city offices (e.g., the Mayor's Office, the Planning Department, and the Redevelopment Agency) that were centrally involved in developing and implementing reconstruction of the central business district. Officials were asked to identify major issues and problems that they considered key in planning for and carrying out reconstruction activities. Information was also sought on interorganizational relations in developing recovery plans and conflicts over the planning and implementation process. Officials were interviewed at the same time household surveys were conducted. The second round of interviews sought to update the status of reconstruction in the Uptown area.

Supplementary information was obtained through reports issued by city agencies, related published reports from academic and business sources, and newsletters published by citizens groups. The local newspaper was also monitored for the duration of the project for additional relevant information. Brief follow-up contacts were made with a number of agencies to obtain recent information on their activities regarding shelter, housing, and reconstruction aid. Information from this component of the study will be interspersed with the quantitative treatment of the family/household survey.

The household surveys were conducted by locally hired interviewers who were trained by the project field director in two one-hour training sessions. A small core of five interviewers were used in the initial survey. Four out of the five original interviewers were used in the second survey one year later. Their familiarity with the instrument, procedures, and respondents assured an efficient data-gathering process. All completed interviews were checked by the field director for completeness. Following each survey period, all completed surveys were reviewed and coding categories developed. Data were then coded and entered into data files for subsequent analysis. Information from interviews with officials and agency personnel were reviewed and content analyzed for key points and issues, as was information gathered from other published sources. Chapter 5 provides a review of key findings from the data analysis.

4

The Whittier Narrows Earthquake[1]

According to California Institute of Technology seismologists, Southern California experiences an average of one M4.0 earthquake per month. The Whittier Narrows earthquake became another in an intermittent series of such earthquakes. At 7:42 a.m. on October 1, 1987, a moderate magnitude 5.9 earthquake struck Whittier and surrounding communities in Los Angeles and Orange Counties, ending a period of relative seismic inactivity. Whittier, a predominantly Anglo, middle-class city with a population of 75,000, was a center of concentrated damage (Figures 4.1 and 4.2). This chapter will present a description of the event and its aftermath as well as a discussion of reconstruction and community recovery in Whittier.

Event Background and Scope of Damage

The Whittier Narrows earthquake was the result of tectonic movement along a previously unknown fault lying well below the known Whittier fault. According to United States Geological Survey (USGS) seismologists, the epicenter of the quake was nine miles deep and was caused by a blind, low-angle thrust fault (Roman, 1988). It has been hypothesized that the Los Angeles Basin may be underlain by a number of such faults and that they constitute significant earthquake hazards to the region (Kerr, 1988; Roman, 1988). These hazards are in addition to the well-known risks posed by the San Andreas and related major strike slip faults (Kerr, 1988).

The October 1, 1987, Whittier Narrows quake was the most powerful earthquake in Southern California since the 1971 Sylmar quake (M6.5) in the San

1. Information presented in this chapter was taken from the *Los Angeles Times* and the *Whittier Daily News*. Other sources are cited in the text.

Fernando Valley. By comparison, the Whittier-Narrows quake released only 10% of the energy of the Sylmar event (Southern California Earthquake Preparedness Project, 1987). The October 1 Whittier earthquake was followed by a major aftershock on October 4 (M5.3) that did additional property damage and resulted in the evacuation of an emergency shelter in Whittier (Bolin, 1989). The area remained seismically active for months after the mainshock and experienced a second significant aftershock of M5.0 on February 11, 1988, that occurred in conjunction with dozens of smaller temblors.

Damage from the Whittier Narrows earthquake was scattered over a wide area of the Los Angeles metropolitan area. The greatest concentration of damage was in the city of Whittier (Figure 4.1). Three persons died as a result, although several fatal heart attacks were attributed to the event as well (Southern California Earthquake Preparedness Project, 1987). At least 200 persons were injured, according to published estimates. The earthquake caused secondary technological impacts, including a chlorine gas leak in the city of Pico Rivera, various fires and natural gas leaks, and flooded buildings from broken plumbing. It also caused, according to the Nuclear Regulatory Commission, an "unusual event" at the San Onofre nuclear power plant, resulting in a reactor shut-down.

The earthquake and aftershocks damaged at least 10,500 residences and businesses in the Los Angeles metropolitan area (Weber, 1987). The Red Cross identified a total of 4,033 buildings that were heavily damaged or destroyed. Most buildings in an eight-square-block section of Whittier's old central business district, referred to as "Uptown," were heavily damaged or destroyed (Figure 4.2). In fact, a number of the buildings in Uptown were in the midst of an ongoing restoration and revitalization effort when the earthquake heavily damaged or destroyed them.

Approximately 12,000 persons in Los Angeles County were displaced from houses and apartments due to earthquake damage. This is, coincidentally, the approximate number of homeless caused by the much more powerful (M7.1) Loma Prieta earthquake that struck the Bay Area and Santa Cruz County two years later (Bolin, 1990).

The Red Cross provided shelter, meals, and other services to 10,000 victims of the Whittier Narrows disaster. At the height of the emergency period, the Red Cross sheltered more than 2,400 persons in 14 public shelters. This compares to some 40 shelters established after the Loma Prieta earthquake (Bolin and Stanford, 1991; Phillips, 1991).

Los Angeles and Orange Counties received presidential disaster declarations on October 7, 1987, in response to a request from the governor of California. Following the declarations, federal aid was made available to individuals, businesses, and local governments. A total of 10 Disaster Application Centers (DACs) were eventually opened across the metropolitan area, including one in the Whittier "Quad," a mostly defunct shopping mall near the heavily damaged Uptown area. Total property losses from the earthquake and aftershocks have

Figure 4.1. Whittier's regional location

been estimated at approximately $360 million for Los Angeles and Orange Counties.

Short-Term Responses

The October 1 earthquake created variable but significant disruptive effects on daily life in the impact area, creating a host of problems for victims and local, state, and federal agencies. This chronology will highlight some of the major earthquake-related phenomena that emerged in the weeks after the mainshock. It will also describe the setting for the current study of household and community recovery from the disaster.

The 7:42 a.m. earthquake resulted in the immediate collapse of several buildings in the Uptown area of Whittier, along with a number of major water and gas leaks. An emergency operations center was opened at Whittier City Hall

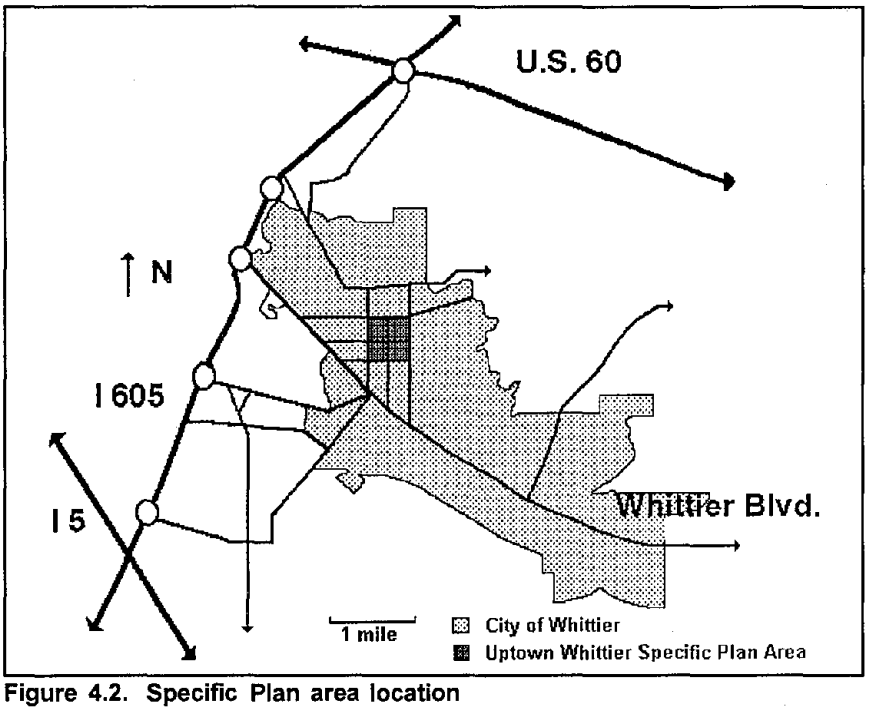


Figure 4.2. Specific Plan area location

at 8:15 a.m. Approximately two hours after the initial impact police cordoned off the Uptown area. Damaged buildings throughout the Los Angeles metropolitan area were evacuated in the few hours following the mainshock, and a state of emergency was declared in a number of communities, including Whittier. Electrical blackouts were widespread, and some 500,000 homes lost power temporarily. The blackouts stranded workers in elevators in a number of buildings and complicated emergency response activities by police and fire departments.

A series of aftershocks made many who had evacuated from their homes and businesses reluctant to return. Recent immigrants from Latin America, many with previous experience in the Mexico City earthquake or Central American earthquakes, were particularly hesitant to return to their dwellings, a phenomenon repeated in the Loma Prieta earthquake two years later (Bolin and Stanford, 1991). Published accounts reported that several thousand victims, primarily poor Latinos, began camping out in parks and yards rather than return to their apartments in the barrios of Los Angeles. Many Latino victims also relied heavily on Red Cross shelters in their neighborhoods. In Los Angeles, building occupancy statutes that limited number of residents in a dwelling unit were temporarily suspended by the mayor to allow families to "take in" victims made homeless by the quake. Reports circulated widely that unscrupulous

landlords used the earthquake as justification for evicting tenants while building repairs were undertaken, thereby circumventing the county's strict rent-control ordinances.

The earthquake refugee population increased steadily for nine days at area Red Cross shelters, in contrast to the more common pattern where shelter occupancy peaks after one or two days. According to the Red Cross, use of their temporary shelters reached a maximum on October 10, and shelters were not closed until October 17, more than two weeks after the quake (Southern California Earthquake Preparedness Project, 1987). Delayed use of shelters was apparently caused by displaced victims remaining near their damaged homes until building inspectors assessed structural impacts. If the inspectors found the house or apartment unsafe, victims would then [typically] proceed to Red Cross shelters, creating the gradual week-long rise in shelter use. A similar pattern was observed after Loma Prieta, although in that case shelters had to remain open for more than two months due to a severe housing shortage in the area (Bolin and Stanford, 1991).

High shelter occupancy rates and the resultant need for volunteers to manage shelters, as well as demands for food and other shelter supplies, increased into the second week after the mainshock. This pattern, according to local Red Cross officials, was unanticipated, and strained mass-care facilities. This occurred in spite of the relatively small number of displaced victims actually using the public shelters and suggests that unusual and unpredictable patterns of shelter use may characterize future large earthquakes in California. The Red Cross shelters were located both in schools and community centers in the affected parts of the metropolitan area. Using community centers as temporary shelters did not displace school-related activities, although several schools in Whittier sustained sufficient damage to require closing for safety reasons.

The Red Cross reported that many shelter victims exhibited high levels of anxiety and fear. This was particularly true for those with previous and recent earthquake experience in Mexico or Central America (Southern California Earthquake Preparedness Project, 1987). Again, this phenomenon foreshadowed very similar experiences reported after the Loma Prieta earthquake of 1989 in Northern California.

On October 4, three days after the mainshock, an M5.3 aftershock struck the same areas of Los Angeles County at 3:59 a.m. This temblor, occurring when it did, added to the fear and anxiety of victims and caused the rapid evacuation of emergency shelters, including one located at the Whittier Community Center. Many shelter victims remained outdoors for the rest of the night for fear of further aftershocks. In addition, the aftershock caused a power failure to some 43,000 homes in the area. The lack of electricity, combined with temperatures approaching 105 degrees, added to the discomfort and stress victims were feeling in the aftermath.

In areas outside Whittier, many recent immigrants were apparently very hesitant to return to apartments after the earthquake, even when apartments were judged safe by building inspectors. The Red Cross ultimately developed multilingual outreach programs to attempt to get non-English-speaking immigrants to return to their dwellings. Housing problems were compounded by landlords locking victims out of apartments for nonpayment of rent (due on the first of the month—the day of the earthquake) with the ostensible purpose of circumventing Los Angles County rent-control ordinances.[2]

Because the earthquake coincided with the so-called "amnesty program" for undocumented immigrants initiated by the Immigration and Naturalization Service (INS), many Latino immigrants were reluctant to utilize any disaster-related services for fear of making themselves ineligible for amnesty. According to Bolton's (1988) research in the Hispanic neighborhoods of Los Angeles, it took the INS 11 days after the earthquake to decide not to penalize undocumented immigrants for utilizing disaster services. Further, that information was not necessarily made immediately known to personnel at the DACs, whom remained uncertain of official INS policy. This lack of decisiveness added to the uncertainties, ambiguities, and misinformation that predominated minority communities. As a result of the confusion over the amnesty program, the Red Cross was understandably cautious about encouraging victims to seek disaster assistance that might inadvertently disqualify them from permanent residency status.

Bolton, Liebow, and Olson (1992) found that Hispanic victims were attached to their neighborhoods and were reluctant to relocate elsewhere, although earthquake damage limited available housing in their old neighborhoods. Of course, at the same time many appeared reluctant to actually move back into their dwellings; hence, the Red Cross initiated the outreach program described above. Three factors combined to make post-earthquake housing difficult for Latino victims: 1) many minority victims were poor; 2) the earthquake most heavily impacted lower-rent, unreinforced masonry buildings that housed residents; and 3) there was a significant shortage of alternative low-cost housing in the area. To deal with these problems, the city of Los Angeles formed an Emergency Relocation Committee to assist the Red Cross in housing victims in the barrios of east Los Angeles[3].

---

2. Los Angeles County rent controls disallowed an increase in rents unless a new tenant occupied the apartment. By evicting existing tenants for nonpayment of rent and leasing to new tenants, this ordinance could be circumvented and rents could be increased.

3. In Chapter 6, programs developed to house low-income victims of Loma Prieta will be discussed and compared to Los Angeles' efforts. The lack of low-income housing in many areas of California has presented persistent problems in providing post-earthquake

Two weeks after the earthquake, approximately two-thirds of the 3,500 disaster homeless in Los Angeles had returned to their apartments or had made other temporary shelter arrangements (Southern California Earthquake Preparedness Program, 1987). The Red Cross was having difficulty placing another 1,100 homeless due to damage to housing stock and the shortage of other low-cost housing options.

The Red Cross' shelter difficulties were compounded by persons who were homeless prior to the disaster who sought to use their shelters and meal services. The problem of the predisaster homeless after the Whittier quake foreshadowed similar problems that occurred after the Loma Prieta disaster two years later (Bolin and Stanford, 1991). The chronically homeless and marginally housed became an issue for aid providers after the Whittier Narrows quake because the Red Cross, in order to determine shelter eligibility, had to distinguish between victims made homeless by the disaster and those who were homeless prior to the earthquake.

Sheltering problems were to continue for weeks after the mainshock as tenements were condemned and new groups were displaced from existing low-cost housing. The Legal Aid Society offered their services to earthquake victims who appeared to be having housing problems due to landlord actions such as unwarranted evictions. Some 950 apartment units had been declared unsafe in Los Angeles County, and many who formerly occupied those buildings were still living in tents or cars three weeks after the initial earthquake (Bolin, 1989). Los Angeles City Council members were greatly concerned about these events, and they found numerous opportunities for making public shows of concern for their now-homeless constituencies. Los Angeles County established a hot line in an effort to link up tenants with landlords who had available units. However, the evidence suggests that earthquake-caused housing shortages were driving up rents and creating persistent housing difficulties for low-income victims in Los Angeles in spite of relocation efforts.

The city of Whittier did not experience the large-scale, post-earthquake housing problems that sections of Los Angeles did, although more than 340 houses and apartments were condemned in the two weeks following the main shock, primarily because Whittier lacked a significant minority, poor, or homeless population. According to Red Cross damage estimates, a total of 1,859 residential structures and 204 businesses in Whittier were damaged by the earthquake and the aftershocks.

---

housing for poorer individuals and households.

The destruction of apartments in Whittier apparently did prompt some victims to move out of the city[4], rather than pay higher rents to live elsewhere in Whittier (Bolin, 1989). Communities surrounding Whittier were largely undamaged from the earthquake; thus, affordable housing could be found in these nearby areas. This out-migration of some victims resulted in a reduction of 200 students in the Whittier school system and a consequent short-fall in student-generated revenues for the system.

Media accounts and Red Cross reports of the first weeks after the earthquake in Whittier suggest that fear and anxiety were at high levels for many victims. Dozens of aftershocks added to the psychological distress of victims and one M5.3 aftershock led to the evacuation of a Red Cross shelter in the Whittier Community Center. In response, the Red Cross used tents to shelter some evacuees who would not move back to their homes due to fear of more aftershocks.

Primary mental health responses to the earthquake began the day after the disaster when the Los Angeles County Department of Mental Health (DMH) Disaster Response Plan was activated to begin assessment of the mental health needs of victims. After the October 7 disaster declaration, the Los Angeles DMH received federal funding for crisis counseling and provided services at the 13 Red Cross shelters and later at the DACs as well. In Whittier, a privately run crisis center was established for immediate mental-health services and was later brought under the aegis of the Los Angeles County DMH crisis-counseling program.

Psychological distress was exacerbated by newspaper reports speculating that the M5.9 temblor was merely a foreshock of the so-called "Big One," the great earthquake that has been forecast to strike Los Angeles sometime in the future. There was considerable evidence that, given the relatively modest damage from the quake, both adult and children victims showed marked anxieties and fears (Bolin, 1989). In the two weeks following the earthquake, the DMH reported receiving 1,700 information and referral calls regarding earthquake trauma, with about 50% of those from monolingual Spanish or Asian speakers. According to DMH figures, more than 7,000 persons sought mental health services in the Los Angeles area in the month after the disaster. There was concern among mental health workers that some victims would exhibit delayed emotional reactions to the event, as is usually expected in instances of post-traumatic stress disorder (PTSD).

---

4. Whittier lacked the ethnic enclaves and deep poverty that characterized victim populations in parts of Los Angeles. Thus, apartment dwellers in Whittier who sought new housing elsewhere after the earthquake were not under the severe financial constraints of many of the Latino victims described by Bolton (1988).

The efforts at mental health intervention for victims was part of the overall emergency response by local and state agencies. Those victims needing mental health counseling were identified in Red Cross shelters, at DACs, in schools, and through DMH outreach programs. Some area schools offered specific earthquake counseling programs for children who were experiencing abnormal anxieties and fears after the event. Approximately 5% of the more than 27,000 victims who used the DACs received referrals for mental-health services, according to DMH officials interviewed in the course of this research. Due to the numbers seeking crisis counseling, there were reports of occasionally lengthy delays at area mental health facilities before consultations could be arranged with disaster victims.

As with all disasters receiving a presidential declaration, the DACs, once established, disseminated information, services, and financial aid to victims. Four days after the October 7 disaster declarations, seven DACs were opened in the Los Angeles metropolitan area, their services coordinated through the Federal Emergency Management Agency's (FEMA) central Disaster Field Office located in El Monte. Press reports indicate that the unexpected number of victims seeking information and assistance at the DACs soon overwhelmed FEMA's processing capabilities, and FEMA subsequently added three DACs to handle the client load.

On the day following the opening of the centers in Whittier, more than 1,000 people were turned away from the Quad DAC. Victims were asked to make appointments for interviews at the Whittier DAC later in the week. The *Whittier Daily News* (October 13, 1987) published comments from a local congressional representative on FEMA's handling of the disaster in Whittier. Representative Dreier (Republican) from Southern California castigated FEMA for taking 11 days to establish DACs and five days to complete a damage assessment in Whittier. He felt that damage assessments should have begun immediately and not delayed until aftershocks had occurred. He also cited FEMA for "indifference" in their handling of Whittier victims.

The number of DACs was progressively reduced as the demand for information and services tapered off in the weeks after the initial earthquake. The main Whittier DAC was closed December 20, 1987. At that point, slightly over two months since the first DAC was opened, 27,824 applications had been received at FEMA's 10 centers. By then, the Small Business Administration (SBA) had disbursed $38.8 million in reconstruction loans to 2,244 households and businesses in Los Angeles County. In addition, 12,800 victims received FEMA emergency housing assistance valued at $9.6 million. Another 3,350 victims obtained Individual and Family Grants (IFG) valued at $3.2 million. IFGs, with a maximum value of $5,000, are generally targeted toward those who cannot qualify for other federal grant or loan programs.

Supplementing aid available through FEMA and the Red Cross, the state of California established its own earthquake relief programs. An earthquake relief

bill was signed into law in California on November 15, 1987, that made $105 million in aid available for the repair of public buildings and $252.7 million for repair of private buildings. The aid package also specified $46.5 million for repairs to schools and universities damaged in the earthquake. The California state program included cash grants to victims and businesses, deferred payment loans, and relocation aid for renters—all supplemented the numerous federal grant and loan programs available to victims.

In addition to the Red Cross, federal, and state programs, the city of Whittier established an earthquake relief fund from donations that were intended to aid local businesses and households. However, ultimately the relief fund only issued monies to local businesses. The Earthquake Relief Fund was established on October 6, 1987, and was administered by the Disaster Relief Committee—a citizens committee established by the Whittier City Council. The total fund peaked at $425,000, with most of the money distributed to Uptown businesses. One year after the earthquake, a total of $307,000 had been disbursed to 165 applicants. Grants were limited to $5,000 and were to be used to defray increased business expenses or losses incurred as a consequence of the earthquake.

The earthquake destroyed sections of downtown Whittier that had been part of an ongoing renewal redevelopment project. The earthquake quickly became the point of departure for a new plan in which redevelopment, earthquake recovery, and urban renewal, were joined in a unified reconstruction plan. As the emergency period gave way to restoration and recovery in the weeks after the quake, planning for the long-term recovery of the business sector became the focus for local political and economic interests. The planning process for the rebuilding and redevelopment of the central business district (Uptown) began almost immediately to engender opposition from local citizens groups.

While business interests viewed the earthquake as an opportunity for the economic expansion in the Uptown area, other interest groups moved almost immediately to erect legal barriers to the razing of buildings they felt had historical value. The forces drawn into opposition represented, on the one hand, the economic interests of the business sector, and on the other, the ostensibly symbolic interests of cultural and historic preservationists. To the latter group, the symbolic value of old buildings for the culture of the local community outweighed the potential economic stimulus of new construction. As a consequence, reconstruction planning became embroiled in conflict as different factions sought to promote alternate, and sometimes incompatible, visions of how Whittier should or would be reconstructed.

In sum, the effects of the Whittier Narrows earthquake were unevenly distributed both geographically and across social classes and ethnic groups. The earthquake had its greatest impacts on lower-income, primarily Latino, neighborhoods in Los Angeles due to its physical impacts on unreinforced masonry apartment buildings common in such neighborhoods. In addition, the

earthquake had significant social and economic impacts on the business district and surrounding, predominantly middle-class neighborhoods in the city of Whittier. Whittier's lack of lower-income minority populations made sheltering and housing somewhat more routine than in other parts of Los Angeles County. Nevertheless, the extensive damage to the business district and to large single-family dwellings in Whittier initiated a protracted household recovery and urban reconstruction process.

Community Recovery

While individual victims had to deal with rebuilding homes and getting over the emotional disturbances of the earthquake (Chapter 5), the tasks facing the city of Whittier were vastly more complex, involving many competing political and economic interests. However, objectively, the major goal for the city was to plan for reconstruction and then implement that plan in the heavily impacted central business district (Uptown). The earthquake and aftershocks had significantly damaged or destroyed some 50 buildings in the historic business district. The high concentration of unreinforced masonry buildings in the Uptown area had condemned the district to major losses from an earthquake, even, in this case, a moderate one. With $90 million in losses to this area of Whittier—along with business disruptions, closures, and the attendant economic losses—the earthquake was particularly damaging to the retail business sector in Uptown.

Business owners and real estate developers in Whittier were significant stakeholders in the reconstruction and redevelopment of downtown Whittier and its surrounding neighborhoods. As noted earlier, formulating reconstruction plans and implementing them proved to be a lengthy process accompanied by considerable debate, disagreement, and conflict. Chief concerns focused on how Uptown would be changed in the course of rebuilding and how surrounding neighborhoods would be affected by these reconstruction and redevelopment plans.

This section will examine the reconstruction process and the conflicts engendered during the course of planning and implementing the rebuilding of the Uptown area. Because retail sales are a major part of Whittier's local economy (Overturf, 1988), residents' reactions to changes in the Uptown area can have significant impacts on the economic recovery of the central business district. Furthermore, changes in neighborhoods due to rezoning and redevelopment can impact household recovery through changes in rents, land values, property taxes, population densities, traffic, and the demographic composition of neighborhoods.

As stated earlier, business interests and the city government viewed the earthquake as an opportunity for the redevelopment and "revitalization" of the Uptown area, while other groups moved almost immediately to prevent the razing of buildings possessing significant historical value. Forces drawn into

opposition were the economic interests of the pro-development sector and the city government against the cultural and historic preservationists. For the latter group, the symbolic value of old buildings for the cultural integrity of the local community outweighed the potential economic stimulus of building demolition and new construction. As a consequence, reconstruction became embroiled in conflict as various groups sought to promote alternative, and sometimes incompatible, visions of how Whittier should be reconstructed. Separate from these organized and activist interest groups were the other residents of Whittier who, based on the victim surveys, wanted to see Whittier reconstruct quickly and recreate much of what existed before the earthquake.

Several local voluntary organizations became active in reconstruction issues to preserve buildings with, in their view, historic value. Demolition and new construction threatened a number of heavily damaged older buildings in Uptown, and these became the focus of concern and political action for historic preservationists. Key among groups engaging in legal tactics, public demonstrations, and related attempts to influence reconstruction decision making were the Whittier Conservancy, the Harvey Associates, and the Whittier Historical Society. The legal actions of these organizations, including injunctions and lawsuits, proved to be antagonistic to efforts by the city to quickly raze damaged buildings. These groups maintained an activist role during the first two years of reconstruction by challenging aspects of the redevelopment plans formulated by the Earthquake Recovery Redevelopment Project, the local agency charged with planning and implementing the reconstruction of Uptown. Consequently, early restoration and recovery activities in Whittier were punctuated by a series of legal skirmishes, including court injunctions and contempt-of-court charges, filed by the various preservationist groups against the city and the redevelopment agency.

Attempts at resolving the antithetical interests of preservationists and redevelopment advocates took several forms. On March 18, 1989, a year and a half after the disaster, the Whittier City Council ordered a study of "historically significant" buildings for a local registry of historic buildings. The goal was to develop a list of buildings to be protected so the reconstruction of the rest of the business district could proceed in a timely fashion. Up to that time, the legal actions surrounding historical buildings, in conjunction with extensive delays in formulating acceptable redevelopment plans, effectively blocked any significant rebuilding in the destroyed Uptown area.

During this period, businesses displaced from their pre-earthquake locations began operating out of trailers located on empty lots in the Uptown area as soon as debris removal made space available. The first few of what would ultimately number 35 trailers were obtained approximately one week after the earthquake and many were still in place 18 months later. The trailers occupied prime parking areas, further complicating business activities in Uptown, which had limited parking even before the earthquake. Other businesses elected to move

elsewhere in the area rather than occupy temporary facilities for an indefinite period. In all, 40 businesses in Whittier were physically displaced as a result of earthquake damage. A total of 80 businesses in the 32-square-block Uptown area shut down at least temporarily after the earthquake, causing nearly a 10% drop in retail income in Whittier during the fourth quarter of 1987.

One of the problems facing Whittier in reconstruction was how to keep existing retail businesses in Whittier when those business could easily move to neighboring towns that had no earthquake damage. Given the almost-continuous urban sprawl in Los Angeles County, there are few clear physical boundaries among the various cities around Whittier. A business could readily move from Whittier to nearby La Habra or Fullerton and continue to serve the same clientele. Such leakage of businesses and retail sales, and thus tax revenues, has been an ongoing concern of Whittier city government since the earthquake (see Overturf, 1988). Of course, business mobility is not a condition unique to Whittier, but rather typifies much of Southern California and will likely be a factor in recovery following future earthquakes in the region.

Numerous stories appeared in the *Whittier Daily News* after the earthquake detailing complaints by Whittier businesses of inadequate aid being received with respect to their financial and property losses. Businesses in the impacted areas in and around Los Angeles received 322 SBA business loans valued at $15,709,400. The majority of these loans were at a 4% interest rate, although 66 loans were issued at 8%. Given the economic vulnerability of many small retail establishments in the U.S., few can afford to be closed for any length of time without facing bankruptcy. Thus, as with individual homeowners, SBA loans became a critical element for reopening businesses promptly.

Additional monies for businesses were available from the State Earthquake Rehabilitation Assistance funds (SERA), the Earthquake Relief Fund, and a community block grant (for redevelopment) already in place in Whittier. The Earthquake Relief Fund was established from private donations, with additional monies donated by Whittier and other cities to assist residents and businesses with their post-earthquake needs. Although originally intended to provide relief for all victims, the committee ultimately decided to provide grants of up to $5,000 for small businesses only. The fund contained $420,000; most was disbursed in the 12 months following the earthquake. However, the grants could not be used to assist a business in relocating outside of Whittier. Given the upper limit on these grants, they were only an adjunct to more substantial funding that businesses had to acquire elsewhere.

Businesses in the Uptown area were particularly hard hit by the earthquake. Losses to businesses averaged $124,600, the highest among seven regional cities (Nigg and Tierney, 1990). It is significant that businesses in Whittier were more likely to qualify for and receive SBA loans at the advantageous 4% interest rate (with a 30-year payback) than were businesses in nearby communities. Because businesses in Whittier received an average SBA loan of $109,000, close to 90%

(on average) of actual losses were covered by government loans—an enhancement of recovery capacity for those 100 businesses that received them (Nigg and Tierney, 1990). Of course, it also meant that many businesses became indebted for up to 30 years for the costs of the earthquake. Because most businesses could not arrange financing and actually receive loans for nearly a year after the earthquake, very little reconstruction actually occurred during that time.

The formation and implementation of the Earthquake Redevelopment Project determined the pace of reconstruction in Whittier in the first two years. Approximately six weeks after the earthquake, the city proposed using the earthquake as the basis for expanding existing urban redevelopment plans. As a result, the Redevelopment Project ultimately provided an estimated $40 million for reconstruction and development over the course of the project. However, formulating widely acceptable reconstruction provisions to be incorporated into the redevelopment project was not without interest-group conflict. The disputes revolved around several key reconstruction issues:

- What were the exact boundaries of the redevelopment area?
- How would land uses be changed in residential areas surrounding Uptown?
- To what extent would neighborhoods of single-family dwellings be replaced with high-density apartment zones?
- How would land-use patterns and urban functions be altered in the business sections of a reconstructed Uptown area?

In an earlier study of disaster reconstruction, Kates and Pijawka (1977, p. 3) referred to "replacement reconstruction" and "commemorative, betterment, and developmental reconstruction" as somewhat distinct and temporally ordered phases. In the case of Whittier, it appears that planning for longer-term "developmental reconstruction" slowed initial replacement reconstruction of businesses. However, once plans were formulated and implemented, the two phases of reconstruction overlapped considerably.

A key feature of the recovery in Whittier was that the speed of physical reconstruction was subordinated to the time needed for comprehensive planning of the style, character, and land-use patterns of the Uptown area. The goals of the planning process included improving urban amenities in the redevelopment zone, enhancing retail business activity, creating an historic and "village-like ambience," and increasing the residential population. Prior to the earthquake, Whittier's central business district was in a state of decline, losing business to shopping malls in the surrounding area. Revitalization, redevelopment, and promotion of business interests became central recovery goals because of opportunities afforded by the earthquake. As Haas, Kates, and Bowden (1977, p. 49) have argued:

> The physical destruction of a part of the city is seen by some persons, especially planners, as a unique opportunity to improve the livability of the city. Still others may see it as an ideal chance for "instant urban renewal"—an opportunity to replace a deteriorating area with new modern land and building packages. But for many persons the new is unfamiliar, and that unfamiliarity creates personal discomfort; there will almost always be resistance to proposed changes in land use.

This sums up the nature of the conflicts over reconstruction planning and development in Whittier, where a polyphony of voices argued for various versions of "new and better" or a return to the familiar and predictable.

Redevelopment issues in Whittier were not limited to the business sector and economic activity in the Uptown area. Additional concerns were voiced by residents over the potential transformation of single-family, older homes (many of which were large Victorian-era houses) into condominiums and multiple-occupancy units in many neighborhoods. Soon after the earthquake, developers bought up some single-family dwellings to convert into more profitable apartments. To stem this unanticipated alteration of residential areas, in 1988 the Whittier City Council issued a five-month building moratorium on new apartments and passed an ordinance allowing only replacement of apartments destroyed by the earthquake.

As reconstruction plans developed, limited residential areas near Uptown were slated for acquisition and redevelopment into small multiple-occupancy buildings. There were concerns that these activities would drive rents up and reduce the availability of lower-income housing even further. However, those who stood to profit from growth saw these developments as the best (and only) way to increase population densities in an urban area with little new land for development—particularly since population had increased little in the preceding decade. Zoning changes as detailed in the Specific Plan[5] could ultimately result in an additional 1,000 housing units near Uptown, increasing the district population by approximately 2,700 persons and creating attendant impacts on traffic, parking, and quality-of-life.

Both preservation, because of required seismic retrofitting, and new construction can drive rents and land values up (e.g., Comerio, 1990). Retrofitting older buildings can be a time-consuming and expensive process, resulting in square-foot costs often higher than new construction. Similarly, new construction can also drive rents and land values upward by catering to a higher-income clientele—something quite evident in Whittier's reconstruction. Both can

---

5. The full title of the document is *The Uptown Whittier Specific Plan and Environmental Impact Report*. Prepared by the Arroyo Group. June 1989. Whittier, California. Information in reference to the Specific Plan in this section is taken from that document.

have negative impacts on low- and fixed-income residents, forcing them to relocate elsewhere or economically marginalizing them further through higher rents.

Much of Whittier's Specific Plan called for attracting businesses to serve an upscale clientele with specialty shops. As noted in the text of the Specific Plan, Whittier's retail sector would "provide goods and services, restaurants, and entertainment in a unique, appealing environment to attract the affluent, close-in portion of Uptown's trade area." Given the high median income in Whittier, planning proceeded on the assumption that the city was, and would, maintain its historic roots as a prosperous, middle-class, Anglo community, in contrast to the ethnically and socio-economically heterogenous nature of much of Los Angeles county. On the other hand, the city acted to protect portions of single-family neighborhoods from encroachment by developers, and this helped to maintain some affordable housing in older neighborhoods.

The Earthquake Recovery Redevelopment Project, as adopted by the city council in November 1987, contained specific plans to protect single-family dwellings from condemnation as well as to establish reconstruction design guidelines for the Uptown area. Earthquake reconstruction was slow in Whittier in part due to a "conditional use" permit system that was adopted to control the nature and types of reconstruction proposed. The process required that a business acquire construction financing, develop plans with an architect, and have the plans approved by the city. The Design Review Board (DRB) in the Planning Department reviewed reconstruction plans. If the DRB felt that the building plans were incommensurate with design standards and zoning restrictions, changes were mandated by the DRB and the Planning Commission. The new plans were then submitted to the DRB, where more changes could be recommended. Once these changes were incorporated (if necessary) and approved, then construction began. The overall approval process took up to one year; thus, at the second anniversary of the earthquake (October 1989), a number of Uptown reconstruction projects were just getting underway.

Part of the delay in reconstruction was simply a result of the Whittier city government taking 17 months to appoint a consulting firm to prepare a unified plan for the Uptown redevelopment. The areas of Whittier slated for redevelopment were finalized at the beginning of 1988, including both the historic Uptown area and an adjacent area that encompassed a heavily damaged and dilapidated shopping mall, known as the Quad. Planning process delays provoked a suit by one business in Whittier against the Redevelopment Agency, for $1 million, that accused the agency of failing to develop a reconstruction plan, and in turn allegedly made it impossible for the business to be sold. In all, 50 businesses in Whittier either closed or relocated in the first year after the quake, producing an estimated loss of $700,000 in sales and property tax revenues for the city.

In June 1989, 21 months after the mainshock, the city presented its *Uptown Whittier Specific Plan and Environmental Impact Report*. The *Specific Plan*

constituted the key planning document for the Earthquake Recovery Redevelopment Project and formalized redevelopment plans for the central business district. The plan represented a comprehensive effort at formulating integrated design standards and land-use patterns for the business district and bordering neighborhoods. It also constituted an attempt at balancing the concerns of historic preservation and maintenance of neighborhood integrity with revitalization and growth of the central business district. A citizens advisory committee had active input in formation and implementation of the plan. However, some nonconforming reconstruction, particularly of apartment buildings, did take place prior to the *Specific Plan*, leading to the previously noted apartment building moratorium by the city council.

Perhaps ironically, the *Specific Plan* contained no discussion of earthquake hazard mitigation or future earthquake hazards in the Whittier area. In interviews with various representatives of Whittier city government, no respondent mentioned hazard mitigation as a consideration in drafting the *Specific Plan*. When queried on the point, all simply referred to the rebuilding in Uptown as complying with state of California building codes. Building a safer Uptown area was not considered as a factor that would attract new businesses to Whittier. Uptown would in fact be safer, not because of the Whittier city government, but because of new building codes and California retrofitting ordinances. Damaged buildings in Uptown that were rebuilt were retrofitted to bring them into conformity with current California seismic safety codes. Although an earthquake was the point of departure for revitalizing the old central business district, interviewed officials clearly showed no concern regarding future earthquake hazard.[6]

However slow the reconstruction of Whittier was initially, the sheer amount of it produced a local boom economy in construction and associated trades that lasted three years. There were 28 single-family-housing starts and 169 multi-residential starts in Whittier in 1986. In 1988, immediately after the earthquake, single-family-housing starts had increased to 134 and multiple units to 323. The rates stayed at a similarly high rate through 1989. However, there was a 42% drop in new housing starts in 1990, reflecting the completion of much single-family residential reconstruction. There was also a 94% drop in multi-unit housing in 1990 compared to 1989, reflecting in part a city council moratorium on new housing until guidelines could be worked out with the Design Review Board. In the residential sector, most victims had a strong commitment to

---

6. Whittier does have an emergency preparedness plan that is the basis of annual disaster drills. All emergency preparedness activities are under the aegis of the director of emergency services, who is also the city manager. A separate commander of emergency services is responsible for the day-to-day handling of emergency services and is responsible for activating the Emergency Operations Center in a disaster.

remain in Whittier and thus rebuilt or repaired their homes as funds became available. Businesses could not always afford to wait for buildings to be reconstructed, nor could they afford the higher rents in new or seismically retrofitted buildings in Uptown.

Tracking central business district reconstruction over the first three years of the recovery disclosed a steady rate of replacement and rehabilitation of retail and office buildings. According to the Whittier Redevelopment Agency, the earthquake destroyed 36 commercial buildings that provided nearly 330,000 square feet and heavily damaged another 28 commercial buildings that contained 203,000 square feet. A total of 140 businesses were affected, and 74 were permanently displaced or otherwise relocated. By May 1988, six months after the quake, 31 buildings had been razed (totalling 305,755 square feet), two were scheduled for demolition, and three owners had not yet acted to demolish or rebuild. No replacement reconstruction had begun, but four owners had reconstruction plans approved by the DRB. Thirteen of the 28 heavily damaged buildings were being repaired and retrofitted, and a few businesses were open in structures with temporary repairs.

In 1989, at the second anniversary of the earthquake, 141,000 square feet in 13 new buildings had been approved, were under construction, or had been completed. At that point, 19 of the 28 damaged buildings had been repaired, for a total of 188,000 square feet of commercial space. By October 1990, three years after the quake, 14 new commercial buildings had been completed that contain 161,000 square feet. In addition, four lots had been purchased by the Whittier Redevelopment Agency for public-use facilities, and five properties had been combined with other properties for new buildings. At least eight property owners had not yet made any decisions about whether to rebuild, while at the same time, 95% of the damaged buildings in Uptown had been fully repaired and retrofitted.

Thus, after three years of reconstruction, more than half of the total square footage of destroyed commercial buildings had been reconstructed and virtually all of the damaged buildings rehabilitated. However, by 1993, only an additional 14,000 square feet had been reconstructed, bringing the total square footage to 176,000 in 15 buildings, less than half of the total number of buildings that were razed. Thus, reconstruction involved a nearly two-year delay in beginning the work, followed by an initial period of rapid reconstruction lasting two years, followed yet again by a greatly reduced pace of building activity. In 1991, Whittier Planning Department estimates indicated it would be at least five more years before reconstruction would be completed in the Uptown area. That figure, given current trends, appears optimistic.

The Redevelopment Agency and the Office of the City Manager were concerned with the occupancy rate of businesses in the reconstructed downtown. The strict design standards and the very specific provisions regarding what type of businesses were "suitable" in that area resulted in rent increases and

restrictions on business activities, both of which affected the occupancy rate of commercial properties. For example, a mortuary that had been in Uptown for decades was considered by some to be inappropriate for the new "Uptown Village ambience," although it was ultimately permitted to return to its old location once the building had been repaired. Leasing the rebuilt properties in Uptown has been "very slow," according to one city official. In 1990 the city was successful in attracting several new businesses to Uptown, including an upscale restaurant chain that the city hoped would draw other businesses into the area as well as increase pedestrian traffic for existing retail stores.

In a larger sense Uptown's significance to Whittier is more cultural and historic than economic. The loss of 33 out of 138 retail businesses in Uptown significantly impacted use patterns and the availability of urban amenities. Overall, however, businesses in Uptown provided only 5% of Whittier's total tax revenues prior to the earthquake. After an initial sharp decline during the first year, during which few businesses could operate, tax revenues from the Uptown district had returned to 4% of Whittier's total by 1989 and were back to near pre-earthquake levels by the following year.

Uptown's symbolic importance to Whittier was a significant factor in planning reconstruction. As an economic center in the 1970s, Uptown was in decline and had been the target of some redevelopment efforts, with little effect. Planners and business interests seized on the earthquake and the resultant state and federal funds for reconstruction to pursue redevelopment and economic expansion. Oliver-Smith (1990, 1991) noted similar phenomena in his research on post-disaster reconstruction and development after disasters in less-developed countries.

The long-term consequences of a centralized approach to reconstruction and redevelopment in Whittier cannot be accurately assessed in five years. Nevertheless, a unified and comprehensive strategy for planning and reconstruction, drawing off both professional expertise and public input, is likely to prove advantageous in the long term when compared to a laissez faire approach where the market is the only arbiter. Developing a master plan, with public hearings for citizens input and instituting a permit system to insure conformity to the plan is potentially time-consuming. In Whittier, the slow return of businesses to Uptown may be as much a consequence of the long-term economic stagnation in the U.S. as of increased rents and building costs resulting from the Specific Plan design criteria. Clearly, planning for reconstruction before an earthquake could significantly speed up reconstruction afterward.

Disasters disrupt ongoing economic trends and social patterns, providing conditions for social, political, and economic change in the midst of tragedy and loss. The intent of the reconstruction in Whittier was not to return the central business district to its prior state, but to create the basis for economic growth by increasing population densities in the surrounding neighborhoods and expanding retail business activities.

Of course, no centralized planning can transpire without engendering opposition and dissatisfaction, even at the local level. The litigious environment that emerged in Whittier over the preservation of historic buildings has already been noted. A number of historic buildings were razed when buyers could not be found, despite economic incentives offered by the Redevelopment Agency. The Whittier Theater, for example, was the subject of a three-year battle between the city and the Whittier Conservancy. The Conservancy resorted to numerous court injunctions and suits to prevent the razing of the heavily damaged building. Ultimately, the building was demolished after all legal channels were exhausted and no commercial enterprise could be found to buy and restore the building (at an estimated cost of $2 to $5 million).

The *Specific Plan* responded to the challenges of historic preservationists by designating historic zones within the reconstruction area where significant buildings would be restored and all new construction would be consistent with the style of existing structures. However, during interviews, members of various preservation groups suggested the city was not interested in preservation and would only give it minimal attention. Nevertheless, efforts at historic preservation clearly slowed demolition and reconstruction. Retrofitting and repair of historic buildings also proved more expensive than simply razing and rebuilding to be consistent with new codes. These organized efforts to preserve buildings were motivated by symbolic rather than economic interests, making the resultant disputes difficult to resolve in an environment dominated by a discourse on development and profit.

Whittier's reconstruction effort may be seen as an example of comprehensive centralized planning that used the earthquake as a point of departure for long-term economic revitalization and expansion of a dying central business district. As noted, long-range consequences of this approach are still unclear, although the earthquake had little effect on the aggregate economic conditions in Whittier. Reconstruction resulted in a safer city, although that was not the intent of the redevelopment plan. It also changed neighborhoods around the central business district somewhat by increasing population density through an increase in multiple-family units. As a result of new construction, repair, and retrofitting, there was a reduction in the amount of lower-rent housing and an increase in rents for commercial buildings. In general, evidence gathered in this study suggests that most of the stakeholders focused on business interests and so-called "up-scale" consumers, not on lower-income groups in Whittier.

Whittier's recovery has been greatly affected by its location within the urban megalopolis of Los Angeles. If lower-income victims were priced out of Whittier, they could usually find affordable housing elsewhere (e.g., Bolin, 1989). Businesses could similarly avoid rent increases in Whittier by relocating to nearby cities with lower commercial rents. One of the strategies of economic recovery and expansion in Whittier was to attract new businesses that could afford higher rents and subsequently attract wealthy shoppers to Uptown. At the

same time, the *Whittier Specific Plan* required attention be paid to the traditions and history of the area, thereby obligating the community to seek to retain existing businesses and limit developmental impacts on older neighborhoods.

The pace of reconstruction in Whittier was thus affected by a number of factors. Key elements included:

- the lack of long-range planning or recovery planning in Whittier prior to the earthquake;
- the time necessary to secure funding from governmental sources (SBA, FEMA, Housing and Urban Development, and State Earthquake Rehabilitation Assistance) to pay for urban reconstruction;
- the time required to develop a comprehensive, integrated master plan for the city;
- a lengthy process needed to get building permits approved for the Uptown area;
- litigation by historic preservation interest groups to prevent demolition of buildings;
- city government staff shortages slowing the inspection of buildings and the review of reconstruction plans;
- lawsuits against the city by businesses claiming the city caused them financial losses; and
- a shortage of builders and materiel for physical reconstruction, especially for residences.

5

Social Responses and Recovery

With community reconstruction serving as a background, this chapter examines factors affecting household level response to and recovery from the 1987 earthquake in Whittier. First, the respondent panel is described to familiarize the reader with the demographic makeup of the sample. The second section discusses the types of property losses experienced by households and victims' utilization of emergency and temporary shelter/housing. The third section examines household use of aid programs, insurance, and related assistance in long-term household recovery. The fourth section analyzes psychosocial effects of the earthquake and resulting response-generated demands (Quarantelli, 1985). This section also considers the relationship of psychological impacts to other facets of household recovery. The final section considers respondent assessments of community reconstruction activities.

Demographic Profile of Victims

The median age of the respondents is 46 years, with ages ranging from 19 to 85 years old. Twenty-four percent of the respondents were 65 or older (n=19). By comparison, Census Bureau figures indicate that 12.4% of the population in Whittier was 65 or older in 1990. The median age of the overall population in Whittier is 33. Thus, this sample has a somewhat higher than expected incidence of older persons, which may be accounted for by a somewhat older population occupying the area surrounding Uptown, where most of the heavily damaged homes were located.

The sample was 52.5% female (n=42) and 47.5% male (n=38). Of those interviewed, 71% (n=67) were married and living with their spouses at the time of the interviews. Eleven percent of the respondents were divorced and another 11% were widowed. The remaining 6% were single (never married). Households ranged in size from those with a single occupant (15%, n=12) to one

household with eight persons. The median household size was two persons (31%, n=25), and 67% of the sample lived in households of three persons or fewer. Most of those contacted lived in a single-family dwelling (95%, n=76). Most in the sample (84%, n=67) owned their own homes, reflecting their general social-class standing.

It is important to note that this high proportion of homeowners in the sample resulted from restricting the sampling frame to higher damage level residences. The most heavily damaged buildings whose occupants could be contacted for interviews were owned by people who remained in Whittier during the course of the study. Thus, the sample probably under-represents more transient (and younger) renters who simply left the area after their damaged apartments were condemned. As noted earlier, because homeowners are more likely to utilize federal and state aid programs in recovery, this group is useful for examining the relationship between aid and household recovery (see Bolin, 1989).

Approximately 55% (n=44) of the respondents worked full or part time. Another 17% were not employed. Reflecting the older median age of the respondents, 27% (n=22) were retired. Of those working, 72% worked in "white collar" occupations (sales, managerial, or professional categories). The other employed respondents were employed in "blue collar" or working class occupations (e.g., laborers, operatives, service workers, and craft workers).

The education levels of the respondents, as expected, closely paralleled the distribution of occupational categories. A total of 48% (n=38) had completed college, and an additional 23% had completed a graduate degree. (These data include both those working and retired). The remaining 24% (n=19) had a high-school education or less.

Another socio-economic variable of interest here is household income[1]. Overall, 15% of the respondents (n=12) reported their incomes as $20,000 per year or less. Another 23% (n=18) reported incomes in the $20,000 to $35,000 range. The largest number of respondents (41%, n=33) reported incomes of between $35,000 and $60,000. Finally, 21% of the sample had incomes in excess of $60,000 per year. The majority of those with income under $20,000 were either under 25 or over 60 years of age. With 63% of the sample earning over $35,000, household income for the sample is somewhat higher than the $29,956 median household income reported by the Census Bureau for the Uptown area in 1985.

The sample was relatively homogeneous in its ethnic/racial composition. The majority of the respondents were white/Anglo (86%), and Latino was the second largest category (9%). The remaining respondents were of Asian ancestry (7%).

---

1. Household income refers to total income from all wage earners, interest sources, rents, etc. before taxes. Respondents were asked to locate themselves within broad income categories, rather than give specific dollar figures for their incomes.

In general, Whittier has yet to experience the rapid growth in ethnic and immigrant populations (particularly Asians and Hispanics) that has occurred in other areas of Los Angeles County. As will be discussed below, this relative homogeneity, coupled with high median incomes, simplified shelter and housing in Whittier, in contrast to other areas of Los Angeles (e.g., Bolton, Liebow, and Olson, 1992).

A final variable useful for characterizing the sample is the number of years respondents have lived in Southern California. Members of the panel had lived an average of 35 years in Southern California (median=32), although not necessarily in Whittier and had lived in their pre-earthquake home an average of almost 12 years. Of course, the younger (i.e., under 25) respondents had lived in their pre-earthquake residences a shorter period of time, ranging from one to three years. Because most of the respondents were long-term residents of Southern California, they were aware of earthquake hazards in the region, and many had experienced other temblors.

In sum, the panel for this study consisted mainly of persons with above-average income, who were well educated, and who were long-term residents of Whittier. In addition, respondents typically had enduring marriages and small families, were likely to live in single-family dwellings that they owned, and were predominately Anglo. Such a generalized description, in fact, corresponds closely to characterizations offered by many residents of Whittier when asked to describe their neighbors and community, which they described as "a nice, stable, white, middle-class town." Thus, the victims studied in Whittier were both ethnically and socioeconomically quite different than the lower-income Latino victims studied by Bolton, Liebow, and Olson (1992), and their post-disaster experiences were likewise different.

Losses and Short-Term Responses

Although the primary sampling frame consisted of all residences identified by the Red Cross as having sustained major damage or being destroyed (level 2 or 3 damage, respectively), respondent estimates of damage were sometimes at odds with Red Cross estimates[2]. Minor damage, as assessed by the respondents, corresponds roughly to Red Cross level 1 damage. It involved superficial exterior damage, including cracked plaster, broken windows, and partially collapsed chimneys. Approximately 21% (n=17) of the respondents reported minor damage to their homes.

---

2. The replacement list used in sampling consisted of the addresses of all damaged residences in Whittier. Most homes on that list had received only minor damage. Thus, when replacements had to be drawn during sampling because respondents could not be contacted, the replacements were more likely to have homes that received only minor damage, accounting for most of those in that damage category.

Thirty-nine percent (n=31) indicated that their homes sustained moderate damage (level 2 or major damage according to the Red Cross scale). Moderate damage included cracked walls and foundations, collapsed garden walls and brick trim, broken plumbing, more serious damage to windows and doors, and roof damage from collapsed chimneys. Interior damage involved cracked walls, collapsed fixtures, and water damage from tipped water heaters or broken pipes.

Major damage[3] (40% of the sample) typified residential units that sustained serious structural damage, including houses dislodged from their foundations, collapsed interior and exterior walls and ceilings, and, frequently, extensive damage to plumbing and electrical fixtures. Houses and apartments that incurred major damage were generally not habitable after the earthquake until clean-up and makeshift repairs were made. Most homes with major damage were repairable, although some were condemned as unsafe by building inspectors.

A common problem with a number of damaged houses in Whittier was that they shifted off their foundations in the temblor; thus, heavily damaging the foundation and infrastructure. Repairing these homes required lifting them and rebuilding the foundation, an often lengthy and expensive process. Only 11% of the homes in the sample (n=9) had to be razed and completely rebuilt on a new foundation.

There was a Richter 5.3 aftershock on October 4, 1987, that, in addition to demoralizing many of the victims, also did further damage to homes weakened by the October 1 temblor. Fifty-one percent (n=41) of the respondents reported new damage from the aftershock. Most of this damage was minor, although a few respondents reported foundation cracks and related infrastructural damage. This major aftershock also functioned to "undo" much of the cleanup that victims had undertaken in the few days after the M5.9 mainshock. Whittier experienced over 30 M3.0 or above aftershocks in October 1987. There was a second resurgence of detectable seismic activity beginning in December 1987 that culminated in an M5.0 temblor on February 11, 1988.

In general, respondents reported slightly lower damage levels to interiors of homes than to the structures themselves. Thus, 37% (n=30) reported minor damage, 45% (n=36) indicated moderate damage, and the remaining 18% reported major damage to house interiors and appliances. Other property losses were produced when collapsing garages destroyed automobiles, as reported by a few respondents (n=10).

---

3. Major damage as used here covers a range of heavily damaged homes including those that were destroyed by the quake. As such, the term covers both homes listed in the Red Cross damage survey as destroyed as well as some homes listed as having sustained major damage. Because the Red Cross survey was based on external assessment only, later detailed assessments by building inspectors may have concluded a home was destroyed, rather than the initial "major damage" listed by the Red Cross.

Dollar losses to residential structures varied considerably, with 8% of respondents reporting $1,000 in damage, and one household that reported damage in excess of $130,000. The median loss amount was $30,000. Because a small portion of the sample rented, 13% were not able to place a dollar figure on structural losses; therefore, dollar estimates for repairs were obtained from 87% of the panel.

Slightly more than one-fourth of the sample reported structural losses of $10,000 or less. In addition, 30% estimated losses of between $10,000 and $30,000, and another 12% placed losses between $30,000 and $50,000. The remaining one-fourth of respondents experienced the greatest dollar losses, ranging, as noted above, to over $100,000. Given the high valuation of single-family dwellings in Southern California (the median value of homes exceeds $200,000 in nearby Orange County), such losses are not surprising, even in a moderate earthquake, and indicate potential property losses from a major earthquake in the area.

Approximately one-third of the sample estimated it would cost less than $1,000 to repair or replace interior (nonstructural) items damaged in the earthquake, and 85% indicated losses of less than $5,000. The remaining 15% estimated replacement costs of up to $20,000. For the majority of respondents, interior losses were minor and did not create significant financial burdens for replacement. Some of the interior losses involved mementos and other keepsakes for which respondents could not give any estimated value. Of course, reported dollar losses do not always reflect the emotional costs of the destroyed items.

Overall, respondents with the highest incomes ($35,000 and above) reported the greatest damage to their houses and interior items. Some of the heaviest damage occurred to Victorian-era homes near Uptown that had been or were being restored by upper-middle-class owners. Thus, higher income victims tended to report the greatest dollar losses to their residential property due to the original value of that property.

Because the city was hit by a significant M5.3 aftershock three days after the mainshock, the emergency period was somewhat protracted, particularly for those whose homes had been most heavily damaged. For some households, a period of more than a week passed before homes could be checked for structural integrity by building inspectors. This, in turn, delayed some victims in seeking temporary shelter elsewhere as they waited for their homes to be officially condemned as unsafe for occupancy. As a consequence, Red Cross emergency shelters received their peak loads of earthquake refugees nine days after the October 1 temblor (Bolin, 1989).

In the aftermath of the earthquake, uncertainties concerning the safety of damaged homes were common. Thirty two percent (n=26) of those interviewed reported spending at least one night away from their home. As expected, nearly one-half of those displaced from their homes stayed with relatives during the emergency period. Another 15% stayed with neighbors whose homes were still

considered safe. The remaining one-third went to public shelters. In Whittier, the main Red Cross shelter, situated in the community center, housed approximately 150 earthquake victims during the first few days of the emergency.

Most respondents (75%, n=56) had their residences examined by building inspectors to assess safety and determine the level of structural damage. Those whose homes were inspected indicated city building inspectors took an average of 12 days to assess structural integrity. Seventeen percent (n=12) had their homes condemned as unsafe for occupancy. The delays in inspection were due to the large number of requests received and a relatively small staff of inspectors in Whittier. Other cities in the metropolitan area lent inspectors to Whittier to try to expedite the procedure. As a result of the delays, many respondents lived in damaged homes whose structural integrity had not been assessed for two weeks or more.

In the aftermath of the earthquake, alternative shelter was immediately needed for those victims whose homes were heavily damaged. In instances where homes couldn't be rehabilitated rapidly, longer-term shelter arrangements were made, pending repair of housing or until permanent housing was acquired. Because only a small percentage of available housing stock in Whittier was actually destroyed, locating temporary shelter and housing was not problematic for most. As will be discussed in Chapter 6, this was in stark contrast to the Loma Prieta earthquake, where a pronounced housing shortage made finding alternative housing very difficult, particularly for the many low-income victims of that disaster.

As noted, approximately one-third of the Whittier sample left their homes after the quake for at least one night. For most victims, few difficulties were encountered in obtaining temporary shelter. Overall, only 15% (n=12) of the respondents used Red Cross shelters (45% of those evacuating). The remainder who left their residences (n=14) went to the homes of relatives or friends during the immediate aftermath of the earthquake. Thus, given the moderate nature of damage to most single-family dwellings, only a small portion of the impacted population needed emergency or temporary shelter for any length of time.

Fifty-four percent (n=14) of those evacuating their homes stayed in temporary shelter three days or less, and 27% (n=7) stayed up to two weeks. Only the remaining five households experienced protracted stays in temporary shelter/housing. Most of this group needed shelter for one to three months, but two respondents were still in temporary residences more than one year after the mainshock.

Of the respondents who evacuated, 54% (n=14) were able to return to their residence after their initial stay in emergency/temporary shelter (median stay=three days). For those 12 households that made a second move before returning to permanent housing, one third went to the homes of friends or relatives. Most of the remainder lived in rental units while their homes were

rehabilitated, although two respondents lived in camper-trailers at their homesites.

Those respondents who used camper-trailers located them in their driveway (or a neighbor's) and lived in them while they rebuilt their homes. They indicated that they gradually shifted from living in campers back to living in their homes as sections were rebuilt, essentially "commuting" between their temporary and permanent housing while the latter was made habitable.

As part of the federal response to the disaster, the Federal Emergency Management Agency (FEMA) made available to qualified victims financial support to cover the costs incurred while living in temporary housing. Funds paid up to three months of temporary housing rent for homeowners and one month for apartment dwellers. However, few respondents sought assistance under FEMA's temporary housing program. Again, among the 32 respondents who were displaced, only 19% (n=6) received assistance from FEMA to cover their temporary housing needs. Another 12% (n=4) received housing assistance from the Red Cross. As reported in a related Whittier study, some victims said they intentionally sought assistance from the Red Cross rather than FEMA to avoid the more complicated nature of FEMA's application process (Bolin, 1989).

Over the last several years FEMA required disaster victims to locate their own temporary housing, rather than have FEMA staff make the arrangements. In addition, FEMA utilized a so-called "ready check" system in which temporary housing checks were printed on-site and mailed to applicants within a few days. This system was intended to reduce the time it normally took to get temporary housing-assistance and home-repair checks to victims. In the case of the Whittier Narrows earthquake, where this system was utilized, in three months FEMA had disbursed $6.8 million to some 13,500 applicants for temporary housing and minimum home repair funds.

In a previous study on Whittier victims (Bolin, 1989), three independent variables were found to be associated with use of FEMA temporary housing aid. Respondent's household income, current job, and education level were significantly related to FEMA housing aid in a bivariate tabular analyses. That study concluded that higher socioeconomic status victims were the main beneficiaries of FEMA's temporary housing program. In Whittier, the FEMA temporary housing program was utilized primarily by homeowners rather than renters, hence the positive relationship with higher socioeconomic status. That study also found that household size was significantly related to temporary housing program use. Thus, victim households with three or more members were more likely to use the temporary-housing program than smaller households (Bolin, 1989). These explanatory factors were also found to hold in the present study in regard to use of FEMA's temporary housing program.

The majority of displaced households in Whittier made their own temporary shelter and housing arrangements outside the formal structure of aid programs.

This is indicative of the relatively low damage levels to housing stock, the availability of alternative housing in the area, and the generally secure financial situations of most victims. As Loma Prieta was to show two years later, a major earthquake in an urban area of California made FEMA's "privatized" approach to temporary housing untenable for a significant segment of the victim population because of a lack of surplus housing stock.[4] There appears to be a threshold of loss of affordable housing stock beyond which a more systematic and/or centralized approach to housing earthquake refugees may have to be employed to provide temporary shelter (e.g., Bolin, 1982; Quarantelli and Pelanda, 1989).

Because FEMA is the primary federal source of temporary housing aid nationally, a number of survey questions focused on respondent use of FEMA programs. Two central issues in temporary shelter and housing programs are: 1) the length of time temporary housing aid was received, and 2) whether the amounts received were adequate to cover costs incurred. None in the panel that utilized FEMA temporary housing aid did so for more than three months, reflecting the general rapid return to permanent housing for that group. None of the households that used FEMA temporary housing indicated that the money received from FEMA was adequate to cover rent while in temporary housing—a persistent complaint that is reported elsewhere (Bolin, 1882; Bolin and Bolton, 1986).[5]

Three of the six households relying on FEMA housing aid indicated that they encountered difficulties in locating suitable temporary housing. Problems centered around cost of the housing and location in relation to their former home. Overall, only a small fraction experienced difficulties with temporary shelter or housing. Since earthquake damage was limited and there was some surplus housing available in Whittier, most of those unable to return to their earthquake-damaged residences were able to make alternative arrangements in a relatively short time. This contrasts notably with the temporary housing situation after other recent California earthquakes, in which many victims had

---

4. As will be discussed in Chapter 6, after the Loma Prieta earthquake, FEMA's program of giving victims rent money and having them make their own housing arrangements proved unsuccessful for many victims. The pre-existing housing shortage in Santa Cruz County made the post-disaster housing situation critical, particularly for low-income households.

5. In an earlier study in Whittier of a similar but larger sample, Bolin (1989) reported that two-thirds of those using FEMA temporary housing aid (n=19) said that the amount was inadequate to cover the costs of rental housing. This suggests that FEMA's estimates of "prevailing rates" for rental housing may not adequately reflect actual rents disaster victims are paying for temporary housing. Alternately, victims may confuse increased overall expenses while living in temporary housing with not receiving enough for rent.

difficulty with post-disaster housing, including lengthy stays in temporary shelter and housing (Bolin and Stanford, 1991).

Because some respondents in Whittier lived in apartments and other rental units, several survey questions were directed specifically at renters. Renters are an important consideration in post-earthquake housing since they depend on landlords to have buildings inspected for damage and repaired for safe occupancy. Renters also are less likely to have earthquake insurance and are eligible for less federal temporary housing aid (Bolin, 1989).

Of the 13 respondents who lived in rental units (16% of the sample), nearly half (n=6) had to find new rentals as a result of earthquake damage. Of that number, three reported having difficulty finding a new place that met their housing requirements (rent amount and location). Five respondents who rented received aid for temporary housing, compared to 11 homeowners in the study. Renters who received short-term rental assistance used either FEMA, Red Cross, or state of California programs.

Elsewhere in Los Angeles there was evidence that some landlords attempted to exploit the post-disaster situation at the expense of their tenants. Respondents reported various problems, including landlord failure to repair damaged buildings, unjustified evictions, and extraordinary rent increases (Bolin, 1989). In the survey, Whittier renters were asked if they had experienced similar problems. Few in Whittier reported having any problems with their landlords, although two respondents complained of delays in getting damage repaired or outright refusal by landlords to repair the damage. Five respondents said that their rents had increased after the earthquake. However, only one of those attributed the increases to landlord opportunism. As other research has suggested (Bolton, 1988), landlord problems were worse in other areas of Los Angeles, particularly in minority neighborhoods with concentrations of unreinforced masonry tenement buildings that were damaged in the earthquake.

Aid, Insurance, and Household Recovery

Due to the nature of property damage that occurred in Whittier, many victims were able to return to their homes quickly after official damage assessments were completed. In what follows, housing recovery related to the repair and rehabilitation of damaged residences will be examined along with use of insurance and other rehabilitation aid.

FEMA established the first Disaster Application Centers (DACs) in Whittier on October 11, 10 days after the earthquake and four days after the presidential disaster declaration. The DACs were centralized sources of aid and information covering virtually all state and federal disaster programs. They also provided information on such services as crisis counseling, home repair contractors, clean-up assistance, and building demolition services.

Seventy-four percent of the respondents (n=59) went to a Whittier DAC. Twenty nine percent (n=23) made a single trip to the DAC to obtain information and file applications. The majority (38%, n=31) made two or three visits. Victims had to return to the DAC because they did not bring the required documentation and related materials necessary for completing federal program applications. Two respondents indicated they made a total of seven trips to the DAC before all their applications were completed. Twenty-eight percent (n=17) reported having difficulty in filling out the various application forms, although none reported any language difficulties with DAC workers.

Comments from those making repeated trips reflected both frustration and irritation at having to make so many trips for what they considered to be unnecessary bureaucratic requirements. Those not using a DAC commonly stated that they didn't apply because the wait was too long and the procedures too complicated for the small amount of financial aid they thought they would receive. In spite of some victims choosing not to pursue aid, FEMA still underestimated the demand on the DACs. Because of the large number of applicants, more than one-third of the respondents were initially turned away after making appointments for return visits to apply for aid.

Respondents who went to the DACs were successful in obtaining aid from one or more programs. Virtually all respondents who went to the Whittier DAC (n=59) received aid in one or more areas, including temporary housing, home rehabilitation, reconstruction loans, individual/family grants, and related recovery services. Although a wide range of programs was available, data will be presented on the most commonly used state, federal, and private programs in U.S. disasters.

Some additional local- and state-funded housing and business loan programs were not available through the DACs. These programs were instituted locally or at the state level after the DACs had ceased operations and applications were processed through the appropriate local or state government office. The Whittier Disaster Relief Fund was one such program, and its role in recovery will be discussed below.

As expected, the best predictor of victim use of DACs was simply the amount of damage and losses sustained by respondents to their property. Only 10% of those with moderate damage levels to their homes went to a DAC, compared to 75% of those who reported major damage. Conversely, for those not going to the DACs, 61% indicated minor to moderate damage to their homes, while 8% indicated major losses. Household income was another factor associated with aid program utilization. Of those going to the DACs, 69% had incomes in excess of $35,000 per year. In contrast, two-thirds of those who chose not to use the DACs had incomes of less than $35,000, with the majority (54%) earning less than $25,000. As will be seen, this self-selection process in applying for aid was largely responsible for the high rate of success among victims in receiving federal aid in Whittier.

The Red Cross, as is normal, was the first organization at the disaster site to dispense aid and provide emergency services for victims, beginning emergency services literally within a few hours of the mainshock and a full week before the DACs opened. The Red Cross was a key source of information, referrals, and financial assistance for Whittier victims; the organization also provided temporary shelter, food, clothing, and other disaster-related services. The Salvation Army also offered food, clothing, and similar services to earthquake victims in Whittier.

The major federal programs available to Whittier victims included those from FEMA as well as the Small Business Administration (SBA). The key FEMA programs of concern here are its temporary housing program, discussed previously, and its Minimum Home Repair Program (MHRP), which provided cash grants to victims to pay for repair of damaged homes. The MHRP was useful in reducing demands on temporary housing by providing homeowners with resources to quickly rehabilitate their residences while they continued living in them. Because few respondents had earthquake insurance, the MHRP program was an important resource (see Table 5.1). However, city officials did report numerous problems with unscrupulous contractors who took money from victims for home repairs and then failed to complete the work for which they contracted.

Low-interest loans for the repair or reconstruction of homes and businesses were available to victims through the SBA. Some Whittier victims did express concern that the SBA was not offering uniform annual interest rates on its loans; those rates ranged from 4% to 8%, depending on the length of the loan payback period. Evidence from other disasters suggests that qualifying for SBA loans is usually difficult for lower-income victims or those on fixed incomes (Bolin and Bolton, 1986). As is normal FEMA policy, victims who failed to qualify for SBA loans were automatically referred to the Individual and Family Grants Program (IFG). Because primarily high-loss, middle- or higher-income victims used the DACs in Whittier, a high success rate in obtaining SBA loans resulted (Table 5.1) (compare to Nigg and Tierney, 1990).

Other aid programs available at the DACs included the Individual and Family Grants (IFG) program, a joint federal- and state-funded program designed to provide small cash grants (up to $5,000) for victims unable to qualify for other federal disaster aid programs. In addition, the state of California developed a matching grant program that provided supplemental assistance to victims through the Department of Social Services (DSS). This supplement to the IFG made up to $10,000 in grant assistance available ($5,000 each from the DSS and IFG) for individuals and families with "unmet needs."

The California Department of Housing and Community Development made loans of $20,000 available to owners of single-family dwellings whose homes were damaged in the earthquake. The Whittier Earthquake Relief Fund, while originally created to provide grants in aid to all local victims, later redirected its

grant program to serve only the heavily impacted business sector. The Whittier Home Rehabilitation Department also disbursed funds to victims for home repairs. In addition, victims in Whittier were able to receive free labor services from the California Conservation Corps for minor demolition and debris removal.

Table 5.1 presents descriptive statistics on utilization patterns of common aid programs available through the DACs. In general, those victims who experienced relatively substantial losses or who had few resources to cover disaster losses used the various aid programs. Victims with losses of less than $3,000 or those with earthquake insurance did not pursue aid through the Disaster Application Centers. Those respondents choosing not to use federal or state aid did so because they were reluctant to spend the time or put together the documentation necessary for the application process. Respondents not using aid typically had sufficient incomes or financial reserves to cover minor losses without relying on formal aid programs. Some respondents said they did not go to DACs because of the (perceived) inadequacy of the aid programs and the "hassles" involved in applying for aid. In addition, some respondents also were unhappy with what they saw as preferential treatment toward Whittier's business sector that they felt was getting in the way of recovery and reconstruction aid.

As shown in Table 5.1, approximately half of all victims who received governmental aid obtained grants through FEMA's Minimum Home Repair Program. The grants for minimum home repair were generally small, with none receiving more than $5,000. Approximately one-third of the grants were under $500 dollars. The top one-third of the grants ranged from $2,000 to $5,000. For moderately damaging earthquakes in areas with single-family dwellings, the MHRP grants appear to be a particularly effective way of assisting victims in the rapid rehabilitation of their homes

The Small Business Administration loan program was used by slightly more than half of all respondents who sought aid, all of whom owned their own homes. SBA was the primary source of loans for homeowners who needed to make substantial repairs. The largest loans exceeded $100,000. In a few instances, as will be discussed below, SBA loans were used in conjunction with earthquake insurance to cover major losses. Of the 30 SBA loans given to respondents, approximately half were $20,000 or less. Forty percent of received loans ranged from $21,000 to $80,000, and the remaining 10% received loans of more than $100,000. Due to the lack of insurance coverage among most victims, even a moderate earthquake would appear to generate a relatively large demand for SBA loans. In Whittier's case, the relatively high socioeconomic status of the victims contributed to the large proportion of applicants who qualified for SBA loans.

Those not able to qualify for SBA loans sought aid through the Individual and Family Grants program. Only 15% of those using aid received IFG grants, reflecting the financial resources available to most Whittier victims outside of

this program "of last resort." Four respondents received grants of less than $1,000, and the remaining five were given between $1,300 and $3,000. The California Department of Social Services offered grants to supplement the IFGs. The same nine respondents who received IFG grants also obtained Department of Social Services monies, ranging from $100 to a maximum of $2,900.

Table 5.1
Aid Program Utilization by Whittier Victims

Program Name	n	% of Victims Using Aid	% of All Victims
Red Cross	4	8.6%	5.0%
FEMA Minimum Home Repair Program	28	49.2%	38.0%
FEMA Temporary Housing	6	10.2%	7.5%
SBA Loan	30	50.6%	37.5%
Individual and Family Grant program	9	15.3%	11.3%
California Department of Social Services	9	15.3%	11.3%
California Conservation Corps	10	18.9%	12.6%
Whittier Disaster Relief Fund	8	13.5%	10.0%
Whittier Home Rehabilitation Department	6	10.2%	7.5%
Religious and Civic Organization Aid	4	8.6%	5.0%

Other sources of financial assistance in Whittier were available through the Whittier Disaster Relief Fund and the Whittier Home Rehabilitation Department. All of the respondents who received money from the Disaster Relief Fund were business owners. Half of those (n=4) received amounts of less than $2,000. The remainder were given between $3,000 and $10,000 for the refurbishing or reconstruction of businesses. A few homeowners obtained grants from Whittier's Home Rehabilitation Department. Three respondents were given $5,000, while others received grants ranging from $6,000 to $15,000.

Two major characterizations can be drawn about respondents' utilization of aid programs. First, one-fourth of those interviewed utilized their own resources to cover disaster losses, not publicly available programs. Second, most who used the governmental aid system felt the funds they received did not adequately cover their actual losses. Some victims acquired aid from more than one program in order to recoup their disaster-related expenses. Table 5.2 presents the number of different aid programs victims used. The majority of respondents using formal aid relied on a single program for their assistance, although almost 40% of those receiving aid relied on more than one aid source.

Respondents in the household survey were asked to report the total amount of aid received from all sources (apart from earthquake insurance). For the three-fourths of the sample that received aid from agencies and organizations, the dollar amounts received is presented in Table 5.3.

Previous research has identified financial need as well as the victim's willingness and ability to "work the system" as the key determinants of success in acquiring federal disaster aid. As noted elsewhere, the ability to pursue aid through bureaucratic channels correlates positively with social class (Bolin, 1982). Of course, actually receiving recovery aid is ultimately determined by the availability of the aid money and the filtering effect of eligibility regulations for each program (e.g., Bolin and Bolton, 1986). The net consequence of these structural and individual factors is a pattern of socially variable access to and utilization of aid programs by disaster victims (Bolin and Klenow, 1988; Drabek and Key, 1984).

For analytical purposes, the key elements to consider are losses, as indicators of need, and social class/demographic factors, as indicators of ability to qualify for and obtain aid. Both class and demographic factors have been shown to play a significant role in eligibility for loan programs and in predicting successful pursuit of financial aid (Bolin, 1982). Similarly, it is not surprising that damage levels were clearly associated with receipt of federal aid. For those receiving aid from a disaster-related agency, 81% reported major losses to their houses and

Table 5.2
Number of Formal Aid Sources

Number of Aid Sources	n	% of Those Receiving Aid	% of Total Sample
No aid received	21	NA	26.3%
1	34	57.6%	42.5%
2	18	30.5%	22.4%
3 or more	7	8.8%	11.9%
Total	80	100.0%	100.0%

Table 5.3
Total Aid Received in Dollars

Amount in $	n	% of Those Receiving Aid
No aid received	21	--
$1,000	14	23.8%
$1,000-$4,999	12	20.4%
$5,000- $9,999	10	16.9%
$10,000-$49,999	13	22.0%
$50,000 +	10	16.9%
Total	80	100.0%

contents. For those who did not receive governmental aid, only 8% fell into the major loss category.[6] In terms of the social class indicators of education, income, and occupation, those receiving aid did not differ significantly from those who did not receive aid. This reflects, in part, the relative class homogeneity of the sample. It should also be noted that those who did not receive aid chose not to apply, rather than having had aid denied. Number of household members was also predictive of receipt of aid, with larger households (four or more persons) significantly more likely to have received aid than smaller households.

To determine patterns of aid program use among respondents, a series of cross-tabulations were computed using social class indicators as independent variables and specific aid programs as dependent variables. The social class variables of respondent education, occupation, and income were each significantly related to receipt of SBA loans and Red Cross aid. For all three class variables, the relationships were positive, with higher socioeconomic status respondents more likely to utilize those two sources. However, the same social class variables were unrelated to use of FEMA's Minimum Home Repair Program. The three class factors were significantly and negatively related to the Individual and Family Grant Program, that is, lower socioeconomic status victims were more likely to be recipients, which is expected given the intent of the program.

Demographic variables were cross-tabulated with use of Red Cross, FEMA MHRP, and IFG programs. Age was significantly related to use of Red Cross aid but not to FEMA's Minimum Home Repair Program or the IFG program. Younger victims (under 35) were more likely to have received aid from the Red Cross than were older victims. In fact, no respondent over the age of 60 used the Red Cross as a source of aid. Some younger victims may have simply been avoiding the more time-consuming application process for federal assistance and thus relied on the Red Cross.

Earthquake insurance is a key issue in policies and programs for earthquake hazard mitigation and response currently being developed in the U.S. Correspondingly, respondents' earthquake insurance coverage was investigated. The data showed that 21% (n=17) of the sample had earthquake insurance at the time of the mainshock. Virtually all the homeowners in the study had regular household insurance, and 52% of the renters had household insurance on their possessions. According to most respondents, their homeowners' and renters' policies specifically excluded damage from earthquakes.

---

6. Victims with major losses who did not use governmental aid typically had their losses covered by earthquake insurance. However, some victims with earthquake insurance did use SBA loans to help pay deductibles.

The percent of losses covered by earthquake insurance ranged from a low of nothing covered for four victims (24% of respondents with insurance) to more than 80% of losses covered for six respondents. Bolin (1989) reported in an earlier study that fully a third of those with earthquake insurance claims in Whittier had yet to receive any money from their insurers 20 weeks after the earthquake. One year after the quake, all respondents with insurance had settled their claims.

In all, 60% (n=10) indicated that they had problems with their earthquake insurance. Most said that either settlements took too long or the amount received was not adequate to cover actual losses (or both). As with SBA loans and FEMA grants, disaster victims clearly wanted to receive assistance rapidly and criticized programs that did not expedite applications. Based on this small sample, it is evident that earthquake insurance did not work particularly well for most.

A point worth noting is that four households with earthquake insurance chose not to pursue claims with their insurers to cover their earthquake losses. The primary reason given for not doing so was that the deductibles were too high to warrant using the insurance. Of those filing claims with their insurers, the data show that half (n=8) paid a deductible of $10,000, and four households paid more, up to a high of $20,000. Faced with deductibles in this range, several respondents turned either to the SBA or related home-loan and grant programs through the DACs for assistance.

While less than one-fourth of the sample had earthquake insurance at the time of the quake, when interviewed one year later, nearly 38% indicated that they now had earthquake insurance. During the second interview, more than two years post-impact, 41% had earthquake insurance. Thus, there was a substantial jump in the number with earthquake insurance initially, but only an incremental increase during the second year after the quake. Clearly, the earthquake significantly motivated respondents to purchase insurance, but as the post-disaster situation normalized, the rate of purchasing insurance dropped off.

In spite of their recent experience with a damaging earthquake, less than half of the Whittier panel had earthquake insurance at the time of the second interview. However, most homeowners had received letters from their insurers offering them earthquake insurance. The majority simply opted not to accept the offer. The most common reasons for not having earthquake insurance were that the deductibles were too large and the premiums were too expensive for the coverage offered (see, for example, Palm, Hodgson, and Blanchard, 1990). All respondents recognized that they were at risk of future earthquakes in Whittier. Those without earthquake insurance appeared to be balancing current financial concerns against possible future risk. Without adequate insurance coverage these households will have to rely on federal or state aid in future damaging earthquakes. The heavy use of SBA loans after Whittier Narrows underscores this point.

In cross-tabulating earthquake insurance with social class and demographic factors, a few patterns emerged. The social class indicators of income, education, and occupational status were all significantly associated with carrying earthquake insurance prior to the earthquake. Higher socioeconomic status residents were more likely to be able to afford the premiums on earthquake insurance and were better able to pay the large deductibles. Both age of the respondent and household size were unrelated to having earthquake insurance.

Thirty-five percent of those sampled (n=28) reported that they encountered financial difficulties in covering their disaster losses. Respondents reported using a number of different strategies to deal with uninsured losses. Among the most commonly used strategies were: not replacing some damaged items, securing SBA loans or FEMA grants, drawing off savings, or combining public aid and private borrowing.

Although securing financial assistance was the first major task facing Whittier victims, the second and more time-consuming task was repairing or rebuilding their damaged homes. In all, 89% (n=71) of the respondents undertook earthquake-related repairs. Table 5.4 presents the proportions of the sample engaging in various repair activities. A relatively broad range of house repairs was required by homeowners in the sample. Some general distinctions can be drawn between repairs affecting major structural parts of the home (e.g., foundation and load-bearing walls) versus more cosmetic features (e.g., carpeting, interior plaster, and lighting fixtures). Of course, heavily damaged homes required extensive structural repairs as well as complete refurbishing of interiors. Seventy-six percent of those having repairs done (n=61) lived in their homes while the work was completed. This was possible for most respondents, except in a few instances where the home had to be razed and completely reconstructed.

Even a moderate earthquake can place major demands on available contractors and building materials. Whittier respondents were asked who carried out the repair work on their homes. Seven households (10%) did all the repairwork themselves or with the help of family and friends. More than half of the impacted households (n=39) relied solely on contractors. The remainder relied on a combination of contractors and their own labor for repairs. Supplementing contractor work with personal labor was a relatively common technique to help defray reconstruction expenses.

In communities in which heavy demands are placed on the building industry, a localized "boom" economy may temporarily emerge. Some of the characteristics of this "disaster capitalism" are artificially high prices, poor quality work, and the proverbial fly-by-night contractor (see Bolin, 1982). Approximately half of those using contractors in the Whittier sample said they were satisfied with the work done for them. The remaining respondents had various complaints ranging from poor quality work (15%) to the contractor not doing all the work commissioned (12%) to excessive delays in finishing the work (19%).

Table 5.4
Home Repair Activities

Repair Activity	n	Percent
Complete Replacement of Home	3	4.2%
Reconstruction of Frame/Foundation	9	12.7%
New Windows, Plaster, Paint, Interior Walls	11	15.5%
Exterior Walls, Chimney, Roof	11	15.5%
Minor Plaster Repair and Clean Up	4	5.6%
Combination of Major Repairs	8	11.3%
Combination of Minor Repairs	25	35.2%
Total	80	100.0%

Higher-loss respondents indicated that the time required for complete reconstruction of heavily damaged homes was problematic. Some respondents were still waiting for the finishing work on their homes to be completed at the time of the first interview one year after the earthquake. A year or more in temporary housing or repairing a heavily damaged home is not particularly unusual in disasters (e.g., Bolin, 1982). However, in Whittier the selective nature of the damage resulted in a dramatic variation in length of time, if any, people spent in temporary housing and/or in rebuilding their homes. In a few cases, the delays victims experienced in repairing homes originated in disputes over insurance settlements. For others, the length of time to receive an SBA loan (often several months) delayed reconstruction of their homes.

Virtually all victims found the repair work to their homes to be disruptive to their day-to-day lives. Ten percent (n=8) had to move out while repair work was being done. Forty percent said that the repairs interfered with their daily routines, while others complained of continual messes from the work (16%) and the lack of privacy due to the number of repair workers around (20%).

Nevertheless, two-thirds (n=50) said that the repair/reconstruction work to their homes made the structures more earthquake-resistant. Approximately half said they were happier with their homes after the repair work than they had been before the earthquake.

In general then, repairing or rebuilding homes was a time-consuming and disruptive process, particularly for those who required extensive refurbishing. This foreshadows probable difficulties that many homeowners will be faced with in reconstructing after a future large earthquake in Southern California. A major earthquake will undoubtedly greatly reduce the availability of contractors and building supplies. These demands will, in turn, significantly extend the time needed to reconstruct homes, as well as drive up the cost of repairs.

In the case of housing, had many more victims been made homeless by the earthquake, creating a corresponding increase in demand for temporary housing, it is not difficult to project that disaster victims would have experienced difficulties in obtaining temporary housing if only standard FEMA programs were used. When only a small percentage of housing stock is lost, as in Whittier, existing vacant housing can be used for temporary accommodations for victims, as can the undamaged homes of relatives or friends. Given the housing shortage in many cities in Southern California, any earthquake that causes widespread damage to housing can be expected to create serious, perhaps intractable, problems in providing shelter for victims unless significant interventions are initiated by authorities. A major earthquake is also likely to create steep inflationary pressures on contractor services and repair costs.

Kinship networks are often relied on either as a supplement to, or replacement for, the programs of aid offered by state or federal governments. In Whittier, a majority (93%, n=73) received some assistance from relatives or friends in the area. The most common forms of assistance from relatives were shelter (32%) or a combination of emotional support and cleanup assistance (34%). No one reported receiving money from their relatives. Disaster victims would appear very reluctant to borrow money or receive gifts of money from kin, preferring to formally apply for loans or grants (e.g., Bolin, 1982). The primary assistance given by friends was emotional support (55%).

To assess the economic effects of the disaster, respondents were asked to evaluate their own economic recovery from the earthquake. Table 5.5 displays the frequency distributions to responses to the self-rating scale for both the 1989 and 1990 rounds of interviewing. Approximately half the sample in 1989 said they had made little or no progress toward economic recovery in the first year after the earthquake. The data for 1990 show that in the intervening year those reporting little or no recovery had dropped to 21% of the sample. Conversely, the remaining 79% considered themselves mostly or completely recovered economically. As will be seen below, this rate of recovery at the household level was significantly more rapid than the pace of urban reconstruction.

Table 5.5
Economic Recovery from Earthquake

	Frequency		Percent	
Recovery Status	**1989**	**1990**	**1989**	**1990**
Not at all recovered	14	8	17.5%	10.0%
Some recovery	25	9	31.3%	11.2%
Mostly recovered	16	20	20.0%	25.0%
Completely recovered	25	43	31.2%	53.8%
Total	80	80	100.0%	100.0%

One-fifth of the sample reported not being economically recovered two years after the earthquake. While this is not a large number in an absolute sense, it does show that a moderate earthquake that leaves most of a community untouched can nevertheless create protracted economic problems, even among reasonably well-off victims. Those indicating little economic recovery two years after the event were, for the most part, victims whose losses required substantial financial assistance. Victims relying on SBA or state loans for disaster-related expenses faced long-term indebtedness to pay off the loans. Thus, some victims felt it would be a number of years before they could consider themselves financially recovered.

To analyze the determinants of economic recovery status, a multivariate analysis was performed using discriminant function analysis to identify key factors in recovery. Recovery status as measured during the 1990 survey was entered as the dependent variable and a set of demographic, socio-economic, aid, and loss variables taken from the 1989 survey were entered into the analysis as independent variables. Utilizing a stepwise selection procedure, the discriminant function analysis selected a set of independent variables that best predicted (discriminated among) recovery scores for the different recovery "groups." For analytical purposes, the economic recovery groups are the same as those in Table 5.5—not at all recovered, some recovery, mostly recovered, and completely recovered.

Independent variables entered into the discriminant-function analysis were selected based on previous research of variables found to be of explanatory importance. A total of 16 independent variables were included in the first stage of analysis. The variables included a range of demographic, loss, aid, and experiential factors. The discriminant analysis routine selected a set of variables

in a stepwise procedure that best discriminated among the four recovery groups. Each function represents a linear combination of independent variables that best discriminates among criterion groups (i.e., recovery groups) as measured by the dependent variable. The stepwise procedure selected statistically the independent variable that accounted for the most variance in the dependent variable. It then identified the variable that best accounted for the remaining unexplained variance in the dependent variable, and so on, in a series of steps until explained variance was maximized by a set of independent variables (Loether and McTavish, 1988). Table 5.6 presents the variables selected and the order of selection.[7]

As Table 5.6 shows, 10 independent variables were selected by the statistical routine based on the discriminatory or explanatory power of the dependent variable. That is, statistically speaking these are the variables that best predict into which recovery group a respondent falls. They can be thought of as the most important factors that account for recovery, among the variables measured in this study. These 10 variables were then used in the remaining stages of the analysis.

Discriminant analysis always derives (N - 1) functions for the number of criterion groups. Since this analysis specified four recovery groups, three discriminant functions were obtained. Each function represents an underlying mathematical axis or dimension, and the relative size of the coefficients in Table 5.7 indicates the statistical "contribution" of each variable to the three functions.

Each function can be described by the unique combination of variables that cluster on it (i.e., that have large coefficient values). Thus, Function 1 can be characterized as a combination of damage and residential disruption variables, based on those variables with the largest discriminant function coefficients. Function 1 explains 59% of the variance in the dependent variable (recovery group). For economic recovery, residential losses in combination with SBA loans, the number of post-disaster residential changes, and utilization of housing aid cluster together on Function 1 as explanatory factors.

Function 2 explains 24% of the variance and can be described by two variables that have statistically significant coefficients: FEMA MHRP grants and assistance received from family and friends after the earthquake. Function 2 consists of housing factors, in that aid from family and friends was usually short-term shelter. Because this function accounts for less than half the variance of Function 1, it can be inferred that temporary housing variables are less important in accounting for economic-recovery than are variables associated with disaster losses and financial aid received.

---

7. Variables *not* selected in the stepwise procedure were: age of respondent, gender of respondent, education of respondent, knowledge of earthquake preparedness, spent at least one night away from home after earthquake, and number of visits to DAC.

Table 5.6
Summary Table of
Discriminant Function Analysis
of Economic Recovery Groups

Step Number	Wilk's Lambda	Signifi-cance	F to Enter	Independent Variable
1	.797	.006	2.740	Damage to Structure
2	.765	.003	3.075	Household Income
3	.624	.002	2.112	$ Amount of SBA Loan
4	.552	.001	2.590	Aid from Family/Friends
5	.508	.002	1.450	Used DACs
6	.483	.002	1.327	Received Red Cross Aid
7	.440	.004	1.412	Number of Aid Sources
8	.421	.005	1.821	FEMA Minimum Home Repair Grant
9	.371	.004	1.381	Household Size
10	.340	.005	1.361	Total Number of Moves Made

Function 3 explains the least variance in economic recovery (17%) and can be described by four variables with statistically significant coefficients. Household income correlates strongly with the function, as do three variables associated with the receipt of aid and the use of the Disaster Assistance Centers. For purposes of discriminating among (i.e., predicting membership in) recovery groups, Functions 1 and 2, as described by the variables in Table 5.7, are the most significant statistically.

In summarizing, the discriminant procedure selected a set of independent variables that predict or explain which respondents fall into each of the four recovery groups. By examining the variables as they cluster on each of the

Table 5.7
Standardized Discriminant Function Coefficients

Function 1	Function 2	Function 3	Variable Coefficient
-.2302	-.0213	.6128	Household Income
.6121	-.1924	.0354	Damage to Structure
.8961	.0067	-.1396	Household Size
.7633	.3567	-.1626	Total Number of Moves
.1233	-.0586	.6438	Used DACs
.1714	.5399	.2381	FEMA Minimum Home Repair Grant
.6013	.2673	-.0526	$ Amount of SBA Loan
-.0235	.2219	.5978	Number of Aid Sources
-.1245	.7118	-.2850	Aid from Family and Friends
-.0120	.2447	-.5029	Received Red Cross Aid
58.91%	23.78%	17.31%	Percent Variance Explained

discriminant functions, two conclusions emerge regarding the determinants of recovery level. One is that losses experienced and financial aid received are significant predictors of recovery group "membership." The second is that household income and household size are the two most important demographic variables for explaining recovery in this study. As other studies have shown (e.g., Bolin and Bolton, 1986), higher income households tend to recover more quickly and larger households tend to recover more slowly, other things being equal.

If one examines the cluster of large coefficients for variables on Function 1 in Table 5.7, it is clear that the dollar amount of SBA loans is an important

predictor of economic recovery. This is consistent with findings from previous research utilizing parallel instruments and analytical techniques (Bolin and Bolton, 1986; Bolin, 1989). For reference purposes, the actual dollar amounts of SBA loans are listed in Table 5.8.

In addition to those already discussed, other important discriminating variables were: losses (structural damage to home), receipt of FEMA MHRP monies, and the total number of residential changes made since the earthquake. In sum, the best predictors of economic recovery concerned measures of: the extent of loss, housing-related problems in the aftermath, federal aid, assistance from family and friends, and household income. Household size was the only demographic factor that demonstrated any discriminatory power, with larger households more likely to fall in the "less recovered" groups than smaller ones.

Based on values of the selected independent variables, discriminant analysis allows the researcher to predict into which group each case will fall. By comparing predicted recovery group membership with actual group membership, it is possible to judge how well the independent variables do in classifying the cases. Using the classification subroutine of the discriminant program, 74% of the cases were classified correctly. This suggests that the variables selected are reasonably good predictors of the recovery level of each respondent.

Table 5.8
Small Business Administration (SBA)
Loan Amounts

Loan Amount	n	% of Those Receiving SBA Loans
Did not receive SBA loan	49	NA
$1,000-$4,999	5	16.1%
$10,000-$19,999	8	25.8%
$20,000-$29,999	8	25.8%
$30,000-$39,999	3	9.7%
$40,000+	7	22.6%
Total	80	100.0%

Psychosocial Impacts and Recovery

The psychological or mental-health impacts of disaster constitute the second major dimension on which recovery can be measured, and one of increasing concern in the literature (e.g., Lystad, 1988). In spite of the limited and varied physical impacts of the Whittier Narrows earthquake, the psychological impacts appeared relatively pronounced (Bolin, 1989). A diverse array of mental health services were made available to Whittier Narrows victims in the weeks that followed the disaster because mental health authorities assumed psychological trauma was likely to be present and professional services would be needed by victims over the ensuing months.

For both rounds of interviewing, a number of questions were included that were designed to assess the psychosocial status of respondents. In order to limit the length of the interview, complete psychological assessment instruments such as the Diagnostic Interview Schedule were not included. Instead, respondents were presented with a series of Likert scale items derived from previous research (Bolin and Bolton, 1986; Bolin, 1989) that measured emotional responses as well as physical and psychological symptoms that respondents were experiencing. Several items asked respondents if they experienced various symptoms commonly associated with post-traumatic stress disorder (PTSD), although a full PTSD diagnostic instrument was not included due to length and complexity (e.g., Laufer, 1988). The scales used in this study do not allow a clinical assessment of psychological disorder. They are best viewed as a self-reported symptom checklist that measures the feelings of the respondent at the time of each of the interviews.

To introduce the section on psychosocial assessment during the interviews, respondents were asked:

> A number of people have told us about emotional strains and anxieties that they have felt after the earthquake and its aftershocks. Have you or anyone in your household experienced anything that you would consider as unusual emotional strains or anxieties?

Data were gathered through questions regarding who in the household experienced the symptoms and the nature of the symptoms. In all, 49% (n=39) said they or someone they lived with were experiencing earthquake-related psychological distress at the time of the first interviews. Of those responding yes, 42% identified themselves as the person experiencing the distress, while 18% indicated another adult member of the household (mostly spouses). Twenty-three percent indicated a child or children were experiencing the emotional distress. The remaining 17% said that more than one household member was having unusual emotional problems related to the earthquake and its aftereffects.

These figures suggest relatively persistent self-reported psychosocial sequelae, in this case present almost a year after the earthquake. By the 1990

interviews, more than two years post-impact, 21% (n= 17) said they still were experiencing emotional effects from the earthquake and its aftermath. Although there was a significant drop between the one-year and two-year data points, a minority of respondents reported continuing symptoms of psychosocial distress.

There is ample evidence from the literature that disaster victims are generally reluctant to seek counseling services for emotional problems related to their disaster experiences (e.g., Lystad, 1988). Of the 39 respondents indicating unusual emotional conditions in 1989, 18% (n=7) sought professional counseling. Based on an open-ended question asking victims to describe their symptoms, the majority of those indicating problems appeared to be experiencing depression, phobias, sleep disturbances, or anxieties (in descending order from most frequently mentioned). Most made use of Los Angeles County or Whittier Mental Health Outreach programs. All respondents who used mental health counseling were already members of existing counseling or support groups. Thus, the only victims who used professional counseling services were those with previous experience, reflecting a pre-existing willingness to use therapeutic organizations for psychological needs. Other disaster victims preferred to cope with various stress symptoms within the confines of their own support networks (primarily family and friends).

To analyze the characteristics of respondents with significant psychological reactions to the earthquake, a number of bivariate cross-tabulations were run. One of the key factors in determining psychological stress is perhaps the most obvious: the severity of exposure to the traumatic event. In the case of Whittier, a good indicator of exposure was the amount of damage victims' property received in the earthquake. Eighty-two percent (n=32) of those reporting "unusual emotional problems" one year after the event had experienced major losses to their homes.

Age has been found to be an important factor in psychological reactions to critical life events (Bolin and Klenow, 1988). Twenty-one percent (n=6) of respondents over the age of 65 reported emotional problems related to the earthquake. By comparison 46% of younger respondents (n=27) indicated that they were experiencing unusual emotional problems—a statistically significant difference. Consistent with the literature, elders in these data were much less likely to report negative psychological reactions to the disaster than younger persons.

Respondent gender was cross-tabulated with the prevalence of emotional problems. Of the household members experiencing psychological distress, 64% were adult females, 24% were adult males, and the remainder were children of both sexes. It is not possible, of course, to assess how much of this difference is the consequence of reporting biases (i.e., women may more freely admit to psychological distress) and how much derives from structural or other factors that may stress women comparatively more in disasters than men. Interestingly, women were no more or less likely to seek professional counseling for their

distress than were men. Other demographic factors, including respondent education and occupational status, were not significantly related to the incidence of emotional distress.

The nature of psychosocial distress in response to the earthquake was measured by a series of Likert scale items. Table 5.9 presents the frequency distributions of responses. Statements were designed to elicit responses to a wide range of symptoms, including anxieties, depression, loss of affect, fear, intrusive images of the stressor, sleep disturbances, and separation anxieties, as well as positive feelings such as increased sense of family solidarity.

Of the items presented in Table 5.9, several were intended to gain information on symptoms associated with post-traumatic stress disorder. While not intended to constitute a diagnosis, the items taken together serve as general indicators of a possible delayed stress disorder. Included are those concerning intrusive recollections of the event, recurrent bad dreams, avoidance of stimuli associated with the event, loss of affect or sense of isolation, depression, and exaggerated responses to stimuli (jumpiness) (Green, Wilson, and Lindy, 1985; Laufer, 1988). However, because initial data were gathered nearly one year post-impact, it is impossible to determine whether reported symptoms were present since the earthquake or if they were delayed-onset reactions, as is the case with PTSD.

A few points are worth noting from the initial descriptive figures presented in Table 5.9. For most indicators, somewhere between one-fourth and one-third of the respondents reported the symptom or condition. More importantly, there are surprising consistencies in the scores over both rounds of the interviewing. Thus, many symptoms respondents attributed to the earthquake persisted over a two-year period after the mainshock. A second observation is that approximately one-third of the sample indicated they were not recovered emotionally from the quake more than two years post-impact. Factors accounting for the presence or absence of psychological distress are generally complex (e.g., Lystad, 1988) and cover a range of demographic, experiential, and post-earthquake response variables.

To analyze some of the determinants of emotional distress among respondents, a number of bivariate relationships were computed between the scale items and background variables, including property losses, aid received, and background characteristics of the respondents. In the interest of brevity, only the more important relationships will be reported here.

Cross-tabulating damage by the Likert scale items produced a number of expected significant relationships. Sleep disturbances, bad dreams, and avoidance of thinking about the earthquake were significantly related to damage level. These relationships were in the expected direction: high-loss victims were the most likely to report psychological symptoms. Thus, there is support for a general dose-response model in which severity of exposure is directly related to persistence of psychological sequelae.

Table 5.9
Indicators of Respondent's Emotional Status

Statement (abbreviated wording)	Percent Agree (n=80)		Percent Neutral (n=80)		Percent Disagree (n=80)	
	1989	1990	1989	1990	1989	1990
1. At times I worry so much about quakes I can't sleep.	15.0	5.0	1.2	1.2	83.8	92.5
2. I have bad dreams about the quake from time to time.	20.0	15.0	5.0	2.5	75.0	82.5
3. Loud noises make me nervous and jumpy.	60.0	65.0	1.2	0.0	38.8	35.0
4. I am over the emotional effects of the quake.	61.3	61.3	5.0	2.5	33.7	36.2
5. I avoid thinking about the quake or damage.	36.3	42.5	5.0	1.2	58.7	56.3
6. Sometimes I feel sad and gloomy.	37.5	37.5	3.8	1.2	58.7	61.3
7. I have vivid memories of the quake and get upset.	32.5	27.5	2.5	1.2	65.0	71.3
8. Sometimes I feel keyed up and tense but don't know why.	28.7	35.0	3.8	2.5	67.5	62.5

Statement (abbreviated wording)	Percent Agree (n=80)		Percent Neutral (n=80)		Percent Disagree (n=80)	
	1989	1990	1989	1990	1989	1990
9. I don't sleep as well since the earthquake.	17.5	12.5	3.8	2.5	68.7	76.2
10. Sometimes I feel distant and isolated from people.	25.0	17.5	6.3	6.3	68.7	76.2

It has been asserted in the literature that previous disaster experience can prepare a person for coping with the stresses of subsequent disasters (e.g., Drabek, 1986). To examine this hypothesis, a respondent's previous experience with damaging earthquakes was cross-tabulated with the 10 stress statements. Items including: bad dreams, sleep disturbances, avoidance of thinking about the disaster, intrusive recollections of the earthquake, and earthquake-related anxieties all were significantly related to having had previous experience with earthquakes. The tabular analysis showed that those with previous earthquake experience were *less likely* to report a given symptom than those who had no previous experience.

The Whittier data support the contention that previous disaster experience improves coping responses to subsequent events. To illustrate this point: of those indicating they worried so much about earthquakes they couldn't sleep, 28% had been in other damaging earthquakes, while the remaining 72% had not experienced a significant earthquake. Previous earthquake experience appears to routinize events such as the Whittier earthquake, creating in many instances a relaxed, even indifferent attitude toward the hazard (e.g., Turner, Nigg, and Paz, 1986).

Respondents were asked to compare their losses to those around them. Answers were grouped into three categories: better off than others, about the same losses as others, and worse off than others. This question of "relative deprivation" was cross-tabulated with the emotional-stress indicators in Table 5.9. It was expected that those who felt their losses were greater than others would correspondingly report more symptoms of psychological distress. This expectation was supported in that for most of the indicators, the "worse offs" were also more likely to report various psychological and somatic problems. For example, 20% (n=10) of those saying they were better off than others reported

earthquake-related sleep disturbances. In contrast, 78% (n=12) of those saying they were worse off reported sleep disturbances. Similarly, 27% of the "better offs" reported depressed moods in comparison to 54% of the "worse offs." These findings suggest that it is not just absolute losses that contribute to psychological distress, but also the feeling among victims that their losses are greater than their neighbors.

There is evidence in the psychosocial literature on disaster (e.g., Gleser, Green, and Winget, 1981; Lystad, 1988) that various post-disaster experiences can be associated with psychosocial stresses. Quarantelli (1985) refers to such post-event experiences as response-generated demands. Such demands include a wide range of behaviors victims engage in to deal with the impacts of the disaster, from evacuation to clean-up to applying for aid to rebuilding their homes. Having to move out of one's home even briefly can be considered a response-generated demand after a disaster.

To examine this among the Whittier respondents, evacuation of home was cross-tabulated with the 10 emotional-symptom items. From previous research, it was expected that evacuees would be more likely to report stress symptoms than those who did not leave their home for emergency or temporary shelter. Statistically significant relationships were found for most of the stress items. For example, 62% (n=16) of the evacuees reported sleep disturbances, in contrast to 17% (n=9) of the non-evacuees. Thirty-three percent of the evacuees said they were over the emotional effects of the quake in comparison to 75% of the non-evacuees, and 46% of the evacuees reported symptoms of depression, compared to 27% of the non-evacuees. Although Whittier residents did not experience major dislocation, the data indicate that even small-scale and short-term residential dislocation is associated with increases in psychosocial symptoms.

The next stage of the bivariate analysis involved cross-tabulating demographic variables against the emotional-symptom items. The variables examined were: respondent age, gender, marital status, and income. The basic hypotheses examined were:

- Older respondents would report fewer symptoms of distress than younger respondents.
- Women would report more symptoms than men.
- Higher income victims would report fewer symptoms than lower income victims.

Each of these relationships have been found to hold in various other studies across a range of disasters (Lystad, 1988).

Looking first at age, a number of statistically significant relationships were found between age and emotional impacts. The general pattern of the evidence was quite straightforward: those over 60 reported fewer symptoms of earth-

quake-related stress than younger respondents. Several examples illustrate the patterns in the data. Thirty-five percent of those under the age of 60 agreed with the statement "Sometimes I worry so much about quakes that I can't sleep," compared to 11% of respondents age 60 or older. Similarly, 35% of those under 60 indicated symptoms of depression, in contrast to 12% of the older respondents. Thirty-seven percent of the younger victims reported earthquake-related sleep disturbances, compared to 14% of the elders. Age was not related to such items as having intrusive recollections of the disaster or indicators of depression.

As an indicator of emotional recovery, 58% of those under 60 said they were "pretty much over the emotional effects of the earthquake." This compares to 81% of those over 60, a statistically significant difference. This finding supports the contention that older persons are, in general, less vulnerable to the negative psychological effects of disasters than younger persons.

Considering gender as an independent variable, 39% of female respondents and 16% of male respondents experienced sleep disruptions caused by worry about earthquakes. One-third of the women in the sample indicated having bad dreams about the earthquake in contrast to 13% of the men—again a significant difference. Female respondents were more likely to report heightened startle responses (jumpiness) than were males (68% versus 38%). Having intrusive recollections of the earthquake was more common among female respondents (39%) than male respondents (17%).

Gender was significantly related to all 10 items appearing in Table 5.9. In all cases, males tended to agree with items indicating they weren't troubled by the earthquake and to disagree with items reflecting negative psychological reactions to the event. The statement of being emotionally recovered from the earthquake is emblematic of the gender differences in responses: 42% of the women in the study agreed compared to 79% of the men.

The last set of bivariate relationships to be examined concerned household income. Social class factors, particularly income, have been found to be associated with psychological well-being in numerous studies (e.g., Kessler, 1979). However, in these data, income was not strongly associated with any of the stress indicators, particularly in comparison to age or gender. The relationship between income and stress was variable and not consistently in the direction anticipated. It was assumed that higher socioeconomic status victims would report fewer symptoms of distress. In fact, in several instances, they indicated higher levels of stress than lower-income victims.

One of the features of the sample in Whittier was that higher socioeconomic status respondents tended to have both the greatest proportional losses (i.e., percent of home damaged) and the greatest losses in real dollar terms. In other research, lower-income victims often have the greatest proportion of their assets lost in disasters (e.g., Bolin and Bolton, 1986); hence, they report the greatest disaster-related stresses. In Whittier the pattern was variable, with social class not consistently related to the psychosocial indicators listed in Table 5.9.

To assess the effects of a group of independent variables on psychosocial recovery, a discriminant function analysis was performed. As with the preceding analysis for economic recovery, a number of demographic, disaster response, and social support variables were selected as predictors (independent variables). The dependent variable selected to define the recovery (criterion) groups was based on respondent's self-rating on an emotional recovery scale obtained during the 1990 interviews. Respondents were simply asked to rate themselves. Three categories were derived from their responses: completely recovered, somewhat recovered, and not at all recovered.

These three recovery groups are categorized from the dependent variable in the discriminant function analysis. As noted above, the stepwise procedure in this analysis selects a set of independent variables from a larger set of variables based on each variable's statistical utility as a predictor. From an original list of 15 variables chosen for their theoretical interest, the stepwise procedure selected 11 independent variables as the best predictors[8] (i.e., the variables that best distinguished among the three recovery groups).

Table 5.10 presents the summary table of the discriminant function analysis. As with the economic recovery analysis, each function here is a mathematical combination of independent variables that optimally discriminates among the three recovery group categories of the dependent variable. The independent variables represent a mixture of demographic, aid, social support, and experiential factors.

Table 5.11 presents the correlations of each independent variable on the two derived discriminant functions. Because there are only three recovery groups in this analysis, two (n-1) discriminant functions were derived. The size of the correlation coefficients indicates the relative contribution each variable makes to each of the mathematical axes or functions. Function 1, which explains three-fourths of the variation in emotional recovery, represents a combination of demographic factors (age, gender), social support factors (number of close friends, aid from family), and experiential factors (years lived in the area, previous earthquake experience). Function 2 explains a statistically significant 30.8% of the variance and may be characterized by several factors related to damage (evacuated home, received Red Cross aid), as well as three demographic variables (income, marital status, and household size).

For the first function, the best variables for predicting membership in recovery groups involve mostly pre-impact characteristics of respondents rather than post-disaster experiences. This highlights the importance of pre-disaster personal characteristics and resources as factors affecting the process of psychosocial recovery. As has been found in other research, the availability and

---

8. The variables *not* selected in the stepwise procedure were: respondent education level, amount of aid received, nature of damage to home, and number of aid sources.

accessibility of social support can be an important factor in mitigating the stresses of disaster. For Function 1 of this analysis, both the availability of social support (number of close friends) and the actual receipt of assistance from primary groups prove to be good discriminating variables in predicting emotional recovery group membership.

Table 5.10
Summary Table of
Discriminant Function Analysis
of Emotional Recovery Groups

Step Number	Wilk's Lambda	Statistical Significance	F to Enter	Independent Variable
1	.611	.0001	4.447	Red Cross Aid
2	.517	.0001	5.221	Years Lived in Southern California
3	.591	.0001	3.998	Respondent Gender
4	.521	.0001	2.775	Evacuated Home
5	.427	.0001	2.335	Number of Close Friends and Family
6	.411	.0001	2.184	Aid from Family and Friends
7	.399	.0001	4.222	Number in Household
8	.385	.0001	2.182	Respondent Age
9	.350	.0002	2.390	Respondent Income
10	.319	.0003	1.443	Marital Status
11	.313	.0003	1.586	Experienced Other Quakes

The variables that cluster on Function 2 can be separated into two categories: demographic characteristics of respondents and earthquake impacts on housing. Of particular note is the selection of household size and marital status as discriminators. Household size, in other research, is often inversely correlated with psychosocial recovery, with larger households recovering more slowly. This may be a consequence of the greater number of dependents and the potential for more emotional distress. Marital status figured prominently in Function 2 and can be interpreted as an indicator of social support availability (i.e., between spouses). Bolin (1989) found that married persons experienced more rapid emotional recovery than did single or divorced persons. Also loading on Function 2 are two variables that directly measure impact levels and disruption of housing. It is not surprising that housing disruption factors proved

Table 5.11
Standardized Discriminant Function Coefficients for Emotional Recovery Groups

Function 1	Function 2	Variable Name
.5221	.1138	Respondent Age
.4241	-.1623	Respondent Gender
.1667	-.6542	Number in Household
.5997	-.1392	Years Lived in Southern California
.2894	-.0533	Previous Earthquake Experience
.4548	.1330	Number of Close Friends and Family
-.0022	.4565	Marital Status
.1411	-.5768	Evacuated Home
.5013	.1246	Received Aid from Family and Friends
-.1540	.3347	Household Income
.2157	.4992	Red Cross Aid
69.22%	30.78%	Percent of Variance Explained

important discriminators in the analysis, as dislocation in housing has been identified as an indicator of prolonged exposure to stress (e.g., Gleser, Green, and Winget, 1981; Garrison, 1985).

The variables selected in the stepwise procedure and grouped by their loadings on the two functions proved to be excellent predictors of group membership for psychosocial recovery. Using the classification procedure of the discriminant program, 83% of the respondents were correctly placed in their respective recovery groups, based on what values each had on the various independent variables. In other words, based only on scores of the 11 independent variables, the computer correctly picked respondent recovery status 83% of the time. This substantiates the analytical utility of these independent variables in anticipating and assessing psychosocial impacts and recovery following an earthquake. Variables such as age, gender, family size, and marital status are useful in identifying groups that may be more vulnerable to the psychological stresses of disaster (e.g., children, single-parent households, and large families). Similarly, recovery from psychosocial impacts will be impeded in instances where there is a substantial disruption in housing, such as through damage and forced relocation.

To briefly review, this section has examined psychological reactions to the Whittier Narrows earthquake using a combination of statistical techniques, including bivariate tabular analysis and multivariate discriminant function analysis. The data indicated relatively persistent psychological reactions to the earthquake for approximately one-third of those interviewed. Victims with higher levels of loss, fewer resources for recovery, and fewer social supports appeared to report higher anxiety and depression levels. Similarly, victims over the age of 60 reported fewer psychosocial sequelae from the disaster. In general, the nature and levels of the psychological impacts of the earthquake appear elevated given the moderate nature of the temblor and the level of losses of most victims. This suggests that earthquakes embody certain characteristics (lack of warning, high threat of recurrence, aftershocks) that make them particularly stressful as a natural hazard agent.

Household Recovery and Community Reconstruction

The discussion, to this point, has focused on various aspects of recovery at the individual and household levels. Households do not exist independently of the community in which they are embedded and consequently affect, and are affected by, community trends and changes. While the planning process and reconstruction of Whittier focused on the central business district and not on households, community reconstruction was nevertheless an issue of central concern to victims in the household survey. Many respondents were long-time residents of Whittier and took a keen interest in issues that emerged in developing and implementing the Specific Plan for the reconstruction of Uptown.

In Whittier, as in most U.S. disasters, individual victims were responsible for securing their own recovery aid, finding their own contractors or rebuilding their homes themselves, and managing their own recovery. However, their recovery as well as their daily activities were still affected, at least in part, by the kinds of reconstruction activities and land-use changes that came about as part of redevelopment in Uptown.

During the second round of interviewing, respondents were asked a series of question regarding their assessment of reconstruction in Whittier and how it was affecting both their use of Whittier facilities and their feelings about the community in general. For example, respondents were asked what the two most important issues were that faced Whittier. As this question was posed in the context of dozens of questions on the earthquake, virtually all respondents addressed their answers to earthquake-related issues. Overall, 75% (n=59) mentioned either political conflicts over redevelopment plans or the encroachment of apartments into single-family neighborhoods as the two most important problems facing Whittier. Concerns over political conflicts typically focused on the delays that were resulting from lawsuits and other challenges to land-use planning and reconstruction. The majority (67%) felt that the city was "taking too long to rebuild," and a like number said too much conflict was engendered by the reconstruction planning process.

Of course, in the politics of reconstruction these two concerns were not unrelated. Conflict over various aspects of the plan slowed its development and implementation (and reconstruction), an irony perhaps lost on residents who wanted a rapid rebuilding process. Seeking public in-put and attempting to balance diverse interests in reconstruction will necessarily slow the process (e.g., Caporale, 1989). The alternative—a strongly centralized approach with no public input and reconstruction directed "from above"—may speed physical reconstruction, but at the cost of responsiveness to public wishes.

Some two-thirds of the Whittier respondents (n=51) said that the city of Whittier had not been "balancing the interests of private citizens and business owners during reconstruction after the earthquake." Most of the comments from respondents indicated that the city was not adequately concerned with individual households, but rather focused most of its attention on business recovery. Respondents living near Uptown appeared particularly concerned with encroachment of apartments in their neighborhoods and the increased traffic, higher rents, and parking problems that resulted. As one victim said, "The city council has allowed too many apartments in here. We're losing that small-town feeling in Whittier."

Because preservation of historic buildings figured prominently in public debate over demolition and reconstruction, respondents were asked about their concerns regarding the preservation of Whittier's historic buildings. Eighty percent (n=64) said they wanted to see historic buildings restored in Uptown. Most of the comments supporting preservation of older buildings referred to

their symbolic importance for Whittier's "historic roots" and "identity." A few respondents felt that historic preservation delayed reconstruction and was, in the words of one, "too expensive to justify for some old buildings."

Most respondents (79%, n=63) said they shopped in the Uptown district before the earthquake. Approximately half (n=32) reported shopping there less or not at all after the earthquake due to business closures, construction activity, and related access problems. For the 63% who said they went to the Uptown area for dining and entertainment before the earthquake, one-half said they went there less in the first three years after the earthquake. Thus, in 1990 reconstruction and business closures were continuing to have a negative impact on the locals' use of the Uptown area. Of course, at the time of the interviews, less than one-half of the total square footage of Uptown that had been destroyed was rebuilt. Reported reductions in shopping and dining activities in Uptown by respondents may be temporary, given their pre-disaster patterns of use.

Several themes emerged from respondents' assessments of reconstruction in Whittier and resultant changes in the community. From the view of household recovery, some victims' concerns with land-use changes allowing encroachment of apartments into areas of single-family dwellings is significant. Although building moratoriums and similar zoning changes prevented wholesale encroachment after the earthquake, the Specific Plan has allowed some zoning changes in altering some neighborhoods from predominantly single-family units to a mix of single- and multiple-occupancy units. Respondents in these areas expressed deep reservations about the changing "character" of their neighborhoods, the negative effects on property values, and their personal identification with their neighborhood.

Numerous comments were also directed toward increasing rents in Whittier and how they were driving out moderate-income residents. Within the limits of these data, it is difficult to reconcile the strength of concern of some respondents with assurances of the Specific Plan that neighborhoods would be preserved and land-use changes limited. Clearly, respondent perceptions of the changes in their neighborhoods differed significantly from the ostensible provisions of the Specific Plan to preserve neighborhood character.

A second theme is that most respondents felt that reconstruction planning and the physical reconstruction of Uptown should have proceeded more quickly. At the same time, a number felt the city government and the redevelopment agency were not responsive to citizens, but rather only to business interests. Most also felt there was too much conflict over the planning process. What is apparent from this multiplicity of opinions and political standpoints is that victims were concerned with political and economic issues in Whittier reconstruction that went beyond their own household recovery. Most felt that their lives were, in various ways, negatively affected by the process of community reconstruction. A subtext of a number of comments is that many victims felt powerless in affecting the

direction of reconstruction of Whittier and were uneasy about "big city problems" they felt were beginning to encroach.

As the Whittier case study has shown, disasters can open up political agendas and increase the saliency of local political and economic issues for residents as communities attempt to rebuild. This theme will be discussed in the following chapter as the Whittier experience is compared to the Loma Prieta earthquake.

6

Conclusions

In concluding this report, a general comparison of Whittier Narrows with the more recent Loma Prieta (1989) earthquake in northern California will be presented. The purpose here is to broadly highlight housing and recovery issues that arose after each event. The discussion will focus these issues in relation to ethnically, demographically, and socioeconomically diverse populations. Sheltering and housing disaster victims marginalized by poverty, age, or minority status is a growing challenge in the United States (e.g., Tubbesing, 1989). The chapter will conclude with a review of selected shelter and recovery issues for households and communities.

Summary of the Whittier Narrows Earthquake

Previous research has shown that housing re-establishment and community recovery are affected by the patterns of culture, social organization, and political-economic conditions that existed prior to the disaster (Bates, 1982; Oliver-Smith, 1986). During recovery, patterns of post-disaster permanent housing are likely to closely resemble pre-disaster patterns, following the tendency of communities to seek a return to the status quo ante in the course of reconstruction (Bolin and Bolton, 1986). The variability in the rate at which victims are able to recover from disaster and re-establish permanent housing reflects the underlying class structure and distribution of resources in the society. Lower socioeconomic status victims have fewer resources to facilitate their return to permanent housing and thus take longer to do so. Unless there is an effort by governments to reduce social inequalities and improve living conditions for lower-income victims during reconstruction, the recovery process will tend to mirror pre-existing social inequalities and may, in fact, intensify them (see Bates, 1982; Oliver-Smith, 1986; Pantelic, 1991).

California's recent earthquake experiences illustrate the types of shelter, housing, and recovery issues that typify post-earthquake environments in the United States. The Whittier Narrows earthquake impacted dispersed areas of the Los Angeles metropolitan area. The temblor, although moderate in magnitude (M5.9), created pockets of damage over much of Los Angeles County (Weber, 1987). As reviewed previously, the greatest concentration of damage was in Whittier, with additional significant damage to low-income, predominantly ethnic neighborhoods of Los Angeles (Bolton, Liebow, and Olson, 1992).

Some 4,000 buildings in Los Angeles County were heavily damaged or destroyed, including 61 buildings in an eight-square-block area of Whittier's central business district. An additional 750 residential units in Whittier, including single-family dwellings and apartments, sustained heavy damage or were destroyed. Approximately half of those residences were condemned as unsafe in the two-week period following the mainshock. Total earthquake-related losses in the Los Angeles metropolitan area were estimated at $360 million.

Due to the uneven distribution of earthquake impacts, only certain areas of Los Angeles County had concentrated damage and loss of housing stock (Bolton, Liebow, and Olson, 1992). Given the urban ecology of Los Angeles, many of these areas were ethnic enclaves with predominantly Latino populations, including a number of recent immigrants from Latin America (Rubin and Palm, 1987). Much of the damage from the earthquake was to unreinforced masonry (URM) apartment buildings in these low-income areas.

Latinos, particularly those with experience in recent Mexican or Central American earthquakes, were very reluctant to return to apartments after the mainshock due to uncertainties about the structural safety of the buildings (Bolton, Liebow, and Olson, 1992). Many chose to remain outside their apartments in hastily erected emergency-shelter camps until they received assurances from building inspectors that their homes were safe. At the height of the emergency period, as many as 3,500 victims were camped in yards, parking lots, and city parks. Many victims eventually went to one of the 14 Red Cross shelters established in Los Angeles County, often after having camped out for a number of days (Bolin, 1989).

The Red Cross developed multilingual outreach programs to get non-English-speaking residents to return to their homes once they had been inspected. Extensive efforts were also made to publicize the location of Red Cross shelters, rather than have thousands of victims live in tents around the city (Bolton, Liebow, and Olson, 1992). As this knowledge spread, shelter populations continued to grow. Consequently, the number being sheltered increased for almost two weeks, creating significant problems for the Red Cross in staffing and operating its shelters. Most of the 10,000 victims registering at Red Cross shelters in Los Angeles were Latino, the majority of whom could not speak enough English to use the relief system established for victims (Bolton, Liebow,

and Olson, 1992). However, of these 10,000 registrants, only about 2,500 actually stayed overnight in Red Cross facilities (Bolin, 1989).

The limiting factor for Whittier Narrows earthquake victims (outside of Whittier proper) was the pronounced shortage of low-income housing in Los Angeles. Much of this housing stock in California is in the form of residential buildings of seismically vulnerable unreinforced masonry construction. URM structures damaged in the earthquake have either been torn down or seismically retrofitted and upgraded to be safer (Bolton, Liebow, and Olson, 1992). One outcome of these hazard mitigation efforts is that once-affordable housing, albeit deteriorated and seismically risky, is becoming more scarce due to razing or more expensive due to retrofitting (Comerio, 1990). Because the Whittier Narrows quake damaged low-income housing most heavily, those victims who previously had occupied this housing were the least able to find new housing at prices they could afford.

In the city of Whittier itself, the quake damaged a wide range of housing, including large, older, single-family dwellings as well as apartment houses. While homeowners in Whittier relied on FEMA temporary-housing programs to pay for temporary housing, it appears that apartment dwellers often opted to simply leave the area rather than to obtain FEMA temporary housing aid (Bolin, 1989). The return to permanent housing for homeowners in Whittier was often delayed by the lengthy process for Small Business Association (SBA) home loans, a major source of recovery aid. Additionally, those few victims with earthquake insurance sometimes waited more than a year to reach a settlement with their insurers, delaying reconstruction of their homes. Such delays resulted in some victims still living in temporary shelter more than a year after the earthquake, while others had already returned to permanent housing (Bolin, 1989). Although renters were less likely to utilize aid programs, their mobility improved their access to new housing compared to homeowners tied to heavily damaged property in Whittier.

As restoration began in the most heavily damaged areas of Whittier, particularly in the Uptown area, conflicts emerged over preservation of historic buildings as well as land use and redevelopment in the central business district. As discussed in Chapter 5, proposed changes in zoning affecting single-family dwellings and apartment complexes were key issues. Long-term residents of the area wanted neighborhoods of older single-family homes maintained rather than replaced by high-density development. While many single-family dwellings near Uptown were damaged by the quake, most were reparable if owners could obtain adequate funding. Developers, on the other hand, sought to buy up damaged homes and convert the properties to high-density residences such as condominiums and apartments, which would change the social character of the neighborhoods.

As a consequence, the recovery process in Whittier was marked by considerable social conflict, including various instances of litigation against the

city. Several neighborhood groups fought to maintain land-use and housing patterns as they were before the earthquake, while developers attempted to profit from the damage caused to neighborhoods. The failure of city officials to anticipate the conflicts and legal challenges that emerged resulted in extensive planning delays for the reconstruction of the central business district and surrounding areas.

Historical preservation was a major goal of citizens groups who opposed various aspects of Whittier's comprehensive recovery plan. Through various legal challenges to the city, these groups were able to delay or prohibit demolition of buildings and insure that, during the planning process, significant attention was paid to maintaining or enhancing the "historical character" of reconstructed buildings in Whittier's downtown. After some early opportunism by developers, in which single-family homes were replaced by apartments in some neighborhoods, strict zoning and rebuilding regulations enforced by the city prevented further erosion of single-family housing stock in the Uptown area.

Whittier's use of the earthquake as an opportunity to revitalize the central business district was not surprising because this effort grew out of a series of less comprehensive redevelopment efforts in the 1970s. The lengthy planning process for earthquake reconstruction was a result of the large amount of public and business sector input and efforts by the city to respond to a large number of conflicting demands. In any centralized planning effort, businesses can be expected to oppose anything that raises their operating costs or somehow constricts how they do business, as was the case in Whittier. More importantly, as reconstruction and retrofitting increases rents and indebtedness, the long-term viability of small businesses with an increased debt load is questionable. Certainly the newly rebuilt and refurbished Uptown area suffered from an absence of businesses, with only a 70% occupancy rate, according to Whittier officials.

Increased rents in Whittier and the availability of retail districts in nearby towns is one factor that has slowed economic recovery of the Uptown area. To counter this bleed-off of businesses, the city of Whittier has been aggressively marketing its Uptown area to attract so-called "upscale" retail businesses from elsewhere in Los Angeles County. Gentrification, of course, squeezed out some long-term merchants in the Uptown area who could no longer afford the increased rents or compliance with new city codes.

Much of Whittier's recovery has been dependent on larger economic forces in the region. Whittier's central business district itself was deteriorating and economically stagnant prior to the earthquake; in a sense, in need of recovery and reconstruction even then. The earthquake provided the opportunity to redevelop and made funds available to facilitate a redevelopment plan. Consequently, it is difficult to disentangle earthquake recovery from the economic redevelopment the earthquake catalyzed. The earthquake and ensuing disaster declaration made significant funds available from both the state of

California and the federal government through grants and loans to municipalities, businesses, and households. These funds were critical for both households and the city in moving toward recovery.

Householders in Whittier generally recovered more rapidly than the Uptown area, both in terms of how quickly homes were repaired and economic stability was returned. Clearly, single-family dwellings can and usually will be rebuilt more quickly than large commercial buildings and apartment complexes, especially when the latter are owned by absentee landlords (e.g., Comerio, 1990). Because household recovery was not dependent on formulating long-term reconstruction plans acceptable to many different interests, residents could begin immediately to seek aid for repairing or rebuilding damaged homes.

The ability to get aid from the federal or state government is dependent on victims' skills at pursuing aid sources and on their ability to qualify for loans. Research has shown that for both homeowners and businesses, financial security and a good income were necessary preconditions to receiving SBA loans at favorable rates (Bolin, 1989; Nigg and Tierney, 1991). SBA was a major source of recovery aid for both households and businesses in Whittier. For both homeowners and business owners, receiving an SBA loan typically meant increased long-term indebtedness, depending on length of payback and forgiveness clauses. For homeowners in particular, an SBA loan meant, in effect, paying two mortgages on a property, possibly resulting in a long-term reduced standard of living.

For the 20% of homeowners who had earthquake insurance in Whittier, economic recovery was somewhat enhanced. Compared to other disasters where homeowners insurance covered losses (e.g., Bolin, 1982), earthquake insurance was by no means an adequate source of recovery funds. A number of respondents complained of high deductibles, averaging $15,000, for the insurance, necessitating SBA or commercial loans to pay for reconstruction. Approximately one-fourth of those with earthquake insurance did not file claims because deductibles were too high compared to losses. In addition, a number of victims felt their settlements were not fair and covered only a fraction of actual losses to their homes. As a result, victims with insurance still had to either draw off savings or get loans to rebuild and refurnish their homes as they were before the quake. Since only higher socioeconomic status respondents had earthquake insurance, they were less likely to experience financial constraints from obtaining reconstruction loans than were lower-income respondents.

As a result of the extensive home-repair and rebuilding activities in Whittier, a localized "boom" economy emerged. Consequently, some earthquake victims were further victimized by unscrupulous contractors charging artificially high prices and providing poor quality work. Barely one-half of the respondents in this study were satisfied with their contractors and the quality of their work. Whittier city officials also indicated significant problems with contractors not completing jobs or simply taking money up front and doing no work at all.

Closer regulation of contractors after disasters is necessary, although disasters tend to overwhelm local governments, particularly building departments, making such regulation difficult. Building department officials in Whittier tended to blame victims by saying they were not adequately cautious when they paid for contracting work before any was done.

In sum, household recovery in Whittier exhibited patterns similar to recovery in other disasters, with higher socioeconomic status victims recovering more rapidly than others. In general, the predominantly middle- and higher-income population in Whittier experienced few of the difficulties that were reported in other areas of Los Angeles (e.g., Bolton, Liebow, and Olson, 1992). However, consistent with other studies of household recovery, most victims felt the aid and insurance received was difficult to apply for, too slow in coming, and not adequate to cover their losses. Thus, most respondents resorted to using savings or simply not replacing household items lost in the earthquake. Due to the moderate nature of the quake, most victims were not displaced from their homes for any length of time, thereby simplifying post-disaster housing needs.

Community recovery, particularly in reconstructing the Uptown area, has occurred at a much slower pace. An extended planning period prior to beginning reconstruction caused pronounced delays in reconstruction. Almost two years had passed before a final comprehensive planning document was approved and rebuilding began in earnest. The long-term effectiveness of the reconstruction and redevelopment in Uptown cannot be assessed adequately so soon after the earthquake. Thus far, the central business district has been plagued by relatively low occupancy rates due to high rents and the availability of other retail space in surrounding communities. City officials estimate "full economic recovery" of the district will take nine to ten years from the time of the earthquake. Although not a concern during planning, the elimination of some URM buildings and the retrofitting of others has made the reconstructed Uptown a safer, more earthquake-resistant zone.

In sum, household recovery in Whittier was a relatively straightforward process for the majority of victims sampled. Most were able to obtain grants or loans to repair or replace their homes within a two-year period of the earthquake. Re-establishing permanent housing did place significant demands on victims and created considerable inconvenience for some. It also created economic hardships for those who did not receive sufficient aid to cover their losses and those who incurred increased indebtedness through disaster loans. However, because of the limited damage to work places, none of the respondents were unemployed as a result of the earthquake.

Reconstruction of the business sector in Whittier has been protracted due to the lengthy planning process and a relatively complicated permit system for new buildings. In spite of public input during the formulation of redevelopment plans, the majority of respondents in this research were critical of various aspects of the city's redevelopment activities.

The Loma Prieta Earthquake

Loma Prieta, a magnitude 7.1 earthquake that occurred in 1989, produced a greater number of housing and recovery issues than those that followed the less-severe Whittier Narrows earthquake. The most concentrated damage to housing and businesses occurred in Santa Cruz County near the epicenter of the mainshock (U.S. Geological Survey, 1990). Temporary shelter and housing and the reconstruction of central business districts in the cities of Santa Cruz (population 48,650) and Watsonville (population 30,000) emerged as significant issues.

Santa Cruz County has experienced a decline in low-cost housing, which has had a negative impact on its relatively large lower-income Hispanic population. This housing shortage was particularly pronounced in Watsonville, where the majority of earthquake victims were low-wage Latino agricultural and service workers (Phillips, 1991). By destroying hundreds of low-rent housing units, the earthquake created a housing shortage crisis (Bolin and Stanford, 1991). In the city of Santa Cruz, victims experiencing significant post-earthquake housing problems included elders displaced from residential hotels, lower-income Hispanics, and others who were homeless prior to the earthquake.

Of the 13,000 persons in the disaster area estimated to have been left homeless, 8,000 resided in Santa Cruz County. A total of some 4,000 residential units were heavily damaged or destroyed in Santa Cruz County alone (Renteria, 1990). As a result, the Red Cross had to keep its temporary shelters open for 66 days, more than four times as long as in the Whittier Narrows earthquake (Bolin and Stanford, 1991). Even when Red Cross facilities were finally closed, 21 families were still staying in one Watsonville shelter and had to be placed in motels.

FEMA initially responded to victims of Loma Prieta through its temporary-housing program, which provided cash grants for rent to qualified victims. Grants were available to cover two months of rent for tenants and three months for homeowners. Victims who could demonstrate that the grant was used for temporary housing were eligible for further assistance as needed. However, the housing shortage in the county made rental units difficult to find—even if victims could afford the rent.

In Watsonville, the provision of temporary shelter and housing became part of a set of class and ethnic conflicts involving victims, community activists, and a wide range of private and federal agencies involved in disaster relief (Bolin and Stanford, 1991). The disputes focused on substandard housing and the lack of housing for low-income residents in the county. By destroying 642 units in Watsonville (8% of the housing stock), the earthquake made low-income housing the center of public debate and political action (Comerio, 1990a).

Emblematic of the political struggle that the earthquake engendered in Watsonville was a "tent city" Mexican-American victims established in a public

park. Because the Red Cross had established five temporary shelters elsewhere, officials were reluctant to sanction this impromptu tent camp by providing food or medical services. Those in the camp refused to go to official shelters because they feared aftershocks would collapse the shelters and desired to remain near their old neighborhoods.

In response to these conflicts, coalitions of community activists, federal agencies, and private organizations worked to build new low-income housing as part of the planned reconstruction in Santa Cruz County (see Phillips, 1991). These coalitions ultimately proved quite effective in promoting rapid re-establishment of housing for victims in Watsonville (Comerio, 1990a).

Following the earthquake, the immediate official concern was how to provide temporary housing for victims until permanent housing became available. One solution to the shortage was to provide FEMA mobile homes. Although FEMA initially did not intend to bring mobile homes to Santa Cruz or Watsonville, local housing activists felt they were an obvious source of inexpensive temporary housing. After some debate, more than 100 mobile homes were brought into the county.

While middle-class victims will avoid using mobile homes as temporary housing if other options are available (Bolin, 1982), for many poor Latinos in Santa Cruz County they represented a significant step upward in housing quality from the substandard units they had occupied before the quake (Phillips, 1991). FEMA officials expressed concern that the mobile homes would become permanent housing and were reluctant to provide them (Bolin and Stanford, 1991). Although victims could purchase the mobile homes to place on private lots, the lack of available lots reduced their viability as permanent housing (see Phillips, 1991).

Shelter and housing in Santa Cruz involved similar concerns to those in Watsonville, where there also was little affordable housing for lower-income victims (Berke, Kartez, and Wenger, forthcoming; Phillips, 1991). The victim population in Santa Cruz was more diversified by class standing and less unified by ethnicity than in Watsonville. While the disaster in Santa Cruz also opened the political agenda to address the housing needs of elders, Latinos, and the chronically homeless, it was not characterized by the rancorous and polarizing political conflict seen in Watsonville.

Due to the destruction of several single-room occupancy (SRO) residential hotels in downtown Santa Cruz, 500 low-income elders were displaced. FEMA and the Red Cross worked with local social-service agencies to place these elders in suitable temporary-housing facilities. The Santa Cruz Housing Authority, in conjunction with other agencies and organizations in the county, worked to create new permanent housing for them (Phillips, 1991).

In Watsonville, recovery planning responded to the demands of marginalized populations that were articulated through a variety of local activist groups. In Santa Cruz, steps to provide permanent solutions were initiated "from above,"

that is, by city and county agencies and other political influentials rather than from organized groups of victims (see Comerio, 1990b). The planning and reconstruction process appears to be moving more slowly in Santa Cruz than in Watsonville, in spite of the initial political conflict in Watsonville.

Because of the small size and population of Watsonville, its strong community orientation, and innovative funding programs, the city has experienced relatively rapid rehabilitation of damaged homes, in contrast to urban areas like San Francisco and Santa Cruz (Comerio, 1990a). However, the replacement of its existing housing stock does not necessarily address the pre-disaster shortage of low-income housing (see Phillips, 1991). For lower-income victims in Santa Cruz, the return to permanent housing, particularly for the elderly in SROs, has been less rapid than for victims in Watsonville. As noted in Whittier, the speed at which small single-family dwellings can be replaced is far more rapid than large hotel and apartment complexes, particularly when the latter are owned by absentee landlords who have no interest in hastening reconstruction (Comerio, 1990a). Nevertheless, Phillips (1991) noted that affordable housing for victims in Santa Cruz was still in short supply two years after the earthquake.

The experiences of Santa Cruz County provide further evidence of how recovery can become a politicized and conflictual process involving a complex array of agencies, organizations, and emergent groups seeking to influence the outcome (Bolin and Stanford, 1991). The reconstruction of damaged central business districts in both Watsonville and Santa Cruz have proceeded much more slowly than the restoration of private housing, particularly in Watsonville (Comerio, 1990a).

Comprehensive planning of reconstruction is time-consuming, particularly when redevelopment and the preservation of historic buildings and other cultural resources are at issue, as was the case in both Whittier and Santa Cruz. In order for planning to be democratic and responsive to local desires, time must be allowed for input from citizens groups, business interests, and the public. Conflicts among various interests will also characterize the process. Planning for recovery also provides an opportunity to incorporate hazard mitigation into reconstruction, reducing future vulnerability.

A year or more may be necessary for planning, and in the interim, existing businesses need to be accommodated in temporary structures. Santa Cruz set up a series of large tents adjacent to the heavily damaged Pacific Garden Mall in the downtown area. Merchants operated out of these shelters while waiting for reconstruction of the business district. In contrast to Whittier, Santa Cruz is a relatively isolated community, separated from the San Francisco Bay Area by a mountain range. In Whittier, displaced businesses could, and sometimes did, relocate to nearby municipalities. Santa Cruz's location made businesses less likely to move to other communities to resume operations.

Of course, without a commitment by residents to patronize displaced businesses in their temporary facilities, some businesses will succumb to economic losses and cease operations. Santa Cruz residents exhibited a strong community orientation and a willingness to patronize local merchants, which is a necessary part of the community recovery process. In contrast, Whittier experienced a reduction in patronage of Uptown merchants, but that was largely due to the loss of businesses in Uptown during reconstruction, rather than lack of support from residents.

As these case studies illustrate, post-disaster housing recovery generally proceeds at a faster pace than business recovery, given equivalent disaster impacts. Housing can become problematic if adequate planning and resources are not available to address social and economic inequalities in housing, particularly for lower-income disaster victims. The changing ethnic and socioeconomic characteristics of disaster victims in the urban areas of the United States are creating new issues and needs in the provision of temporary shelter and housing that are not always met successfully by existing programs (Tubbesing, 1989). The re-establishment of permanent housing after disasters receives little attention from emergency planners or the federal government[1]. The general approach in Whittier was to let victims handle their own housing on an individual basis and direct most planning toward restoration of the business sector. In Watsonville and Santa Cruz, some steps were taken to address pre-existing housing problems as those communities confronted recovery and reconstruction needs. Whatever the approach, restoration of permanent housing is of central importance in the overall recovery of individuals and communities.

Post-Earthquake Recovery Issues

This discussion will conclude with some general observations and recommendations:

1. Current federal aid for temporary and permanent housing provides relatively greater resources for middle- and higher-income victims than lower-income victims. Thus, in areas with a high proportion of low-income victims, household recovery will be very slow unless federal programs are established to serve the increasing numbers of poor in the U.S. To reduce the major social costs of a great New Madrid earth-

---

1. The growing shortage of affordable housing in the United States is systemic and limits the extent to which disaster planners can realistically plan the recovery of permanent housing. Existing housing shortages reflect larger economic inequalities and the lack of a strong federal focus on the provision of affordable housing for lower-income citizens.

quake, a systematic program of providing seismically safe, low-rent housing for urban poor should be initiated before, rather than after, a disaster. Congressional consideration should be given to extending FEMA's authorization to fund the construction of permanent housing for disaster victims

2. As demonstrated in Loma Prieta, flexibility will be necessary in aid programs provided by both governmental and nongovernmental organizations that offer housing and recovery assistance. The case studies reviewed here suggest that cooperative relations among local authorities, federal agencies, and citizens groups will be necessary if major delays are to be avoided in the planning and implementing of reconstruction. Establishing working relationships and coordinating among these various actors will augment response efficiency and recovery in the housing sector.
3. Prior to disasters, communities should incorporate recovery of housing and businesses into ongoing planning and economic development strategies. Anticipating recovery needs and goals and identifying local resources and organizations prior to a disaster will speed implementation of recovery plans after a disaster. At the same time, strengthening coordination among local community and governmental organizations through recovery planning as part of the routine planning process will improve response and recovery effectiveness when a disaster occurs.
4. Local governments should utilize existing community resources, including voluntary organizations and citizens groups that have particular skills useful in recovery and reconstruction. By tapping local resources and knowledge to augment state and federal programs, community solidarity and response effectiveness could be enhanced. Encouraging significant local input in responding to an earthquake could also reduce social conflict over planning and reconstruction.
5. Hazard planners should identify the demographic makeup of potential disaster victims and incorporate this knowledge into the planning for post-disaster housing. Ethnically heterogeneous areas will produce the greatest problems if shelter staffs do not have multi-lingual capabilities or are insensitive to the cultural diversity of victims seeking assistance. In the case of a major earthquake, relying solely on volunteers and locally recruited shelter managers may fall far short of the numbers actually needed to staff temporary shelters.
6. Planning for housing after earthquakes must consider that many urban residents, including those in ethnic and low-income areas, may have a strong commitment to their neighborhoods and be very resistant to moving elsewhere for temporary shelter or housing. Outreach programs

may be needed to assist victims who are reluctant to leave. Sensitivity to cultural values and preferences of the displaced will improve response effectiveness if relocation is necessary.

7. Temporary relocation of victims after a great earthquake may be advantageous where damage is catastrophic. If relocation is to be considered, pre-disaster planning must be a public process, and the nature of the proposed plans should be widely disseminated as part of general earthquake preparedness education programs. Haphazard relocation is likely to be traumatic for victims, creating additional and significant psychosocial distress.

8. The most effective responses to the shelter and housing problems in an ethnically and demographically diverse population involve local citizens advocacy groups working with federal, state, local, private, and nonprofit disaster organizations to tailor aid to local needs. If extended stays are required in emergency and temporary shelters, social conflicts may arise over issues of aid, shelter conditions, and temporary housing. These conflicts can be mitigated through cooperative efforts by organizations and agencies in responding to the issues raised by victims and community groups.

9. Earthquakes that cause extensive damage to homes and businesses create major demands on contractors and building materiel. City officials must carefully monitor contractors and prices, instituting price controls, if necessary, to prevent "gouging" of victims. Increased monitoring will require increasing the size of relevant agencies' staffs. How to most effectively monitor contractors and others involved in reconstruction should be part of pre-disaster planning for recovery. Failure to create regulatory tools to manage reconstruction activities will likely result in delays in recovery for some residents as well as increased recovery costs.

10. Earthquakes produce long-term psychological distress among some victims. In instances of large-scale damage to neighborhoods, combined with extended stays in temporary shelter and housing, psychological distress can be intensified and protracted. Attention must be given to planning to address persistent psychosocial sequelae that are likely to be experienced by victims. Planning for mental health services should extend beyond the emergency phase, recognizing that recovery and reconstruction can produce significant new stressors on some victims that may require intervention.

11. The presence of significant numbers of pre-disaster homeless may result in increased and conflicting demands on shelter providers, as in the case of Loma Prieta and to a lesser extent, Whittier Narrows. Policies and

procedures for dealing with the chronically homeless must be established by all relevant organizations prior to a disaster. Simply refusing shelter or aid to such persons will only deepen the social crises engendered by the earthquake. Organizations should also anticipate that some of the chronically homeless seeking shelter may also be in need of mental health services.

12. An expanded long-term federal role in planning for and funding the return to permanent housing for victims will be necessary, particularly for low-income housing in urban areas. Comprehensive, mandatory, and inexpensive earthquake insurance could speed recovery significantly, but is currently not available. However, insurance would only speed recovery if settlements were made quickly and fairly—something that did not happen after the Whittier Narrows earthquake. Grant programs such as FEMA's Minimum Home Repair Program may be useful in funding individual homeowners' rehabilitation of their damaged homes, thus reducing their need for temporary shelter. The size of such grants should be increased to promote more extensive repair of damaged homes without victims having to apply for and wait to receive SBA loans.

13. Pre-disaster planning for recovery should be adopted as part of long-range planning in all communities exposed to significant seismic hazard. The innovative programs being developed by the city of Los Angeles to provide a broad policy framework to manage recovery and reconstruction following a future great earthquake can serve as a model for other municipalities in seismic zones (Topping, 1992). Recovery planning should pay particular attention to temporary and permanent housing and develop programs to promote rapid replacement of destroyed housing stock consistent with public needs and desires. Addressing problems in infrastructure and availability of affordable housing should begin before a disaster, rather than waiting for an earthquake to transform a problem into a crisis.

In reviewing recovery issues that have affected communities in California, it should be apparent that specific social and cultural factors in a given community make response and recovery strategies dependent on local conditions. What is hoped is that by studying other communities' attempts at implementing recovery plans, planners and emergency responders can begin to anticipate the range of recovery issues that may well emerge in their own communities. An obvious but necessary point is that earthquake recovery is slow and expensive. It also provides opportunities to address past inequities in housing and develop a sustainable economic infrastructure in the reconstructed city. While pre-disaster planning and mitigation will speed recovery, flexibility in program

development and the willingness to tap local skills and resources will strengthen the recovery effort and reduce social conflict, particularly in communities with a diversity of cultures and classes.

Bibliography

Aysan, Y. and P. Oliver
1987 *Housing and Culture After Earthquakes*. Oxford, United Kingdom: Oxford Polytechnic.

Ahearn, F.
1981 "Disaster Mental Health: A Pre- and Post-Earthquake Comparison of Psychiatric Admission Rates." *The Urban and Social Change Review* 14 (2):22-28.

Alexander, D.
1986 "Disaster Preparedness and the 1984 Earthquakes in Central Italy." Working Paper No. 55. Boulder: University of Colorado, Institute of Behavioral Science.

Baldassarro, L.
1975 "Sicily's Earthquake Zone: Waiting in the Wreckage—Effects of the 1968 Earthquake." *Nation* 221:198-201.

Bates, F., ed.
1982 *Recovery, Change and Development: A Longitudinal Study of the Guatemalan Earthquake*. Athens, Georgia: Department of Sociology, University of Georgia.

Berren, M., J. Santiago, A. Beigel, S. Timmons
1989 "A Classification Scheme for Disasters." In *Psychosocial Aspects of Disaster*. Edited by Gist and Lubin. 40-57. New York: Wiley.

Berke, P., J. Kartez, and D. Wenger
Forthcoming *Recovery After Disaster: Achieving Mitigation, Development, and Equity*. Washington, D.C.: U.S. Geological Survey.

Bolin, R.
1976 "Family Recovery from Natural Disaster: A Preliminary Model." *Mass Emergencies* 1:267-277.

1982 *Long-Term Family Recovery from Disaster.* Monograph No. 36. Boulder: University of Colorado, Institute of Behavioral Science.

1985 "Disasters and Social Support." In *Disasters and Mental Health: Selected Contemporary Perspectives.* Edited by B. Sowder. 150-158. Publication No.85-1421. Washington, D.C.: Department of Health and Human Services.

1986 "Disaster Impact and Recovery: A Comparison of Black and White Disaster Victims." *International Journal of Mass Emergencies and Disasters* 4 (1):35-51.

1988 "Response to Natural Disaster." In *Mental Health Response to Mass Emergencies.* Edited by M. Lystad. 22-52. New York: Brunner Mazel.

1989 *Temporary Sheltering After the Whittier Narrows Earthquake.* Final Report to the National Science Foundation. Las Cruces: New Mexico State University, Department of Sociology and Anthropology.

Bolin, R., ed.

1990 *The Loma Prieta Earthquake: Studies of Short Term Impacts.* Monograph #50. Boulder: University of Colorado, Institute of Behavioral Science.

Bolin, R., and P. Bolton

1983 "Recovery in Nicaragua and the U.S.A." *The International Journal of Mass Emergencies and Disasters* 1:125-144.

1986 *Race, Religion, and Ethnicity in Disaster Recovery.* Monograph No. 42. Boulder: University of Colorado, Institute of Behavioral Science.

Bolin, R., and D. Klenow

1988 "Older People in Disaster: A Study of Black and White Victims." *International Journal of Aging and Human Development* 26 (1):29-43.

Bolin, Robert, and Lois Stanford

1991 "Shelter, Housing, and Recovery: A comparison of U.S. disasters." *Disasters* 45 (1):25-34.

Bolin, R., and P. Trainer
1978 "Modes of Family Recovery Following Disaster: A Cross-National Study." In *Disasters: Theory and Research*. Edited by E.L. Quarantelli. 234-247. Beverly Hills, California: Sage Publications.

Bolton, P.
1988 *Preliminary Project Report to the National Science Foundation*. Seattle, Washington: Battelle Human Affairs Research Center.

1979 "Long-Term Recovery from Disaster: The Case of Managua." Ph.D. Dissertation. University of Colorado.

Bolton, Patricia, E.B. Liebow, and J.L. Olson
1992 "Community Context and Uncertainty Following a Damaging Earthquake: Low-Income Latinos in Los Angeles." Paper presented at Symposium on Policy Issues in the Provision of Post-Earthquake Shelter and Housing, January 26-28, Santa Cruz, California.

Bowden, M., D. Pijawka, G. Roboff, K. Gelman, and D. Amaral
1977 "Reestablishing Homes and Jobs: Cities." In *Reconstruction Following Disaster*. Edited by J. Haas, R. Kates, and M. Bowden. 69-146. Cambridge, Massachusetts: M.I.T. Press.

Burton, I., R. Kates, G. White
1978 *The Environment as Hazard*. New York: Oxford University Press.

Caporale, R.
1989 "Toward a Cultural-Systemic Theory of Natural Disasters: The Case of the Italian Earthquakes of 1968 in Belice, 1976 in Friuli and 1980 in Campania-Basilicata." In *Preparations for, Response to, and Recovery from Major Community Disasters*. Edited by E.L. Quarantelli and C. Pelanda. 253-271. Newark: University of Delaware, Disaster Research Center.

Comerio, M.
1990a "Hazards Mitigation and Housing Recovery: Watsonville and San Francisco One Year Later," Paper presented at Disasters and the Small Dwelling Conference: Oxford, U.K., Oxford Polytechnic, September 2-6.

1990b "Seismic Safety—At What Price?" In *Proceedings of the 4th U.S. Conference on Earthquake Engineering*. Oakland, California: Earthquake Engineering Research Institute.

Davis, I.
1975 "Disaster Housing: A Case Study of Managua." *Architectural Design* (January):42-47.

1977 "Emergency Shelter." *Disasters* 1 (1):23-40.

Drabek, T.
1986 *Human System Responses to Disaster*. New York: Springer-Verlag.

Drabek, T., and W. Key
1984 *Conquering Disaster: Family Recovery and Long-Term Consequences*. New York: Irvington.

Drabek, T., A. Mushkatel, T. Kilijanek
1983 *Earthquake Mitigation Policy: The Experience of Two States*. Monograph No. 37. Boulder: University of Colorado, Institute of Behavioral Science.

Erikson, K.
1976 *Everything in its Path*. New York: Simon and Schuster.

French, S., C. Ewing, M. Isaacson
1984 *Restoration and Recovery Following the Coalinga Earthquake of May, 1983*. Working Paper No. 50. Boulder: University of Colorado, Institute of Behavioral Science.

General Accounting Office
1991 *Disaster Assistance: Federal, State, and Local Responses to Natural Disasters Need Improvement*. GAO No. RCED-91-43. Washington, D.C.

Garrison, J.
1985 "Mental Health Implications of Disaster Relocation in the United States: A Review of the Literature." *International Journal of Mass Emergencies and Disasters* 3 (2):49-65.

Geipel, R.
1982 *Disaster and Reconstruction*. London: Allen and Unwin.

Gleser, G., B. Green, and C. Winget
1981 *Prolonged Psychosocial Effects of Disaster: A Study of Buffalo Creek*. New York: Academic Press.

Golec, J.
1983 "A Contextual Approach to the Social Psychological Study of Disaster Recovery." *International Journal of Mass Emergencies and Disasters* 1 (August):255-276.

Green, B., J. Wilson, and J. Lindy
1985 "Conceptualizing Post-Traumatic Stress Disorder." In *Trauma and Its Wake*. Edited by C. Figley. 53-72. New York: Brunner-Mazel.

Greene, M.
1987 "Skopje, Yugoslavia: Seismic Concerns and Land Use Issues During the First Twenty Years of Reconstruction Following a Devastating Earthquake." *Earthquake Spectra* 3 (1):103-117.

Greenson, R., and Mintz, T.
1972 "California Earthquake 1971: Some Psychoanalytic Observations." *International Journal of Psychoanalytic Psychotherapy,* 1 (5):7-23.

Haas, J., R. Kates, and M. Bowden
1977 *Reconstruction Following Disaster*. Cambridge, Massachusetts: MIT Press.

Hogg, S.
1980 "Reconstruction Following Seismic Disaster in Venzone, Friuli." *Disasters* 2:173-185.

Instituut voor Sociaal Onderzoek van het Nederlandse Volk Amsterdam
1955 *Studies in the Holland Flood Disaster 1953*, Vol. I-IV. Washington, D.C.: National Academy of Sciences, National Research Council.

Kates, R.
1970 "Human Adjustment to Earthquake Hazard." In *The Great Alaska Earthquake of 1964: Human Ecology*. Edited by the Committee on the Alaska Earthquake. Washington, D.C.: National Research Council of the National Academy of Sciences.

Kates, R., and D. Pijawka
1977 "From Rubble to Monument: The Pace of Reconstruction." In *Reconstruction Following Disaster*. Edited by J. Haas, R. Kates, and M. Bowden. 1-24. Cambridge, Massachusetts: MIT Press.

Kerr, R.
1988 "California Quakes Forecasted." *Science* 241:241-242.

1989 "Flurry of Quakes in L.A." *Science* 244:1542.

Kessler, R.
1979 "A Strategy for Studying Differential Vulnerability to Stress." *Journal of Health and Social Behavior* 20:100-108.

Kreimer, A., and E. Echeverria
1991 "Case Study: Housing Reconstruction in Mexico City." *Managing Natural Disaster and the Environment*. Edited by A. Kreimer and M. Munasinghe. 53-61. Washington, D.C.: The World Bank.

Kreimer, A., and M. Munasinghe (eds.)
1991 *Managing Natural Disasters and the Environment*. Washington, D.C.: World Bank.

Lambright, W.
1985 "Earthquake Prediction and the Governmental Process." *Policy Studies Review* 4 (4):716-724.

Laufer, R.
1988 "Human Response to War and War-Related Events in the Contemporary World." In *Mental Health Response to Mass Emergencies*. Edited by M. Lystad. New York: Brunner-Mazel.

Lima, B., H. Santacruz, J. Lozano, and J. Luna
1988 "Planning for Health/Mental Health Integration in Disasters." In *Mental Health Response to Mass Emergencies*. Edited by M. Lystad. New York: Brunner-Mazel.

Loether, J., and D. McTavish
1988 *Descriptive and Inferential Statistics*. Boston: Allyn and Bacon.

Loizos, P.
1977 "A Struggle for Meaning: Reactions to Disaster Amongst Cypriot Refugees." *Disasters* 1 (3):231-239.

Lystad, M., ed.
1988 *Mental Health Response to Mass Emergencies*. New York: Brunner-Mazel.

May, P.
1985 *Recovering from Catastrophes: Federal Disaster Relief Policy and Politics*. Westport, Connecticut: Greenwood Press.

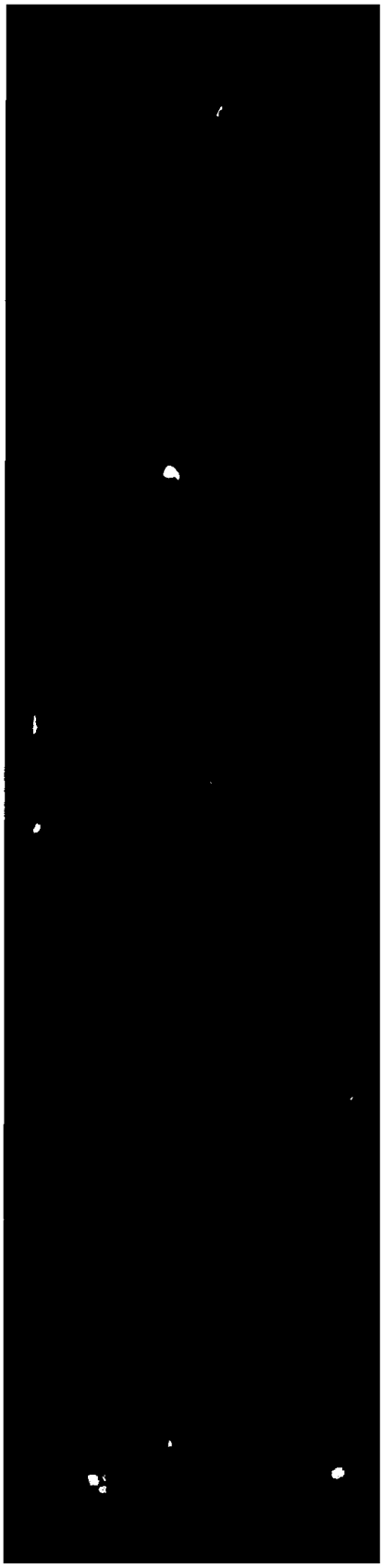
Mileti, D., J. Hutton, and J. Sorensen
1981 *Earthquake Prediction Response and Options for Public Policy*. Monograph No. 31. Boulder: University of Colorado, Institute of Behavioral Science.

Misch, A.
1993 "Chemical Reaction." *World Watch* (6) 2:10-17.

Mitchell, W.A., and T.H. Miner
1978 *Environment, Disaster, and Recovery: A Longitudinal Study of the 1970 Gediz Earthquake in Western Turkey*. Colorado Springs, Colorado: U.S. Air Force Academy, Department of Economics, Geography and Management.

National Academy of Sciences, Committee on the Alaska Earthquake, ed.
1970 *The Great Alaska Earthquake of 1964: Human Ecology*. Washington, D.C.: National Academy of Sciences, National Research Council.

National Academy of Sciences, Committee on the Socio-economic Effects of Earthquake Prediction
1978 *A Program of Studies on the Socio-economic Effects of Earthquake Prediction*. Washington, D.C.: National Academy of Sciences, National Research Council.



National Academy of Sciences, Advisory Committee on the International Decade of Natural Hazard Reduction
1987 *Confronting Natural Disasters*. Washington, D.C.: National Academy Press.

Nigg, J., and K. Tierney
1990 "Explaining Differential Outcomes in the Small Business Disaster Loan Application Process." Paper presented at the 12th World Congress of Sociology, July 9-13, Madrid, Spain.

Oliver-Smith, Anthony
1986 *The Martyred City*. Albuquerque: University of New Mexico Press.

1990 "Post-Disaster Housing Reconstruction and Social Inequality: A Challenge to Policy and Practice." Paper presented at the Annual Meeting of the Society for Applied Anthropology, March, York, England.

1991 "Successes and Failures in Post-Disaster Resettlement." *Disasters* 15 (1):12-23.

Olson, R.
1985 "Political Economy of Life-Safety: The City of Los Angeles and 'Hazardous Structure Abatement'." *Policy Studies Review* 4 (4):670-679.

Overturf, Stephen
1988 *Retail Trade and Service Industry Demand Analysis: Uptown Whittier, California*. Whittier, California: Whittier College.

Palm, R.
1985 "Educating Business and Industry About Disaster: Legislative Problems in the Adoption of Modified Lending Terms by Home Mortgage Lenders." *Policy Studies Review* 4 (4):655-661.

Palm, R., M. Hodgson, D. Blanchard
1990 *Earthquake Insurance in California: Environmental Policy and Individual Decision Making*. Boulder, Colorado: Westview Press.

Pantelic, J.
1991 "The Link Between Reconstruction and Development." In *Managing Natural Disasters and the Environment*. Edited by A.

Kreimer and M. Munasinghe. 90-96. Washington, D.C.: The World Bank.

Peacock, W., C. Killian, and F. Bates
1987 "The Effects of Disaster Damage and Housing Aid on Household Recovery Following the 1976 Guatemalan Earthquake." *International Journal of Mass Emergencies and Disasters* 5 (1):68-88.

Petak, W., and A. Atkisson
1985 "Natural Hazard Losses in the United States: A Public Problem." *Policy Studies Review* 4 (4):662-669.

Phillips, B.
1991 *Post-Disaster Sheltering and Housing of Hispanics, the Elderly and the Homeless.* Final Report to the National Science Foundation. Dallas, Texas: Southern Methodist University.

Quarantelli, E.L.
1982 *Sheltering and Housing After Major Community Disasters: Case Studies and General Conclusions.* Columbus, Ohio: Ohio State University, Disaster Research Center.

1985 "Social Support Systems: Some Behavioral Patterns in the Context of Mass Evacuation Activities." In *Disasters and Mental Health: Selected Contemporary Perspective.* Edited by B. Sowder. 122-136. Washington, D.C.: National Institute of Mental Health.

1989 *A Review of Disaster Recovery Research.* Newark: University of Delaware, Disaster Research Center.

1991 "Disaster Response: Generic or Agent Specific?" In *Managing Natural Disaster and the Environment.* Edited by A. Kreimer and M. Munasinghe. Washington, D.C.: World Bank.

Quarantelli, E.L., and R. Dynes
1989 "Reconstruction in the Context of Recovery: Thoughts on the Alaskan Earthquake," Paper presented at the conference on Reconstruction after Urban Earthquakes, National Center for Earthquake Engineering Research, September 13-16, 1989, Buffalo, New York.

Quarantelli, E.L., and C. Pelanda
1989 *Preparations for, Responses to, and Recovery from Major Community Disasters*. Newark: University of Delaware, Disaster Recovery Center.

Raphael, B.
1986 *When Disaster Strikes*. New York: Basic Books.

Reasenberg, P., and L. Jones
1989 "Earthquake Hazard After a Mainshock in California." *Science* 243:1173-1175.

Renteria, H.
1990 "Loma Prieta Earthquake: Social Response to Housing and Food Requirements." Paper presented at Putting the Pieces Together: The Loma Prieta Earthquake One Year Later, October 15-18, San Francisco, California.

Roman, M.
1988 "Finding Fault." *Discover* (August):57-63.

Rossi, I.
1982 *The Logic of Culture: Advances in Structural Theory and Methods*. South Hadley, Massachusetts: Bergin-Garvey.

Rubin, C., and R. Palm
1987 "National Origin and Earthquake Response: Lessons from the Whittier Narrows Earthquake of 1987." *International Journal of Mass Emergencies and Disasters* 5 (3):347-355.

Rubin, C., M. Saperstein, and D. Barbee
1985 *Community Recovery from a Major Disaster*. Monograph No. 41. Boulder: University of Colorado, Institute of Behavioral Science.

Southern California Earthquake Preparedness Project (SCEPP)
1987 Newsletter on the Whittier Narrows Earthquake. Los Angeles, California.

Stewart, A.
1986 *Psychological Responses to the Mexico City Earthquake*. Quick Response Research Report No. 18. Boulder: University of Colorado, Institute of Behavioral Science.

Topping, K.
1992 *Final Report on Recovery and Reconstruction Plan Revisions.* Pasadena, California.

Trainer, P., and R. Bolin
1976 "Persistent Effects of Disasters on Daily Activities: A Cross-Cultural Comparison." *Mass Emergencies* 1:279-290.

Trainer, P., R. Bolin, and R. Ramos
1977 "Reestablishing Homes and Jobs: Families." In *Reconstruction Following Disaster.* Edited by in J. Haas, R. Kates, and M. Bowden. 147-206. Cambridge, Massachusetts: MIT Press.

Tubbesing, Susan
1989 "Earthquake Reconstruction: Emerging Lessons for a Safer Future." Paper presented at the Conference on Reconstruction After Urban Earthquakes, the National Center for Earthquake Engineering Research, September 13-16, 1989, Buffalo, New York.

Turner, R.H., J. Nigg, and M. Paz
1986 *Waiting for Disaster.* Berkeley: University of California Press.

U.S. Geological Survey
1990 "The Loma Prieta, California, Earthquake: An Anticipated Event." *Science* 246:1562-1563.

Warheit, G.
1985 "A Propositional Paradigm for Estimating the Impact of Disasters on Mental Health." *International Journal of Mass Emergencies and Disasters* 3 (2):29-48.

1988 "Disasters and Their Mental Health Consequences: Issues, Findings and Future Trends." In *Mental Health Response to Mass Emergencies.* Edited by M. Lystad. 3-21. New York: Brunner-Mazel.

Weber, F.
1987 "Whittier Narrows Earthquakes." *California Geology* (December): 275-281.

Wijkman, A., and L. Timberlake
1988 *Natural Disasters: Acts of God or Acts of Man?*. Santa Cruz, California: New Society Publishers.

Wyllie, L., and J. Filson, eds.
1989 "Armenia Earthquake Reconnaissance Report." *Earthquake Spectra* (August):150-160.

Yong, Chen, Kamling Tsoi, Chen Feibi, Gao Shenhuan, Zoy Qijia, and Chen Zhangli
1988 *The Great Tangshan Earthquake: Anatomy of a Disaster*. New York: Pergamon Press.

Young, M.
1954 "The Role of the Extended Family in a Disaster." *Human Relations* 7 (August):383-391.