

300/6
309

"SCENARIO FOR A HOUSING IMPROVEMENT PROGRAM
IN DISASTER-PRONE AREAS"

Frederick C. Cuny
INTERTECT

Paper presented at a conference,
Disasters and the Small Dwelling

Oxford Polytechnic, Oxford, England
April 19 - 21, 1978

SCENARIO FOR A HOUSING IMPROVEMENT PROGRAM
IN DISASTER-PRONE AREAS

Frederick C. Cuny
INTERTECT

Introduction

Each year, disasters destroy or substantially damage hundreds of thousands of housing units in the developing countries. It is estimated that thousands of lives could be saved, and millions of dollars of property damage could be reduced, if the housing stock in the developing countries were of a better quality. Particularly in the earthquake- and cyclone-prone regions of the developing world, simple and inexpensive changes can be introduced which would vastly improve the performance of the structures in earthquakes and high winds.

The basic technology for improving the performance of structures is already known. What is lacking now is a backlog of experience in how to transfer this technology and how to introduce new housing methods into developing societies.

Until recently, most of the work in this field has focused on attempts to introduce new building components and systems, rather than on attempts to improve the existing housing types. Yet experience has shown that it is best to begin with the structures that people already have and to upgrade these units in terms of performance by introducing changes which can be made compatible with the normal building process, at a price which the residents can afford.

Within this context -- i.e., improving what exists -- INTERTECT began in 1977 to develop a scenario which could be utilized by governments and private voluntary organizations in order to improve the housing stock in disaster-prone areas. The following steps represent a model scenario, for use in developing a housing improvement program in a disaster-prone developing country, which is based on several fundamental assumptions:

1. That there are only three distinct situations in which an opportunity exists to change the housing stock: rapid urbanization; development of new settlements in rural areas; and post-disaster situations wherein large number of the housing stock have been depleted.

2. That housing changes and improvements will be slow and will require a substantial commitment in terms of time and money to effect.
3. That housing improvements must be introduced gradually, except in a post-disaster situation; and that the basic housing unit must appear substantially the same as the house which it replaces.
4. That all housing programs must be carried out in the broader context of the development of the society.
5. That the incidence of destruction can be substantially reduced by adequate pre-disaster planning.

Steps for Planning and Conducting a Housing Improvement Program

1. Identify High-Risk Areas

The first step is to determine which areas have the greatest potential for disaster, by looking at the disaster history of a particular country. Old records of past disasters should be sought; and disasters should be plotted on a large map showing the types and frequencies of the disasters, noting any patterns which emerge.

In the case of earthquakes, geological assessment of faulting patterns and recent ground-breaking activity is also required.

In the case of flooding, land-use studies along flood plains and in the upper reaches of a stream are necessary to determine the flood potential, both now and in the future.

2. Identify Areas with Concentrations of Vulnerable Structures

In order to determine vulnerability, both structural and site analyses must be made.

- A. Structural Analysis of Existing Housing Types: Obviously, certain types of structures are more susceptible to damage than others, and structures which are vulnerable in one type of disaster may be ideal for encountering another. For example, heavy adobe structures are susceptible to destruction

in strong tremors in earthquake-prone regions, yet they are ideally constructed to withstand high winds in cyclone-prone regions.

Structural analysis should include:

- 1) a study of structural types' historical vulnerability to the type of disaster that might strike;
- 2) a study of the quality of the materials which are used in building a typical structure (it should be remembered that most houses fail not because of the quality of the materials, but because of the way in which they are used);
- 3) examination of the quality of the workmanship typically used in building a house (the performance of many structures could be enhanced by simple, improved masonry or carpentry techniques);
- 4) Taking note of features of traditional houses which might cause excessive loading in earthquakes or windstorms (e.g., the way in which rooms are added to a house may cause undue stress on interior walls, or may change the center of gravity. Porches and large roof overhangs are particular problems to note in high wind areas);
- 5) examination of the suitability of a structure to its environment. (With the increased mobility of populations today, housing skills and techniques are often brought to one area from another which is climatically different. For instance, adobe-making technology which is usually found in temperate, dry areas may be introduced to lower, wetter areas where the adobes may be more susceptible to damage from erosion at the base, or where the soils may not enable a good adobe block to be produced. Housing which has been transferred in this manner often makes the occupants more susceptible to the same type of disaster than they would have been in the original location.)

- B. **Site Analysis:** In determining vulnerability, it is of the utmost importance to ensure that the site (i.e., the land on which the house or settlement is built) is safe. Steep hillsides with unstable slopes, areas which have eroded, flood plains, etc., are all poor sites; and it will do little good to improve the housing stock in an area where it will end up at the bottom of a ravine as soon as the earth begins to shake.

There are also other site limitations, especially concerning the amount of room available on which to build. In urbanized areas, many subdivisions which have been granted to squatter settlements preclude, by their very layout, adequate room to construct safe housing. In one country in Latin America, for example, the local government provides 20' x 80' lots for the construction of squatter housing. On lots this size, the minimum separation between houses -- one meter recommended for earthquake areas -- is not feasible, as the usable interior space would be reduced to a width of approximately fifteen feet, once the exterior walls are built.

3. Determine Housing Demand

In order to introduce change in housing, there must be an existing demand for new housing. People simply will not give up an existing structure, which is already built and paid for, just to move into a new house which offers better protection against a disaster which may or may not come during their lifetime. This cannot be emphasized too often: a housing program that is attempted in an area where there is no demand for housing is doomed to fail even before it begins.

Indicators of housing demand include:

- A. rapid urbanization;
- B. stable rural areas with strong agricultural economies;
- C. high percentage of young people, especially those between 18 and 30 years of age;
- D. areas with recent history of disasters and high disaster frequency.

4. Determine Receptivity to New Ideas

There must be receptivity on the part of the target population in order to introduce new ideas. It is often very difficult to gauge receptivity, as most people are very polite and will encourage outsiders to try new things within the community. However, traditions are always strong, and there may be a great deal of skepticism about whether a new idea will work. Thus, it is imperative that an accurate assessment of the potential for introducing a new technology be made. Some indicators of receptivity are:

- A. other evidence of "modernization" such as dress (do people still dress in traditional clothes, or are newer fabrics and styles prevalent?); household belongings; degree of literacy;
- B. degree of contact with other communities;
- C. past experience of other organizations attempting to introduce change in the area.

5. Conduct a Sociological Profile of the Community

At this point in the process, a number of possible communities have been identified, and the process of selecting the actual community for the first pilot project begins. Sociologists and/or anthropologists should prepare a socio-economic profile of the community, including the following three vital factors:

- A. Determination of the coping mechanisms: In each society, a variety of internal coping mechanisms exist which serve to help individuals and families through difficult periods, often providing vehicles for collective response both in disasters and also in normal life situations. Identification of these coping mechanisms, and determination of how to relate outside assistance to these built-in systems, are of the highest priority in understanding a community and how it functions. All outside assistance must be provided in such a way as to encourage a collective response utilizing these mechanisms.
- B. Determination of the social and cultural obstacles to the success of the program: The vast majority of housing programs

fail because the obstacles to success have not been identified in the planning phase. Thus, no provision is made in the project to try to overcome these obstacles.

- C. Determination of the target group: In housing programs, much effort is wasted in trying to convince people who are not essential to the construction process that changes should be made. Much time and effort can be saved by identifying the key actors in the process -- the decision-makers -- and the incentives which are necessary to encourage the key actors to accept the new technology. For instance, if carpenters or masons normally build the houses in the community, then they should be the target group for much of the housing education effort. If they believe in the changes, then they will be able to encourage those for whom they will build to accept the new ideas.

6. Select a Community/Site

Once the information about the context and constraints on a project is understood, a specific community can be chosen. In the final site selection process, two factors are primary:

- A. the determination of the community's desire to participate;
- B. the determination of which coping mechanism(s) to work through/with.

These activities fall into the realm of community organization. These decisions are often taken for granted by agencies, and it may be very difficult to determine the real desire of a community to participate in such a program. Failure to devote sufficient time to these two functions, however, invites further problems which develop at later stages of the project.

7. Study the Normal Building Process

Each society has its own normal process for the building of housing. Any improvements to the housing must be based on a clear understanding of that process. Contributions must be compatible with local resources and technical

capabilities. Factors which must be understood in the normal building process include:

- A. Who participates? For example, who builds the houses? Who participates in the actual construction? Who makes the decisions and at what time?
- B. What skills are available? For example, what skills exist in the building vernacular: basic, intermediate or advanced? carpentry or masonry skills?
- C. Are all the required materials available? If so, are they properly cured?
- D. How are houses normally financed? Who participates and what are the financial arrangements?
- E. Is there a normal building season during which construction should be scheduled? In every society, there is a certain period when excess time, capital and materials are all available concurrently. Timing is one of the most important factors in planning a housing program. Adobe cannot be made in the rainy season; wood or bamboo cannot be cut except at the full moon; and houses cannot be built unless it is the right time.
- F. What is the comprehension level of the target group? Considerations which must be taken into account include:
 - 1) the ability to understand the new concepts;
 - 2) the ability to understand the training aids being used;
 - 3) the number of new concepts that can be accepted and understood at one time by persons in that society;
 - 4) the number of times that it is necessary to repeat an operation in order for the average person in the target group to comprehend it.

8. Develop the Training Aids and Promotional Materials

Once an understanding is gained of the normal building process and the comprehension level of the target group, it is possible to begin development of the training aids and promotional materials for the program. The first step in this activity is to obtain a variety of visual aids and to conduct a brief field test to determine whether people understand the message that the aids attempt to illustrate. In some societies, printed materials work well. In others, motion pictures or filmstrips are more successful. In still others, it is necessary to use a broad combination of materials, each reinforcing the others, to get the idea across. The best way of demonstrating something, of course, is to show the actual, finished product. But simple training aids can be effective if they are properly developed.

It is equally as important to devote attention to the development of promotional materials which will encourage the population to accept the new ideas. One of the greatest weaknesses in recent housing education programs has been the failure to promote acceptance of the new housing ideas within the general population. It was mentioned earlier that a target population should be identified, and that efforts should be made to encourage that group to adopt the new ideas. Yet this does not mean that the population at large should not be encouraged to accept the new techniques. It is necessary to create a demand for the new techniques, although not necessarily an awareness of all the precise or technical reasons why these innovations are better.

9. Conduct a Pilot Project

When the above steps have been completed (including the preparation of training aids and promotional materials), and when the materials are ready and the building season begins, that is the time to conduct the pilot project. There are seven basic steps involved in the carrying out of construction activities:

- A. Select the recipients: Working through the coping mechanism(s) that have been chosen, select the recipients for the housing units. There are two considerations at this point. First, it is necessary to build more than one unit; the more you build, the better. If only one unit is constructed, and if the occupants perceive the house as being radically different, they will

feel that they are "freaks" in the community and the house will be unpopular from the beginning. In essence, there is safety in numbers. Second, note that houses should be provided to the people who will occupy them.

- B. Select the work group: Again working through the coping mechanism(s), select the people who will be building the structure. These are the people with whom you want to leave the new skills.
- C. Train the team: Training should take as much time as is necessary; one class in "how to build a house" is usually not sufficient. Ideally, this process should be a part of the promotional activities, which culminate in a greater understanding on the part of all the participants. The key members are then singled out and given additional training before actual construction begins.
- D. Build the units: There are several things to watch for during construction. First, do not do anything which is not in accord with the normal building process; i.e., do not do something which would normally not be done. Use the same supervisory chain of command as is normally used. Use the same work schedule, the same tools, and as many of the existing techniques as is possible. When you reach a stage in the construction where a new technique is to be incorporated, sandwich it between operations or steps which are normally a part of the process. Be sure to pay attention to details as the house goes up. It will be very damaging to the program if the first few attempts at introducing the new technology are botched because representatives of the project have not planned precisely for the introduction of the new methods or techniques.
- E. Inaugurate the house: If the owner agrees, a party should be held to commemorate the finishing of each house. At this party, neighbors are invited to see the house and to examine the innovations which have been incorporated. (In some societies, such an inauguration would not be proper; therefore, this activity should only be undertaken if the owner agrees.)

- F. Furnish the house: Once construction is completed, the furnishings and fixtures should be moved in as quickly as possible, so that people understand that it is a house and not just a shell. The more comfortable a house looks, the more acceptable it will be.
- G. Evaluate and revise: While this is listed as the final step in the project, it is, of course, an activity which should be on-going throughout the process. As each of the model houses is completed, all the participants should stop and conduct a thorough self-evaluation of the project. Most importantly, it is vital to get the reactions of the occupants first; for if you have not satisfied their needs, then the program will require substantial revision.

Common Problems in Housing Improvement Programs

A number of common problems have been noted in examining past experience with housing education and improvement programs. They include:

1. Failure to select an area where there is a real demand for new housing.
2. Failure to conduct the project in an area where new ideas are more readily accepted.
3. Failure to work through existing social and economic institutions relating to housing.
4. Failure to determine the cultural and social constraints/obstacles for a housing project of this type.
5. Failure to deliver housing improvements at a price which homeowners can afford.
6. Failure to understand the normal building process.
7. Failure to understand the importance of timing in construction activities.
8. Failure to accurately determine the comprehension level of the target group.

9. Placing an over-reliance on the use of training aids as opposed to actual model structures.
10. Construction of buildings other than houses, to serve as model houses (e.g. schools, community meeting halls, offices, warehouses, etc. As far as local people are concerned, a house is not a house until it is occupied. Housing units which are built but not furnished also pose an identity problem.).
11. Failure to use local builders.
12. Use of architects or engineers to develop designs and to supervise construction. (If people see architects or engineers designing each model house and going through the steps that are normally conducted for building a house in an industrialized society, they will become convinced that the technology being advocated is either beyond their comprehension or beyond their ability to afford.)
13. Taking short-cuts. (Often, in an attempt to speed construction, certain short-cuts are taken - for example, the use of machine tools to replace hand labor; the importation of materials that are not indigenous to the area or are not in season; and/or the use of components that would not normally be used in building a house in the target community.)
14. Building out of the normal building season.
15. Failure to provide enough space in the model houses. (Acceptability of new housing styles is often predicated more upon the amount of living space than on any other single factor.)
16. Failure to follow up and thoroughly evaluate the housing program.
17. Building in an overly receptive atmosphere. (A new process or building system which is tried out successfully in a rapidly urbanizing area may have little or no chance of being accepted in a rural area. The pilot project for a housing improvement program must be carried out in the society in which the potential end-user lives.)