

Chapter 3

DATA COLLECTION, PROCESSING, AND ANALYSIS

This chapter introduces the primary datasets for both the benefit-cost analysis of FEMA mitigation grants and the community studies. These datasets were used to:

1. Establish the costs of all FEMA mitigation activities;
2. Help select a stratified sample for the benefit-cost analysis of FEMA mitigation grants and the communities evaluated in the community studies analysis; and
3. Help support comparative analysis studies of community mitigation.

These primary datasets, how information was developed using them, and the additional datasets developed during the course of this project are described below.

3.1 Existing Data Sources

3.1.1 FEMA NEMIS Database

The National Emergency Management Information System (NEMIS) database is used by FEMA to monitor the status of hazard mitigation grants. The NEMIS database was used to help select the stratified sample of grants for the benefit-cost analysis of FEMA mitigation grants and the communities for in-depth analysis. Key fields in this database are: FEMA region, disaster declaration number and project numbers, subgrantee name, project title, mitigation type, project status (void, withdrawn, denied, pending, approved, closed), total approved net eligible project cost, and Federal share obligated to date.

These data identify general location (city or county), cost of mitigation, and often (but not always) the type of risk being mitigated, and so were useful in selecting sample grants for detailed examination. However, the NEMIS database does not provide several pieces of information crucial to estimating mitigation benefits, most notably: precise location (latitude, longitude, and ground-floor elevation of affected properties for flood hazard mitigation projects); engineering and architectural information (structure type, number of stories, square footage, era of construction, roof configuration, etc.); values exposed to risk (building replacement cost, content replacement cost, number of occupants, economic consequences of business interruption, etc.); and, in many cases, detailed descriptions of the mitigation work performed.

The NEMIS database provides a current, cross-sectional snapshot of the status of FEMA-funded grants but provides complete data for only those projects that are “closed.” Information for all other FEMA-funded grants either reflect the project descriptions and costs indicated in the original project application or, if changes have been approved, information from the last posted quarterly report.

In most cases, probably over 95 percent, information in the database proved to be accurate. There were, however, some recurrent problems that became apparent when grant files were

reviewed or verified during community site visits. For example, sometimes the subgrantee name was too long to fit the allocated space in the database, and this resulted in an occasional misidentification. Also, mitigation types were often chosen to fit a list of very general, predetermined categories, and some projects were significantly different from what was expected. For example, in the list of flood-induced buyouts of private property in riverine areas, one buyout would have been more accurately caused by a landslide debris flow in an alluvial fan than by flooding.

In many cases, after funds were allocated for hazard mitigation projects, some projects were cancelled, not completed, or reduced in scope and unspent or “de-obligated” federal funds were often reallocated after subsequent disasters. The reallocations often were for large projects with many buyouts (in which properties are purchased, the buildings removed, and the land dedicated to open space) or elevations (in which buildings are physically raised and their foundations altered so that the first floor is above the 100-year flood elevation) that could be divided so that some could be funded from separate disaster declaration funds. In these situations, a total buyout of multiple properties in a community was funded by two or more disaster grants. Consequently, in a limited number of cases the number of NEMIS grants exaggerated the number of actual projects.

According to the NEMIS database (as of 5 June 2003), there were 9,719 project applications for all hazards since approximately 1989. The disposition or status of these applications is presented in Table 3-1. A little over 40 percent of these applications represented completed projects and about 30 percent were still active. All applications were funded by the following programs:

1. Various supplemental appropriations and appropriations to serve unmet post-disaster reconstruction needs,
2. Flood Mitigation Assistance,
3. Hazard Mitigation Grant Program, and
4. Project Impact.

Table 3-1 Status of applications in NEMIS database (as of 5 June 2003)

Current Project Status	Count
Closed	4,265
Approved	2,967
Denied	793
Withdrawn	783
Pending	527
Void	279
Null	104
2 nd Appeal	1
Total	9,719

Of the 7,232 funded mitigation activities (i.e., approved and closed), 5,479 were associated with flood, wind (including hurricane and tornado), or earthquake. Because other hazards such as winter storm, fire, and terrorism were outside of the scope of this project, grants to reduce the risks from these hazards were excluded.

Table 3-2 presents the approximate number and cost of funded grants by hazard type. Approximately 64 percent of the funded projects dealt with the mitigation of flood hazards, while 29 percent addressed wind, and 7 percent addressed earthquake hazards. Flood grants represent 63 percent of costs, while wind and earthquake represent 11 percent and 27 percent, respectively. Earthquake mitigation efforts are generally more costly than flood or wind — \$2.4 million for the average earthquake grant, compared with \$630,000 and \$240,000 for flood and wind, respectively.

Table 3-2 Number and cost of funded grants by hazard type

Hazard Type	Grants	Cost (\$M)
Wind	1,572	374
Flood	3,512	2,217
Earthquake	395	947
Total	5,479	3,538

A breakdown of grant types indicates that 90 percent of the grant applications were for project mitigation activities and 10 percent were for process mitigation activities. In terms of cost, grant applications for process mitigation activities accounted for only 5 percent of total costs.

Figure 3-1 shows the distribution of grants by FEMA region. The largest number of grants (32 percent) is associated with Region IV, which includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee. The greatest grant amount (28 percent) is associated with Region IX, which includes California, Arizona, Nevada, and Hawaii.

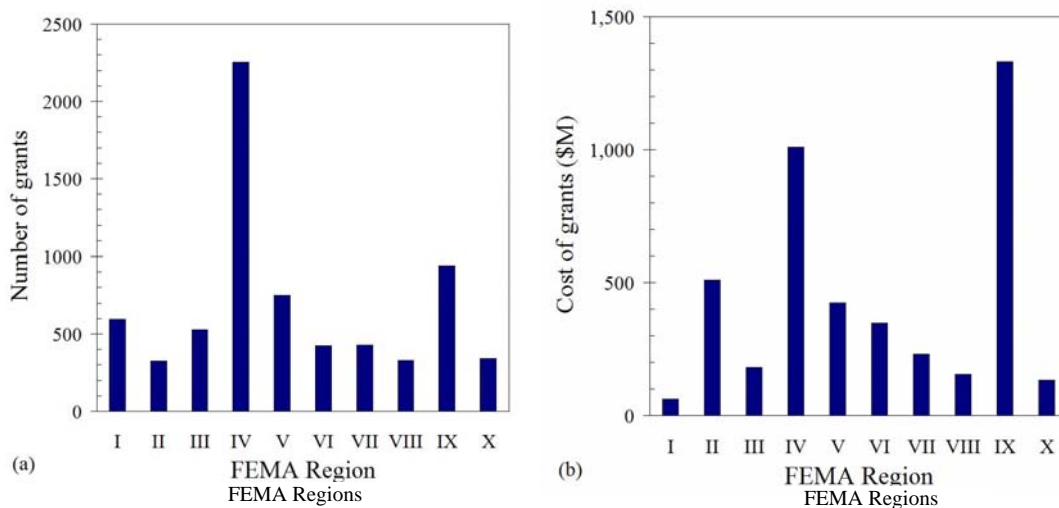


Figure 3-1 FEMA mitigation grants by region: (a) number and (b) total cost.

Figure 3-2 shows the distribution of FEMA grants by year of declaration (i.e., the year the disaster was officially declared by the federal government). Although the largest number of funded projects occurred in 1998, the highest costs were experienced in 1994, the year the Northridge, California, earthquake occurred.

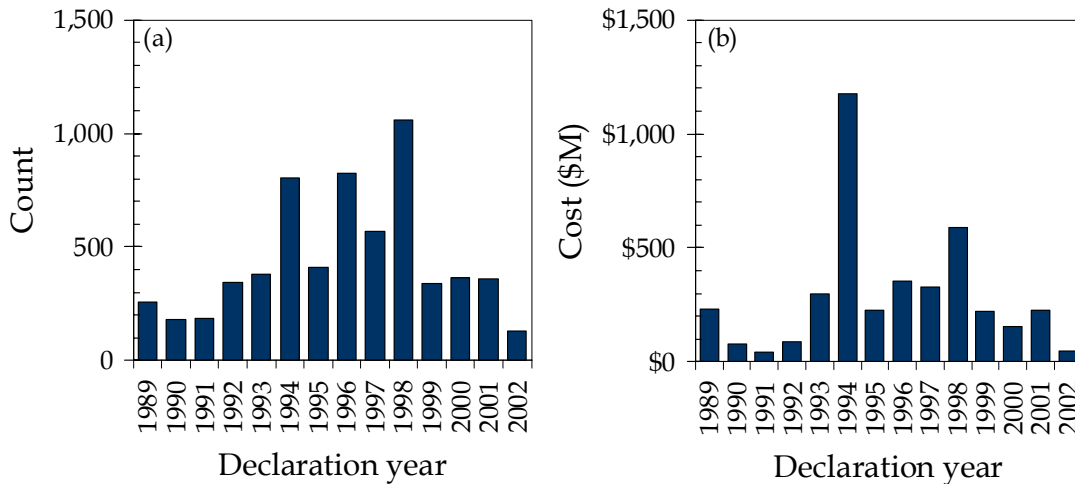


Figure 3-2 Mitigation grants by year of declaration.

3.1.2 Hazard Mitigation Grant Program and Flood Mitigation Assistance Grant Files

An examination of grant files was necessary to supplement the NEMIS data, particularly for precise location, engineering and architectural information, values exposed to risk, and in many cases, detailed descriptions of the mitigation work. Grant files generally were kept by the FEMA regional office overseeing the grant, the state emergency management office, and the local community or subgrantee. FEMA provided copies of files for review or the files were examined in FEMA offices. Files from the FEMA regional office and the state emergency management office were found to be nearly identical and were organized into similar folders that separated documents by topics such as financial, benefit-cost, environmental, project application, and correspondence. The only consistent differences were in correspondence and the retention of original notes that accompanied sent mail. Files exist at both locations for all grants listed in NEMIS.

Documents retained at the state and federal FEMA region were typically also found at the local community; however, they were not organized in the same way (e.g., in some communities, all documents were located together while in others documents were retained in the files of the staff or consultants who created them). Unlike the states and the FEMA regions, which broke up lengthy documents and filed different sections under the appropriate topic, the local communities kept their documents whole. Also, communities retained internal project analyses and consultant reports that seldom made their way into the state or federal files (e.g., the state and FEMA region

files might contain a summary of a benefit-cost analysis while the community file would contain the lengthy analysis developed by a consultant that was used to create the summary).

Grant applications were the main source of information for the FEMA Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Assistance (FMA) funded grants. The grant applications usually contained fairly detailed explanations of the proposed mitigation activity, justifications for funding, engineering back-up if needed, descriptions of structures affected by the proposed activity, financial statements, benefit-cost analyses, and project schedules. There were, however, often more than one grant application if the project scope had changed. The grant applications were available at the regional, state and community sites and provided the basis for technical analysis.

During field visits, the initial contact person in each community normally provided access to the written documents, set up interviews with key informants to discuss the projects, and led tours of the project sites. The field visits usually were sufficient to clear up misconceptions and uncover information not available at the FEMA regional and state emergency management offices. Following field visits, detailed analyses of the FEMA-funded grants were conducted. If questions arose, knowledgeable persons were contacted by telephone and e-mail for additional information.

3.1.3 Project Impact Report Files

Project Impact was initiated by FEMA in 1997 to provide federal seed money to communities (selected by states) willing to develop long-term public-private partnerships that would result in self-sustaining disaster mitigation programs.² FEMA's goals were to support the creation of "disaster-resistant communities" and to reduce future federal post-disaster payments to these communities. It was believed that, if successful, Project Impact communities would become examples for other communities to emulate. Because of the nature of Project Impact, these grants and the reporting requirements are not like those for the other two FEMA hazard mitigation grants programs considered.

Whereas HMGP and FMA grant files were retained in folders with similar headings, Project Impact files were not. FEMA gave the communities great latitude in running their programs. Project Impact grants typically funded multiple activities determined by locals to be good mitigation investments. However, after the start of Project Impact, many initially proposed activities were further evaluated and were either cancelled or modified during the life of the grant and different activities were often added. If partners in the community offered to pay for a project, federal funds were moved to another activity. The dynamic nature of the projects was reflected in the files. There often was no clear indication of what set of activities was actually completed until a final report was prepared and, because the program ended suddenly, some communities did not keep their files or write final reports.

On-site interviews with Project Impact managers and the collection of additional printed documents were necessary to accurately identify the activities conducted under Project Impact. Most of the printed documents found in the communities had not been submitted to FEMA as

² Project Impact ended in 2001; communities with existing grants were allowed to complete their activities.

part of their required financial quarterly reports. However, uncertainties concerning what activities were actually attempted and their status remained because key managers on several Project Impact grants had left and were unavailable for interviews.

3.1.4 Other Files

In the community studies, additional data were sought to describe and evaluate overall community hazard mitigation programs and to determine the effect of FEMA hazard mitigation grants on future community mitigation activities. Telephone and face-to-face interviews, field investigations, and email correspondence efforts were structured to cast a wide net to gather information concerning any hazard mitigation efforts that occurred before or after a community received FEMA grants, the sources of funding those efforts, any written documents describing the activities and their outcomes, and knowledgeable persons to contact to discuss the endeavors and locate the documents. Virtually all the documents identified through this process were collected during site visits although some were also located over the Internet.

Five types of written documents were found:

1. Local hazard mitigation plans;
2. Budgets, both annual and capital, that contained descriptions of mitigation activities carried out by local government agencies, spending amounts, and funding sources such as local revenues, dedicated property tax receipts, or bonds;
3. City and county council meeting minutes and resolutions related to mitigation activities;
4. Internal local government agency reports and studies done in-house or by contracted consultants describing proposed or existing mitigation activities, funding, and expected or actual results; and
5. Files, including project applications and supporting documents, for mitigation projects funded by state or non-FEMA federal agencies. Funding agencies included state emergency management offices and insurance departments, the U.S. Army Corps of Engineers, and the U.S. Department of Housing and Urban Development.

3.2 Other Primary Datasets

To supplement the databases above, several new datasets were developed during the course of this study. The discussion below presents data and information created as part of the community studies analysis; this is followed by a brief discussion on new data for the benefit-cost analysis of FEMA mitigation grants.

3.2.1 Community Studies

To supplement existing datasets and to provide more contextual information on community mitigation activities, additional data were collected through structured interviews with knowledgeable persons, field research, and limited archival record recovery. Figure 3-3

illustrates the data collection process. The process is comprised of four major phases: pre-interview activities; formal interviews; field visits; and data or information processing.

Pre-interview activities generally were conducted by field researchers. The main purpose of this activity was to collect from FEMA regional offices reports and data that would help in the conduct of any subsequent benefit-cost analysis and identify knowledgeable persons to interview. As part of the study protocol, FEMA Headquarters formally asked the regional offices to provide records to study personnel.

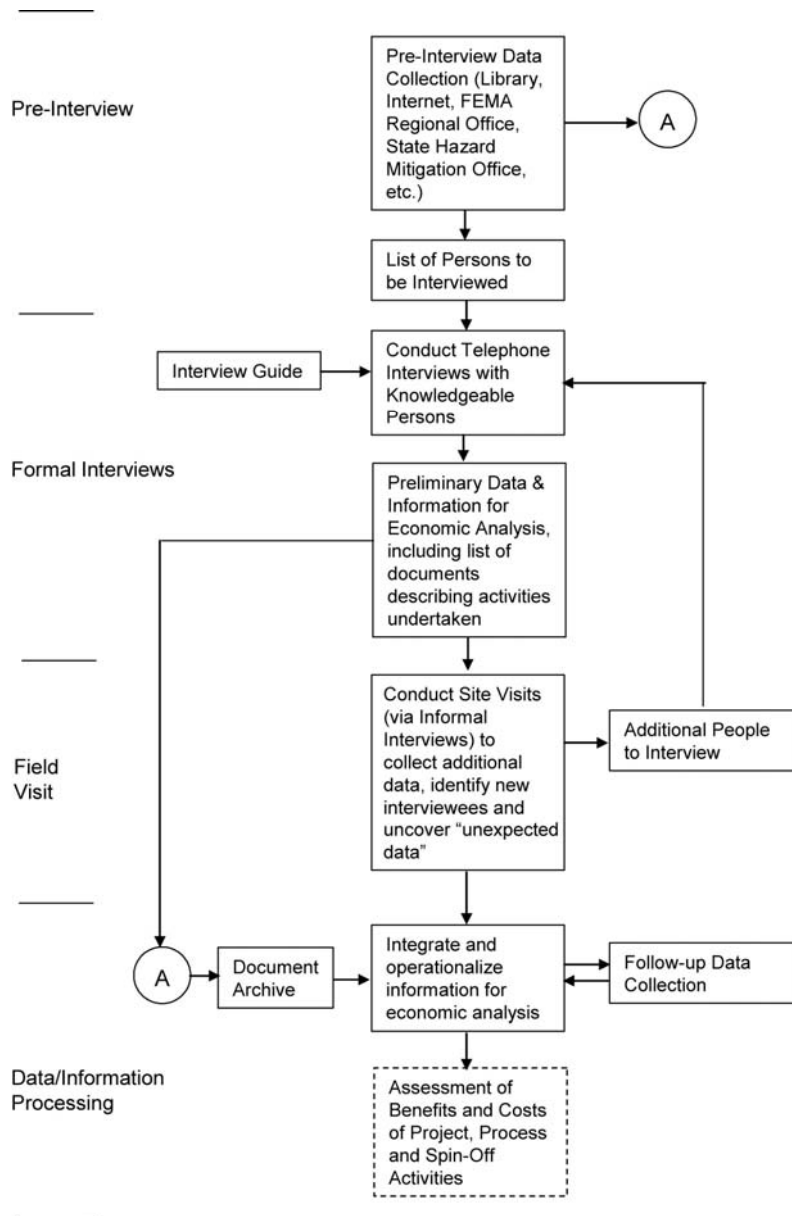


Figure 3-3 Data collection process for community studies; “A” denotes archive.

The next step involved telephone interviews with knowledgeable persons. These interviews provided an “insider’s view” of hazard mitigation programs and projects that were being conducted within each of the communities investigated. As part of the data collection protocol, a detailed interview guide was created (see Appendix B) and tested during a pilot study involving Tulsa, Oklahoma.³ Because the vetted guide was used in all subsequent interviews, the information gathered could be used as the basis for limited generalization. Some of the questions contained in the interview guide focused on the identification of possible synergistic activities that arose from FEMA hazard mitigation grants. These interviews also resulted in identification of additional people for face-to-face interviews.

Once telephone interviews were complete, face-to-face interviews were conducted with some of the knowledgeable people identified above and with others whose input was identified as valuable during field visits. In many communities, unexpected data and additional persons were found that led to further data analysis and telephone interviews. After the community site visit, any additional requests for data or clarifications were completed by telephone or by email.

3.2.2 FEMA Mitigation Grants

The FEMA regional office files were reviewed for all grants in the study sample. Electronic coding forms were created to extract data from the sample grant applications in a detailed and structured manner. The form for project mitigation activities contained 200 data fields for each property or location mentioned in the grant application. A coding database was compiled from the extracted data. Eventually 54,000 data items were entered into the coding database. The database addresses 1,546 properties in project mitigation activities and 387 distinct efforts in process mitigation activities.

Required data that appeared neither in the grant files at FEMA regional offices nor in the NEMIS database were acquired from the Internet or from other sources and inserted into the coding database. For example, square footage, number of employees, and precise street addresses for a number of mitigated buildings were acquired from the subgrantee’s website or from the website of engineers or architects involved in the grant project. Latitude and longitude of most facilities were acquired using GIS software such as Microsoft Streets and Trips[®] (Microsoft Corp. 2004). Site soil classifications for earthquake projects were acquired using a geographic database created by the California Geological Survey (Wills et al., 2000).

³ The above concepts were considered in development of the standardized questionnaire used in telephone interviews and when selecting variables to assess from the 2000 census. Included in the standardized questionnaire were questions about non-FEMA-funded hazard mitigation activities, the history of hazard mitigation in the community, the existence of relevant state and local mitigation laws, the existence of active partners, perceived risk of disaster, perceived efficacy of hazard mitigation programs, and similar questions. Drawn from the 2000 census were data on population size, population growth rate, median age, percent non-white, percent of households with children under 18 and members over 64, percent of female-headed households with children, percent of families below the poverty line, percent in the labor force, and median family and per capita income. A more complete discussion of the demographics of each community is contained in Appendix C.