THE ORGANIZATION OF A MASS EDUCATION PROGRAM IN ORDER TO MITIGATE EARTHQUAKE HAZARDS IN CALABRIA

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Introduction

This paper is intended to be an account of one of the first experiences in mass education undertaken by a local government in Italy, after the approval of the official rules of application of civil protection (Law No. 996 of December 8, 1970).[1] Indeed, after the last earthquake in Irpinia (November 23, 1980), many local governments situated in seismic territories, have been concerned by the lack of local emergency plans for natural calamities. The rules of application for civil protection give them the possibility of organizing a local emergency network, with the technical support of experts, engineers and scientists knowledgeable of such problems, in cooperation with central authorities. The civil protection program of the Commune of Rende was made possible by the cooperation of the local administration, interested in taking the lead in this field, of the Department of Sociology of the University of Calabria, and of the Irpi Institute of the National Research Council of Italy.[2]

The Commune of Rende (5,479 km^2; 13,157 inhabitants according to the 1971 Census) is located a few miles north of the city of Cosenza in Calabria, and actually constitutes one of the new, developing suburbs of this city. It was struck by an earthquake, affecting the whole Cosentine Valley, on the 20th of February 1980, causing considerable damage to buildings and infrastructure. A few weeks after that event, a research team from the Department of Sociology of the University of Calabria, in cooperation with Rende's Social Center, carried out a survey of 295 families living in the Commune. Four subsamples were selected according to social class and type of dwelling. Although the survey was not specifically designed to meet the requirements of a program of mass education, which was later requested by the local administration, it certainly served as a source of practical information to the research team. In this paper, indeed, some of the findings from the survey will precede the description of the structure of the program which is based upon them.

Immediate Collective Behavior

The first actions after an earthquake strikes are intended to save one's life. Although it had no serious consequences in terms of casualties, the 20 February earthquake caught the population in the least favorable conditions for response: namely, at 3:00 a.m. in the middle of the winter. If this quake had been more violent, it could have taken a heavy toll of lives. The first shake woke up 62% of the interviewed. Twenty nine percent could feel the quake because they were not sleeping, just having returned from Carnival parties.[3] Five percent of those who perceived it did not think it was a quake; 4% continued to sleep until they were informed by other members of the family. This was a 6 to 7th

Table 1

Question B.1 "Did you feel the earthquake, on the night of February 20, with epicentre between Cosenza and Montalto?"

Response	Percent
Yes, certainly (respondent awake)	27.8%
Yes, by waking up suddenly	62.0
Yes, I felt the first shake, but did not think about an earthquake	4.7
No, I was sleeping (awakened by others)	3.7
No, I did not feel it (for other reasons)	1.7
Other answers	--
	100.0% (N=295)

degree earthquake on the Modified Mercalli Scale; that is, strong enough to wake up sleeping persons and to send people outdoors, but too weak to cause the immediate collapse of any built structure. The panic and the spontaneous flight behavior it created cannot be "simulated" by a social science experiment. The seismic phenomenon, however, was not as destructive as it might have been: it permitted the maintenance of family and social groups and the resumption of social activities a few days after the first quake. It did not require a massive intervention on the part of rescue teams from other regions. Officers on duty from the fire and police corps were sufficient to keep the situation under control.

Immediate collective behavior can be catalogued into a set of actions which are described in Table 2. As the first answer to the question, "What did you do at the beginning of the quake?" the majority of respondents (40%) said they informed other family members (e.g., children or relatives living in separate rooms).[4] Seventeen percent got dressed, 11% immediately left the living quarters, 12% preferred to stay where they were. As the second answer most people, after getting ready, said they left home. This especially applied to families with children who cannot make individual decisions about what to do, but must first collect everyone in the group. To further stimulate evacuation from housing, a second seismic wave followed the first one after a few minutes. At this second violent warning, 94% decided to leave homes.

Table 2

Question B.2 (If answers 1,2,3 to question B.1)
"Do you remember the first thing you have done after the first quake?"

Response	Percent	
	First Answer	Second Answer
Stayed in bed	12.5%	0.3%
Woke up wife/husband	9.1	0.6
Informed other family members	40.1	3.1
Got up and looked out for a safe shelter	2.8	1.0
Dressed rapidly	17.4	10.1
Assisted other family members	4.9	3.1
Went outdoors	11.1	42.2
Gave help to somebody	0.7	0.3
Other actions	1.4	0.3
N.A.	--	39.0
	100.0%	100.0%
	(N=287)	

Five percent remained for the following reasons: the quake was not considered dangerous, they could not easily move out from their apartments (old age, sickness) or they had to assist close relatives in the same condition.

The patterns of immediate collective behavior can best be studied by making reference to the primary group environment. They can be classified as "little reaction" (such as staying in bed), "symbolic behavior" (waking up and informing other members of the family), "helping behavior" (assisting family members who cannot be evacuated) and "escape"

(getting dressed and leaving the apartment). Table 3 (crosstab between marital status and reaction patterns) shows that both over and under response, escape and little reaction from underestimation of the danger are patterns characteristic of the unmarried, whereas family groups are more likely to engage in symbolic behavior leading to group mobilization and solidarity.

Table 3

Crosstabulation between marital status and question B.2

First thing done at the quake	Marital Status			
	Unmarried	Married	Married w/ children	Total
Scarce reaction (1)	20.7%	9.1%	9.0%	12.5%
Symbolic behavior (2+3)	21.8	50.0	62.4	49.2
Helping others (6+8)	3.4	4.5	6.8	5.6
Escape (4+5+7)	50.5	36.4	21.3	31.3
Other reactions (9)	3.6	0.0	0.5	1.4
Total %	100.0	100.0	100.0	100.0
N	(87)	(22)	(178)	(287)

Chi sq. = 68, sign. = 99.9

Seeking Refuge

Out of 275 interviewed people who left their dwellings, most respondents (88.4%) did so because they were afraid of a stronger quake; 23.3% expressed the intention of moving the family to a safer place; 8% thought their house was much too dangerous; 7.6% gave other reasons. It should be noted that the percentage of people thinking their house dangerous rises from 2.8% for concrete buildings to 21.8% for housing made of masonry. Table 4 shows the connection between building typology and reasons for going outdoors. A comparison with other earthquakes,

Table 4

Motivations for Leaving the Apartment by Building Typology

Motivations	Building Typology				
	Concrete	Iron and Masonry	Tradit. Masonry	Reinforced Masonry	Total Avg.
Afraid of a stronger quake	94.3%	88.4%	54.5%	55.2%	88.4%
House was dangerous	2.8	2.9	21.8	10.3	8.0
Moving the family to a safer place	20.6	24.6	16.4	24.1	23.3
Other motivations	9.9	--	7.3	10.3	7.6
N	(141)	(69)	(55_	(29)	(275)

(Column percentages add up to more than 100% because of multiple answers. Four missing cases in the crosstablulation because they could not specify building typology.)

Table 5

Question B.6 "Where did you find a shelter?"
by type of building

Type of Shelter	Building Typology			
	Farm, Villa	House (1-2 floors)	Building (>2 floors)	Total
Safe place, near to the house	92.9%	87.5%	75.2%	81.8%
Safe place, far from the house	7.1	10.2	21.8	15.6
Shelter outside town	--	2.3	3.0	2.4
Total %	100.0%	100.0%	100.0%	100.0%
N	14	128	133	275

Chi sq. = 26, sign. = 99.9

which is not possible here, would show that an alarmed perception of one's house tends to increase with the violence and the repetition of seismic phenomena.

From Question B.6 in Table 5 it can be ascertained that people did not go very far from their living quarters (the majority, 82% moved to a "safe place, close to home"), 16% went farther away and about 2% decided to leave the town (mostly young people and residents from surrounding villages). There is a weak correlation between building typology and place of evacuation (corrected contingency coefficient = 0.22) in the sense that people living in taller buildings and in densely populated areas tend to move farther away in their attempt to evacuate. The preferred refuge is an open space within the city (large squares, parks, unbuilt spaces) and the next best one is in the countryside. For practical reasons the refuge is not located far from home, as people--after the first reaction--tend to return to their apartments to check that all is in order or to pick up what they might need for the night.

From newspaper accounts it can be determined that the search for an appropriate refuge was easier in the new neighborhoods where housing was constructed according to seismic standards and buildings were considerably distant from each other. In the old town of Rende, built at the top of a hill with narrow streets and interconnected housing, the problem of access to open space was more serious, as only two streets led out of the town. The same problem was felt by the population of the medieval city of Cosenza, built with narrow streets, tall buildings, staircases and galleries before the enforcement of seismic standards. In fact the problem of providing adequate refuge and safe avenues of evacuation from high risk areas is one which any committee for local emergency planning must face with a set of policy measures: (1) it is necessary to establish emergency evacuation routes and to keep them free from traffic, available for flight from the area and for the delivery of first aid; (2) it is necessary to improve the security of those streets, in the historical centers (not only in Italy but also in other nations) which may become bottlenecks for the evacuating population. This can be done without large scale renewal, but more simply by reinforcing buildings, walls and roofs and by removing dangerous hanging objects from the streets; (3) during the program of mass education, it is necessary to point out safe sites of convergence in each neighborhood, not far from the dwellings, where people can expect to receive the necessary help and information, and where the families can group together and wait for the shocks to cease.

It was found from the survey that private means of transportation is often used as a shelter. Seventy one percent of the respondents said they spent the night in their cars. Automobiles were first used to carry people to the hospital, to reach relatives and friends in other parts of the town, in the absence of functioning public transportation. Cars were used to reach safer locations and as a protection against cold temperatures during the night. A major problem was that the city of Cosenza and other districts remained jammed for hours by private traffic. Traffic jams have been reported in other earthquakes, including that of Naples (November 23, 1980). All emergency plans suggest that people should not use their cars to move about in disasters. This obvious suggestion, aimed at improving the delivery of first aid and rescue teams

Table 6

Question B.7 "Did you spend all the night outdoors?"

Response	Percent
No	5.8%
After the quake, came back home	1.7
Stayed outdoors 1 hour	1.7.
Stayed outdoors 2-3 hours	5.8
Outdoors all the night	85.0
	100.0%
	(N=295)

Table 7

Question B.8 "Did you spend the following nights outdoors?"

Response	Percent
No	23.4%
Yes, the following night	39.0
Yes, 3 nights	16.6
Yes, 4 nights	4.7
More than 4 nights	14.9
N.A.	1.4
	100.0%
	(N=295)

does not seem to be followed in practice for a number of legitimate individual reasons. The only means of prevention seems to be that of developing a plan to regulate traffic in advance, to coordinate and to instruct officers to discourage the use of private transportation in the urban context.

Life Styles during the Emergency

The danger represented by the quake considerably modified the living habits of the disaster stricken community. Eighty five percent spent the night of the quake outdoors, especially the families with children (see Table 6). Thirty nine percent avoided sleeping indoors the following night (Table 7); 20% stayed outdoors for more than three nights. It can be said that people faced the earthquake experience with considerable prudence. The preferred shelter, in most cases, was a car stationed somewhere in an open space. However, other people succeeded in changing apartments and moved to what they thought were safer homes, located on the first floor and lived with relatives or friends from whom they could receive help (see Table 8). This was especially true for the elderly or for women with small children. A minority used tents or trailers owned for summer holidays. The extensive use of emergency shelter is reported for greater earthquakes. For at least one day, the disaster prevented the prosecution of normal working activities (42% did not go to work and 4% went to work but came back after a few hours). About 13% of the offices or factories were closed. In the following days, some office buildings which had remained open were closed by the request for a technical inspection. The respondents who did not work or could not work spent the day at home in a state of alertness ready to give their families assistance at the next sign of danger. Other people moved their families to a safer location, and others took care of the damaged housing.

Past Earthquake Experience

For 84% of the respondents, this was the first time they had experienced an earthquake. For 3% it was the second time; only 12% stated they had experienced more than two earthquakes. The data do not support the hypothesis that in regions classified as major seismic areas people have accumulated a sort of "cultural experience" of this phenomena. On the contrary, for the majority of respondents this was considered a new event in comparison with minor seismic disturbances which occasionally occur in the Province of Cosenza.

Out of 295 respondents, 26 mentioned quakes happening in Calabria and in other parts of Italy, dating as far back as 1925. Twenty three described what could be termed a "non-disastrous event", and only 3 reported being present at a major disaster. Two persons said they were present during quakes which caused several casualties, but none of them had any victims among relatives. It can be concluded that, in spite of the presence of small seismic disturbances, the inhabitants of Rende never felt seriously threatened by earthquakes, and that the disaster which happened on February 20, 1980 was a relatively new experience to them. It is hard to establish whether any psychological motivation or represion mechanism influenced the answers concerning past natural

Table 8

Question B.9 "If you spent the following nights outdoors where could you sleep?"

Response	Percent
In a car	70.8%
In a bus	1.7
In a tent, roulotto	1.7
Apartment of friends	3.0
Apartment of relatives	18.5
Outdoors	3.9
In a hotel of another town	0.4
	100.0% (N=233)

disasters. It is, however, certain that a direct seismic experience such as that of February 20 has made the local public more aware of this issue, of broadcasts and of news about earthquakes, and that the solidarity shown for the victims of the November 23 quake in Irpinia was greatly enhanced.

If the results of this survey can be generalized to other similar cases, it can be stated that no program of mass education can rely upon the establishment of "local traditions" concerning the knowledge of quakes, since this same knowledge seems to be fragmentary and discontinuous. It must, therefore, be taken for granted that the earthquake is a new event for the community and that in general the community is not spontaneously prepared to face it.

Housing and Safety

The built environment of Southern Italy varies considerably from that of American suburbia or of Japanese cities. The prescriptions given for seismic protetion in those areas do not fully apply to Southern European housing. Homes and offices are made either of masonry or concrete; there is little use of prefabricated materials, of plastic, glass, and steel. Housing constructed before the present century is built of masonry (bricks or stones) with wooden roofing. It can be found in the historical towns or in scattered farm dwellings. Contemporary housing is mostly concrete structures, four or five floors high, organized into apartments with staircases and elevators. In comparison to wooden structures, this type of housing has some undeniable advantages: it lasts longer, under generally safer conditions, and it can be easily renewed by restoration. Housing five centuries old is still inhabited and constitutes a remarkable part of the office and

Table 9

Question C.1 "Is this your first earthquake experience?"

Response	Percent
Yes	83.7%
No, it's the second	3.4
The respondent has more experiences of earthquakes	12.2
N.A.	0.7
	100.0% (N=295)

Table 10

Question C.2 (if 1 is answered to the previous question) "How was your experience of this first earthquake?"

Response	Percent
The respondent maintains to have lived through this experience:	
Well	12.2%
Positively	16.3
Not Well	23.1
Very Badly	31.9
	100.0% (N=246)

Table 11

(If the respondent has experience of other earthquakes)

Response	Percent
Type of quake described:	
Non disastrous	88.5%
Damaging	7.7
Heavily damaging	3.8
	100.0% (N=26)
Type of damages:	
Only damages to property	92.3%
Casualties	7.7
	100.0% (N=26)

residential buildings of city centers. It is generally quite resistant to fire and to windstorms, more so than wooden housing.

However, from the seismic point of view, both concrete and masonry are subject to collapse. Being heavier structures, they leave little hope for persons crushed or buried alive under the rubble of their buildings. For this reason, it is quite important to design earthquake resistant housing.

The survey results showed that 5.4% of the respondent families lived in a farm or villa (one floor apartment), 47.1% in a small house (1-2 floors), and 47.5% in buildings taller than two floors. 15.9% of the housing was constructed before 1900, 19.4% between 1900 and 1960, 58.0% after 1960. Major urban development occurred after 1960, when the enforcement of seismic construction standards was already well established by law. This area is fairly typical of new urban development in Southern Italy. The answers given by respondents indicated 50.8% of all housing was made of concrete structures, 24.1% with masonry using iron bars for support of ceilings, 9.2% with ancient masonry and wood reinforced by chains holding opposing walls together, and 14.6% with ancient, traditional masonry, without any reinforcement. Four respondents (1.4%) did not specify type of construction. Masonry

reinforced with chains is estimated to withstand shocks up to the 7th degree of the Modified Mercalli Scale, whereas concrete is supposed to guarantee against collapse up to the 9th degree. The last Irpinian earthquake, which caused some concrete buildings to collapse, was estimated to be between the 9th and the 10th degree of the Scale at the epicenter.

The structural characteristics of the buildings are a good predictor of their ability to resist seismic shocks. 16% of traditional masonry construction suffered heavy damage compared with none for concrete. The heavily damaged buildings were constructed before 1930, that is with obsolete construction technology. The data in Table 12 clearly show that older buildings are more vulnerable than newer ones. However, there are some exceptions. The table shows that 5% of all concrete buildings suffered considerable damage, and newspapers report that at least three new residential buildings, following the first earthquake, were declared non-inhabitable by firemen and local government engineers. In response to another question intended to reveal doubts about the safety of their dwellings, some families maintained that the design and the location of the structure could not guarantee any kind of safety. It can be assumed that there is a small percentage of buildings which may not be able to withstand severe earthquakes in spite of their technical specifications for a variety of reasons, such as poor site conditions, quality of construction, improper design, faulty foundations, etc. It is no wonder, therefore, that in quakes greater than the 7th degree of the Modified Mercalli Scale many masonry houses have not resisted, and some concrete housing has collapsed (at least three cases--November 23 earthquake in Naples and St. Angelo dei Lombardi).

These negative experiences with contemporary construction suggest that officials should not rely on the general technical properties of buildings, and that controls should be imposed individually for each structure and each site. If structures show signs of unexpected damage after a minor earthquake, this should be interpreted as an indication of weakness. Immediate measures should be taken for reinforcing, even though the inhabitants may not understand why so much work is needed to repair a little damage. According to the survey, 50% of all buildings in the Commune of Rende had been inspected by officials and civil engineers a month after the earthquake. These inspections, however, did not extend to all housing. They were not carried out automatically, but had to be requested by families living in the dwellings or by the owners. In the case of the city of Naples (after November 23rd) inspections were made within a few weeks after the first earthquake, but the continuation of seismic activity over several months required technicians to reinspect endangered buildings.

In response to the question, "Do you know whether your house is constructed according to seismic standards?" 25% answered that their home is too old, 17% that it does not appear so, 23% that they do not know, 16% yes, probably, and 19% were positive about it. Usually, owners are more knowledgeable than tenants about construction details. The level of education and occupation are important factors also.

Table 13 shows the majority think that their house is safe enough to withstand an earthquake (54%), but only 11% answer that they are certain

Table 12

Damages by construction typology

Damages	Building Typology: Concrete	Iron and Masonry	Tradit. Masonry	Reinforced Masonry	Total Avg.
No damages	46.0%	46.5%	20.9%	44.4%	42.0%
Light damages	48.7	50.7	53.5	51.9	50.5
Noticeable damages	5.3	2.8	9.3	3.7	5.1
Heavy damages	--	--	16.3	--	2.4
Total %	100.0%	100.0%	100.0%	100.0%	100.0%
N	150	71	43	27	295

(4 missing cases do not state building typology. Chi sq. = 50, sign. = 99.9)

Table 13

Perception of house's safety by building typology

The house is	Building Typology: Concrete	Iron and Masonry	Tradit. Masonry	Reinforced Masonry	Total Avg.
"Safe"	18.0%	4.2%	--	7.4%	10.8%
"Safe enough"	61.3	54.9	25.6	48.1	53.6
"Unsafe"	6.0	16.9	32.6	29.6	14.9
"Dangerous"	--	2.8	20.9	3.7	4.1
Doesn't know	14.0	21.1	18.6	11.1	15.9
Other/n.a.	0.7	--	2.3	--	0.7
Total %	100.0%	100.0%	100.0%	100.0%	100.0%
N	150	71	43	27	295

(4 missing cases do not state building typology. Chi sq. = 87, sign. = 99.9)

it is safe. 15% are dubious about the security of the building, and 4% think it is dangerous. The remaining 18% either don't know or give no answer. There is a strong correlation between building typology and perception of safety. In fact, in the section of the questionnaire concerning the safety of the house, building typology constituted the principal causal link. Of 71 persons who think their house is not safe, 65% mention the building is too old, 14% say it is not built with concrete, 11% say ceilings and roofs are not stable, 8% that stairs are dangerous, and 8% that stairs are too far from the exit. Those living on the top floors of apartments are afraid they might not be able to reach the exit of the building in the event of an earthquake. Other cases of complaint include not enough space in front of the building, house not well constructed, building close to a steep slope, which concern sites and design.

Future Prospects

The earthquake dispelled the belief people had in the security and safety of their natural environment. In response to a question about the possibility of another earthquake, the majority (78.0%) answered that one can happen at any time, 3.1% add the danger is continuously present, 0.7% predict them each 2-3 years, 4.7% say that quakes are rare events, and 13.6% do not know. The data basically show that the population felt threatened at any moment.

To the question, "What would you do if you were informed in advance?" 48.6% responded they would immediately leave their house until the danger was over, 16.9% would escape from the area, 24.4% would take some precautions, and only 11.5% would continue their life normally. However, according to the majority of respondents, (68%) it is not yet possible to predict earthquakes.

Finally, the risk of an earthquake is not felt to be so important as to compel families to relocate permanently. 55.6% of the respondents said that they would not move their residence because of earthquake risk. 11.2% say that--if they could--they would change the type of house and neighborhood, 18.3% say that they would change city and local government area, 14.9% do not know. It can be concluded that proneness to earthquakes in itself does not threaten the stability of a location. This has also been demonstrated by the will of the people of Friuli and Irpinia to rebuild the same towns. However, this fact makes the need imperative for emergency organization and for mass education and training directed at the younger generations in those communities which may be stricken again.

The Program of Mass Education

The role of mass education in relation to other programs of community preparedness.

First of all, a program of mass education must not be independent from a whole series of measures for increasing the general preparedness of the community against unscheduled events. In the case of earthquakes,

these include knowledge of the geodynamical aspects of the territory (past seismic activity and active faults), the seismic engineering study of the resistance and the weakness of the built environment (housing and infrastructures), and the study and practical improvement of organizational response within the community. Mass education is a part of the community's organizational response program which includes, on the one hand, the intervention of the public administration, with all its emergency powers and on the other hand the active cooperation of the people. One of the effects of mass education should be that of distributing certain disaster related responsibilities--traditionally the province only of police and fire corps--to a broad base of volunteers who are not called from outside the community, but generated within the community as soon as the need for intervention arises.

Aims and limits of mass education.

The first aim of mass education is that of preventing exposure to danger by providing advance knowledge of safety measures. The results of the survey about previous experiences with earthquakes showed that, in the Cosenza area, this was a new event in comparison with minor seismic disturbances. Only a small minority shared an experience of damaging earthquakes. A second aim is that of decreasing anxiety about unknown danger by creating patterns of recognition and of discrimination between false alarms, warnings and actual threat. Any type tremor is perceived as equally threatening, whereas there are important differences between minor and major events. A third aim is that of improving ad hoc coordination of family groups and of other spontaneously emerging groups by transforming symbolic behavior (observed especially among families) into practical defense and escape. The program should direct people to safer locations by pointing out evacuation routes and should provide precise expectations about the help which can be delivered by locally based organizations. It should also indicate patterns of responsibility and roles of leadership within disaster stricken groups, sources of coordinating information which families can access. There are also long range effects of mass education which should be taken into account. Mass education should teach practical procedures for increasing the safety of the home environment by modifying furnishing and installing elementary safety devices for fire, gas, and electricity. In the second place, it should lead to an improvement of hazardous buildings by encouraging and supporting restoration and reinforcement.

The research at this stage does not permit measuring the effects and evaluating the efficacy of a mass education program. The first problem consists in the organizational ability to spread knowledge in the community over a long time period, so that people continue to be informed before the next earthquake. Since there is no sure method of predicting an earthquake, the success of such a program greatly depends upon its timing with respect to the events. Mass education is most effective if it is achieved one or two years before the earthquake; its utility decreases as time passes before such an event happens again. It is necessary to discriminate between information which is subject to obsolescence and information which may continue to be effective throughout time (see Table 14). The program should protect against obsolescence by undergoing revision every four or five years.

In the second place, the program cannot prevent by itself the destructive effects of major earthquakes (such as the collapse of buildings, massive casualties, the interruption of energy and communications). Certain items which are suggested for minor earthquakes may turn out to be irrelevant for major ones. The program was designed to be adequate for earthquakes varying between the 5th and the 9th degree of the Modified Mercalli Scale for the Commune of Rende. In the case of more severe earthquakes it is assumed that the community loses self-sufficiency with respect to rescue, and that major help must be delivered from outside. The improvement of the efficacy of the program largely

Table 14

Obsolescence in Educational Programs

Items not subject to obsolescence

1) Elementary notions of what is an earthquake
2) Patterns of recognition of earthquake
3) Personal safe behavior
4) Patterns of family organization and response
5) Procedures of evacuation
6) Home safety
7) Structural improvement of the building

Items most likely to become obsolete

1) Evacuation sites
2) Evacuation roads
3) Emergency for new districts
4) Location of health services
5) Location of administrative offices and emergency personnel
6) Channels of public communication (TV, radio)
7) Other channels of communication

depends upon the technological progress which is being made both in earthquake prediction and in the design of building resistance.

Families as Action Units

Other studies of families during disasters show, as does this one, that belonging to a family group makes individuals dependent upon collective decisions: families are more likely to engage in symbolic actions (warning and getting together) which may have the final effect of retarding their time of response to emergencies. The purpose of the

program of education addressed to families is that of increasing their efficiency as action units, by making clear dangers, roles and expectations. Of course, in order to become efficient and safe the family group needs minimal support from official organizations: the help promised to families must be fulfilled in the presence of coordinating officers in evacuation sites. Instructions to families are distributed in a booklet ("How to defend oneself from earthquakes", instructions for families) which is intended to represent in a realistic manner (by making extensive use of illustrations) the earthquake situation. The booklet is prefaced by the Sindaco (the local government head) which gives an official appearance to the information being distributed. The earthquake is seen, first of all, at home, with the damages it can eventually provoke, and the dangers it can represent to human lives (such as fire, furniture collapse, falling objects, breaking glass). Families are instructed to stay where they are, to find a safe shelter within the house at the moment of the earthquake, avoiding falling objects and avoiding getting out of the building. Instructions assume that the building will be standing after the first shock. Next, the family must group together, preparing children and helping the elderly to leave the dwelling. Evacuation must be done as a group, avoiding falling objects, without using elevators. Gas and energy must be turned off before leaving the dwelling. On the streets families are able to join other members of the community who have experienced the same situation. Together, these groups must be directed to evacuation areas which also become, during the emergency, service areas for the community. Evacuating people must help each other (including the elderly and the handicapped) and as a group must discourage panic or individualistic behavior. The urban context allows evacuation on foot which improves face to face interaction and helping behavior.

The role of families, as reference groups for safety and evacuation, is particularly important if the earthquake happens at night or in the evening. During other times of the day other social groups and organizations may work as reference groups for evacuation: for children and young people the schools become the second important reference point. For the adult it is the office and the factory. For the elderly it is the neighborhood with its social services.

Mass Education in Schools

Schools, especially elementary schools, have been built to the safest seismic criteria. In previous Italian earthquakes they have often become important community coordination centers because as shelters they withstood the strongest shocks. The main problem the school must face during an earthquake is of an organizational nature. Children and teachers must know in advance their respective roles and must perform them. In particular, children should be assembled under the leadership of teachers who are responsible for their safeguard until they are returned to parents. Teachers must be knowledgeable of seismic safety measures; they must be able to group and identify their class and guide it to a safer location outside the building until the danger is over. For the purpose of drills, the danger of an earthquake can be equated to that of fire. Fire and earthquake drills can be regularly practiced in the schools at the ringing of alarms.

Another service schools can provide to the community is to teach students elementary norms of safe behavior which they can transmit to families. In particular, children should be instructed to know what to do (1) when the earthquake strikes at home during the evening or the night; (2) when it strikes at the playground or any other open space, not far from home. Besides, they should recognize and be able to reach evacuation sites in the district, where they can meet family members or other relatives they might know. Although some notions of elementary geodynamics already appear in 4th and 5th grade textbooks, children of the last two years of elementary schools can receive specific seismic training: it is possible to explain to them what an earthquake is, and how to recognize one from basic signs. More advanced training is possible in post-primary education by creating volunteer geodynamic observation laboratories, and by training scouts to intervene in natural calamities.

Training in the schools can be most effective if audiovisual material is used (movies and videotapes where actual images of earthquakes are shown). The use of audiovisual material is suggested at the junior high school level (post primary) where students have a more realistic perception of filmed images. In the elementary schools a sort of euphemistic representation of reality (by stories, cartoons, characters) can be more effective with young readers.

Mass Education in Factories

High concentrations of working personnel can be found in industrial plants during working hours. If the earthquake strikes in the morning or early afternoon, it will damage not only the plants but also endanger the lives of the working population. Therefore, it is necessary that large plants have their own local emergency plans. Factories can be divided into two types: (1) industrial establishments which do not contain any special hazard (e.g., toxic substances, flammable materials, explosives) and which can be evacuated without special procedures; and (2) hazardous establishments which may become highly dangerous in the case of earthquakes (e.g., dams, nuclear reactors, chemical plants, etc.) Type 2 is not found in the Commune of Rende, which is not characterized by a high industrial activity, but should be kept in mind for similar programs elsewhere. Emergency plans for factories are supposed to (1) assess the stability of buildings where the industrial process occurs; (2) evaluate the safety of any stockpiled material within the buildings or near them; (3) provide emergency exits which are to be kept clear, and to point out safe evacuation sites; and (4) establish terminating procedures for the work in process during a natural disaster (e.g., shutting off power, storing raw materials, etc.) It is the task of the factory management to organize a local emergency plan and to assign tasks to individual workers or teams; however, the management can receive helpful advice from the seismic safety board.

There should be a clear distinction between emergency plans for before and after an earthquake. The plan for industrial safety before the earthquake concentrates upon the safety of personnel. After the earthquake, certain factories are considered resources from which machines, operators, and technical equipment can be ordered in order to

deliver first aid. The role of the construction industry becomes extremely relevant, as it owns the machinery needed to remove debris of collapsed buildings. Bulldozers and machine operators needed to remove heavy debris are most likely to come from construction plants, from mines or from highway construction. Saving lives within a few hours, can depend upon their immediate presence. For this reason, the Commune of Rende--as a result of experience accumulated in Irpinia and Friuli--has completed a classification of necessary technical equipment to be found in the local industries. Other industrial plants may contain useful equipment which may become necessary in the weeks following the catastrophe (such as tents, trailers, clothes, drugs, canned food). This equipment may never become available to the local population if no agreement has been made between the local administration of the Commune and private industry management. Therefore, it is necessary that a program of mass education in the factories be carried out by considering the double aspect of personal safety and community emergency, and by evaluating the contribution that specialized personnel can give to the social organization of community survival.

Public Administration

Mass education should also take into account office personnel in private employment (such as banks, insurance companies, commercial enterprises, power, gas, telephone companies and other public utilities) or in public bureaucracies (employees in the Commune, in general hospitals, in social and administrative services, in post offices, etc.). Many of these services should be continued after the disaster, and competent personnel should be instructed to do so. The safety of buildings is the first subject to which the program of prevention should pay attention: this includes the upgrading of unsafe structures, the construction of safety exits where they are lacking, the establishment of emergency lights and emergency power. In the Commune of Rende many communal offices are not safe because they are located in ancient buildings which may not resist stronger shocks. The city hall is located in the ancient castle. A certain degree of risk can be taken, but other structures need reconstruction to remain public offices. During the last Irpinia earthquake some important office buildings--the Prefecture of Salerno and one local Army camp in the same city--had to be evacuated. The vulnerability of offices which may become important during the emergency needs to be ascertained.

As with industrial establishments, there are offices which may be evacuated and shut down for a few days without major economic consequences and there are other public services which need to work on a 24-hour schedule, such as medical services and administrative coordination. These services need, first of all, autonomous power supply and communications. They also need the presence of specialized personnel. This study found that there was no emergency planning in the hospital, and this needs to be established as soon as possible (in fact, this is the case with most local medical facilities). In addition, no instruction has been given to administrative personnel in the case of an earthquake; for some days, communal offices were shut down after the February 20 earthquake. It is necessary to create special procedures and regulations which, approved by city hall, become effective as soon as an

emergency is declared. By a set of ordinances, which are part of the local emergency plan, the Sindaco is given legal tools to recall public employees to their work, if it is considered a primary necessity. The same is more difficult to establish for private employment, where worker participation becomes more of a voluntary matter. Volunteerism must be prepared for and planned, especially when it involves some degree of personal risk. The program of mass education directed at public employment should emphasize the primary role of social and administrative services in responding to catastrophes. Expectations of the positive role civil servants can play in community protection should be emphasized.

Evacuation Sites

Throughout the educational program families and individuals are given the expectation they will find help and services in evacuation sites which are identified to them district by district. The function of these sites becomes extremely important and needs to be properly established. In the general emergency plan--of which mass education is but one part--the sites have a two-stage function. At the onset of the disaster, the evacuation sites are meeting points where families and officers from public services converge to find each other, to group and organize, to share first aid services. The site also represents a shelter in comparison to a built environment which has suddenly become dangerous. The sites are connected to each other by radio communication, each is served by emergency medical aid and ambulances. They collect, on the one hand, the weak and the disabled, the injured who need immediate help; they represent safety for women and children. On the other hand, equipment and active volunteer forces are supposed to converge on evacuation areas to organize and start rescue of victims in the surrounding districts. In the case of a minor disaster, where the number of injured is minimal, the evacuation sites have the basic passive function of sheltering. In a major disaster, it must become an alternative to the destroyed built environment, and must emerge as an active service and community center, as the number of volunteers increases and technical equipment is supplied. Evacuation sites, pre-established in the disaster plan, also become the focii for rescue, arriving from outside the disaster stricken area.

It is not the purpose of the educational program to elaborate all possible functions of evacuation sites, as many of these may remain latent in the case of a minor threat. The program simply states "know your site"; it divides and allocates the population to meeting points which can be safely reached without using transportation. Beyond emergency health services, tents and food supply, communication is another important function of the center. Immediate information, available to the site, will reduce insecurity and uncertainty about the future, and facilitate a realistic perception of the catastrophe in the disaster-stricken community.

Mass Education in the Context of the Emergency Program

Two viable alternatives were presented to the scientific committee which was requested to draft a mass educational program for seismic safety at the Commune of Rende. The first one, which had already been applied to other disaster stricken areas, was that of distributing to the population general literature about seismic risk, personal safety and first aid. This literature, once it was printed and given out, did not require any further commitment from the Commune or the University. The second alternative, feasible in a context of mutual esteem and cooperation, was that of attaching mass education to an integrated local emergency plan. Without excluding the aims of the general program mentioned above, mass education provided specific instruction about where to go, what to do, reference areas and institutions to be found in the context of everyday life. This second approach to the problem was intended to have the advantage of making people more interested in and attentive to the instructions which are given.

Mass education specific to seismic areas requires a greater effort on the part of the board which is required to study the problem and prepare plans, and on the part of the community based organizations which must fulfill the promises and achieve the services which people are told to expect. The program also needs continuity and maintenance. However, compared to the past, it represents a qualitative step forward which, hopefully, will be adopted by other collective safety programs.

FOOTNOTES

1. "Norme sul soccorso e l'assistenza alle popolazioni colpite da calamite--Protezione civile" Law No. 996, December 8, 1970. However, the norms for applications of these laws "Approvazione del regolamento di esecuzione della legge 8 dicembre 1970, n.996" have been recently passed on January 16 1981. This late application of the law shows the low interest by the government in civil protection, which was documented by newspapers after the last Irpinian earthquake.

2. I wish to thank those who have kindly cooperated in the establishment of this program: Senator Francesco Principe, who first approved the project, the Mayor of the Commune, Avv. Sandro Principe, Dr. Giovanni Perri, Chairman of the Seismic Safety Board, Dr. Lorenzo Chiappetta, Director of Rende's Social Center, Dr. Marino Sorriso of the IRPI Institute, Dr. Franco Chiappetta for data processing and Mr. Santino Fiorello for data input.

3. The actual date corresponded to Shrove Tuesday. This explains why 28% of the people were still awake.

4. According to a small sample preliminary survey in Montalto (N=120) all boys below 13 years of age remained asleep during the quake. This indicates the importance that they be awakened by other members of the family.

REFERENCES

Abe, Kitao. How to Survive in Emergencies: The Behavioral Science of Disaster. Tokyo: Japanese Association of Property Insurance, 1973.

Battisti, Francesco. "La Casa ed il Terremoto: Osservazioni derivate dall'esperienza di indagine sul campo compiuta dopo il terremoto del 20-2-80 nei Comuni di Rende e Montalto," conference paper presented to the Camera di Commercio di Cosenza, June 17, 1980.

Battisti, Francesco. "L'Educazione al Terremoto," Sapere, Vol. 84 (March 1981), pp. 48-54.

Battisti, Francesco. Social Behavior in the Earthquake: The Immediate Reaction: Results from the Earthquake of Cosenza (Italy) 2-20-1980. Rende, Italy: Department of Sociology and Political Science, University of Calabria, 1980.

Colonna, Vincenzo. "Rapporti tra terremoti e strutture geologica della Calabria," Il Politecnico, No. 10 (December 1980), pp. 10-14.

Disastro e Azione Umana, Bernardo Cattarinussi and Carlo Pelanda, eds. Milan, Italy: Franco Angeli, 1981.

National Governors' Association. Emergency Preparedness Project (1978). State Comprehensive Emergency Management Project, Final Report. Washington, D.C.: Civil Defense Preparedness Agency, May 1979.

Ohta, Hideaki. "Evacuating Characteristics of Tokyo Citizens" in Organizational and Community Responses to Disaster. Japan-United States Disaster Research Seminar. Columbus, Ohio: Disaster Research Center, Ohio State University, 1972.

Ohta, Hideaki. The Methods of Survival in an Earthquake. Tokyo: Tokyo Sports Newspaper Co., 1977.

Tokyo. Metropolitan Police Board of Tokyo. How to Behave in an Earthquake. Tokyo: Ohta Ward, Tokyo, n.d.

Turner, Ralph H., Joanne M. Nigg, Denise H. Paz and Barbara Shaw Young. Earthquake Threat: The Human Response in Southern California. Los Angeles, California: Institute for Social Science Research, University of California, 1979.

United States. Office of Science and Technology Policy. Working Group on Earthquake Hazard Reduction. Earthquake Hazards Reduction: Issues for an Implementation Plan. Washington, D.C.: Office of Science and Technology Policy, Executive Office of the President, 1978.

Valvo, Marino Sorriso. "Attivita Sismica ed Assetto Geomorfologico: Cause-effetto ed esaltazione locale," Il Politecnico, No. 10 (December 1980), pp. 23-27.