

Strategic planning for post-disaster temporary housing

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Temporary housing programmes suffer from excessively high cost, late delivery, poor location, improper unit designs and other inherent issues. These issues can be attributed in part to a prevalence of ad hoc tactical planning, rather than pre-disaster strategic planning, for reconstruction undertaken by governments and non-governmental organisations (NGOs) in the chaotic post-disaster environment. An analysis of the process and outcomes from six case studies of temporary housing programmes after disasters in Turkey and Colombia in 1999, Japan in 1995, Greece in 1986, Mexico in 1985, and Italy in 1976 yields information about the extent to which strategic planning is employed in temporary housing programmes, as well as common issues in temporary housing. Based on an understanding of these common issues, this paper proposes a framework for strategic planning for temporary housing that identifies organisational designs and available resources for temporary housing before the disaster, but allows modifications to fit the specific post-disaster situation.

Keywords: post-disaster reconstruction, strategic planning, temporary housing

Introduction

Many communities now have pre-disaster preparedness plans for the emergency phase of post-disaster housing. However, for the reconstruction phase, even though organisations may have some pre-established recovery plans, these tend towards ad hoc tactical decision making in planning for housing reconstruction. This is even more true for temporary housing—where decisions are made quickly within days of the disaster, and actions are initiated to house people in the interim before permanent reconstruction can be completed. While it is not possible for organisations to account for all the variables in a temporary housing programme before a disaster occurs, strategic planning—which identifies responsible organisations, and links stakeholders and the resources available for temporary housing—can increase the likelihood of success of a programme, in the knowledge that operational decisions will have to be made quickly after the disaster.

Past research has found that temporary housing programmes suffer from recurrent issues such as cultural or climatic inappropriateness, poor location, social problems inside the camps, and delays linked to the procurement of shelters, finding sites, and a lack of organisational capacities (Bolin and Stanford, 1991; UNDR0, 1982; Davis 1977). UNDR0 (1982) states that accelerated reconstruction of permanent housing is preferable to the use of temporary housing. While this may be true, temporary housing programmes continue to be instigated after every major disaster because affected

families are in need of a place to live and it can take many months, or even years, to build adequate stocks of disaster-resistant housing. This research proceeds from the perspective that temporary housing appears to be a necessary step in reconstruction, and it is therefore necessary to determine how to improve its application. Using empirical evidence taken from case studies of temporary housing projects after earthquakes in Turkey, Colombia, Japan, Mexico, Italy and Greece in the past 30 years, this research defines the major issues in temporary housing, and proposes a model for the strategic planning of temporary housing.

As is stated above, temporary housing is erected after major disasters all over the world and from this certain macro-patterns of planning for temporary housing can be deduced. These patterns, however, must be understood in the light of the fact that housing in any country is a product of its political economy and national context. While this study draws out similarities in the forms and functions of temporary housing across the cases presented, there are strong differences in social and cultural customs across countries, not to mention differences in abilities to pay for housing, financing systems, family composition, formal versus informal means of housing procurement, and the culture of building and participation in the housing process, among other aspects. The purpose of this study is to understand, in a general sense, the macro-issues that face the provision of temporary housing to enable them to be integrated into the planning process.

What is temporary housing?

During and after a disaster in which people's homes are damaged or destroyed, families must seek alternative housing until a permanent housing solution can be found. Temporary housing can be considered both a *stage in the process of rehousing* after a disaster, and a *physical type of housing stock* used by families during the post-disaster period.

Quarantelli (1995) offers a definition of the four distinct stages of housing that may be employed after a disaster. He makes the distinction between *sheltering* and *housing* in the post-disaster scenario in which *sheltering* denotes the activity of staying in a place during the height and immediate aftermath of a disaster, where regular daily routines are suspended, and *housing* denotes the return to normal daily activities such as work, school, cooking at home, shopping, and so on. Based on this distinction, the four stages are:

1. *Emergency shelter*, which may take the form of a public shelter, refuge at a friend's house, or shelter under a plastic sheet and is generally employed for one night to a couple of days during the emergency. Because the stay is so short it does not usually imply the need for extensive preparation of food or prolonged medical services.
2. *Temporary shelter*, which may be a tent or a public mass shelter used for a few weeks following the disaster, and is also accompanied by the provision of food, water and medical treatment.
3. *Temporary housing*, which is the return to the daily activities of home life and the possible return to work and school, although families will be living in a temporary

residence, hopefully awaiting some permanent solution. Temporary housing can take the form of a rented apartment, a prefabricated home or a small shack, depending on the context.

4. *Permanent housing* is the return to the former home after its reconstruction, or re-settlement in a new home where the family can plan to live on a permanent basis.

Those whose homes are affected by a disaster may or may not pass through all these stages, and some stages may be employed simultaneously for different sectors of the affected population. Temporary housing, no matter what form it takes, is the process by which families can begin to recover and reintegrate a sense normalcy into their lives. During the time a family stays in temporary housing, it is desirable that family members should also have the chance to plan for their future living arrangements, that is, permanent housing, whether this means rebuilding, relocating, accessing government programmes or submitting insurance claims. In this respect, a programme for temporary housing must not only include a roof but also offer aspects that make it possible to return to normal life, such as housing in a location that has reasonably convenient access to services and jobs or an affordable transport system, proximity to the former dwelling if appropriate or desired, maintenance of neighbourhood ties and support systems, and guidance on the procedures and options for the permanent housing process.

Strategic planning for temporary housing

In temporary housing programmes it is unfortunately often the case that ad hoc tactical planning occurs after a disaster in the absence of any strategic planning beforehand. Specifically, this means that organisations are making decisions that respond to the immediate situation at hand—the need to get people housed as quickly as possible after the disaster—and this may be at the expense of taking proper account of longer term objectives such as the quality of life that temporary housing provides or giving an appropriate level of priority to permanent reconstruction. For temporary housing specifically, it is necessary to identify an organisational strategy and resources for locating or building temporary housing.

In a similar way to any project in the building industry, temporary housing is generally implemented by a temporary multi-organisation—a group of organisations with different mandates and objectives that comes together to complete the project or programme and then dissipates once it is finished (Davidson, 1988). Various government ministries, aid agencies, foreign and local non-governmental organisations (NGOs), private contractors, private manufacturers, landowners and community leaders may all be involved in a temporary housing project. The combination of the temporary multi-organisation, the chaotic—and sometimes corrupt—post-disaster situation, and the prevalence of ad hoc tactical planning means that coordination between organisations is almost inevitably less than optimal in temporary housing projects.

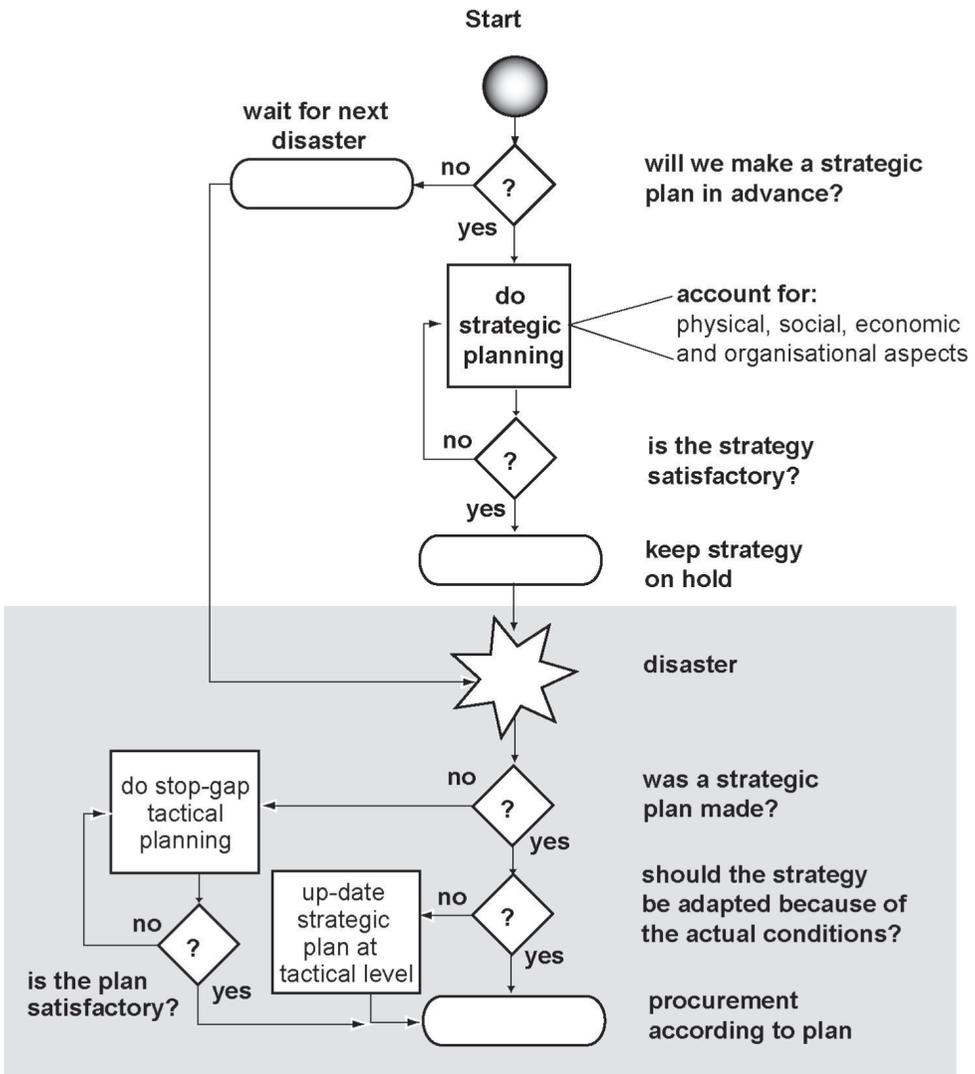
Having temporary housing quickly available is of primary importance but the successful use of temporary housing must also satisfy other objectives—such as the families'

social needs, and the long-term outcomes of the units and the sites—all viewed in the context of the overall reconstruction programme.

Since the actual need for temporary housing in the event of a disaster cannot be determined beforehand, the public resources required for sheltering cannot be locked into specific pre-planned programmes. Comerio (1998) also makes this point, suggesting that it is necessary to have a variety of contingency sheltering programmes in place that can be activated in stages, depending on the types of damage and the alternative housing available in the private market at the time and place of the disaster.

Figure 1 shows that, ideally in a sequence of decision making, planning actions for post-disaster reconstruction should begin before the disaster, although, as has frequently

Figure 1 The decision-making sequence for strategic planning or tactical planning for post-disaster reconstruction



been the case, the ‘wait for next disaster’ paradigm will usually prevail—consequently delaying all planning until after the disaster. However, even if the decision is made to plan in advance, the strategic plan will require updating at the tactical level in order to adapt it to the specific needs caused by the disaster (number of houses destroyed, weather conditions at the time, the political situation or the state of the economy, etc.). If no pre-disaster strategic planning takes place then stopgap tactical planning will inevitably happen after the disaster. In the chaos following the disaster, decisions have to be made quickly and often on the basis of incomplete information.

Research objectives and questions

The general objectives of this research are:

- To explore the use of strategic planning in past temporary housing projects;
- To examine, in a comparative overview, temporary housing projects in order to draw out the main difficulties of the projects;
- To define how difficulties may be overcome within a strategic planning framework.

To complete these goals, this research asks the following corresponding questions:

1. How has strategic planning been implemented in past temporary housing projects?
2. Based on an understanding of project organisation, process and outcomes, what kinds of issues arise in temporary housing projects?
3. Based on the issues identified above, what needs to be addressed in a strategic planning framework for temporary housing?

Methods

General method

Using a qualitative approach, this research employs a holistic multiple case study design based on the Case Study Method diagram put forward by Yin (1994, p. 49). Empirical evidence from each of the case studies of temporary housing programmes after disasters is individually analysed at the holistic level of the programme. Cross-case conclusions are drawn from the individual case reports. The cases provide both literal replications, that is, they identify similar patterns, and theoretical replications—they identify contrasting patterns but for predictable reasons. These findings are then used to develop ideas for the strategic planning of temporary housing.

Case study selection

The selection of the case studies is based on the following criteria:

- *The cases are earthquake disasters.* The need for temporary housing exists after many types of disaster, including floods and hurricanes, but one type of disaster was chosen for the sake of consistency—the consequences of earthquake disasters;

- *The disaster-affected areas are urbanised areas.* Temporary housing may be necessary in rural areas but the criteria may be different and therefore involve a different set of issues and planning considerations;
- *The cases involved the construction of temporary housing units.* Families can be temporarily housed in existing apartments or units or with extended families but all the cases chosen for this research involved the *construction* of temporary housing units; and
- *The cases provide evidence permitting literal or theoretical replications* of patterns of strategic planning and various issues in temporary housing.

Based on these criteria, six case studies of temporary housing were chosen for the research conducted for this paper. The primary case study, of the 1999 Marmara earthquakes in Turkey, is based on empirical evidence collected by the author during field visits to Turkey between June 2000 and July 2004. The information was collected from numerous interviews with parties concerned with temporary housing projects, such as residents of temporary housing, local citizens, local officials, researchers and staff at the Ministry of Public Works, as well as from published reports. Data for the other case studies—Armenia, Colombia, in 1999; Kobe, Japan, in 1995; Kalamata City, Greece, in 1986; Mexico City in 1985; and Friuli, Italy, in 1976—was gathered from accounts of temporary housing programmes previously published by other authors, and has been re-analysed in the light of the research questions posed in this paper.

Case study treatment

The cases are clearly much more complex than they are presented in these short case studies, especially in terms of the social, political and economic conditions in which the various temporary housing programme were situated. An effort has been made

Table 1 Synopsis of the earthquake, damage and the homeless situation for each case study

Earthquake	Turkey	Colombia	Japan	Greece	Mexico	Italy
Date	17 Aug. and 12 Nov. 1999	25 Jan. 1999	17 Jan. 1995	13 Sep. and 15 Sep. 1986	17 Sep. 1985	6 May 1976 and 15 Sep. 1976
Magnitude	7.4; 7.2	6.0	7.2	6.2; 5.4	8.1	6.4; 6.1
Housing units uninhabitable	93,618	6,000	247,000	2,870	76,000– 180,000 ¹	32,000
Homeless	300,000+	Not available	316,000	Not available	30,000– 200,000 ²	70,000
Total population of affected district/city/region	2.3 million in region ³	3 million in region	3.5 million in region	42,000 in city	3 million in district; 24 million in Mexico City	500,000 in region
Proportion of homeless	13%	Not available	9%	Not available	1%–6.6% in district	14%

Table 2 Synopsis of the temporary housing project for each case study

Earthquake	Turkey	Colombia	Japan	Greece	Mexico	Italy
Number of units built	40,621	6,000	48,300	2,870	22,000	21,000
Time for construction activities	8 months	Varied from settlement to settlement	7 months	11 months	Not available	8 months
Type	Mostly prefabs	Wood/corrugated iron	Prefabs	Prefabs	Prefabs/corrugated iron	Prefabs
Size	30m ²	24m ²	20–30m ²	~25m ²	20m ²	~30m ²
Average family size	4.6	4.6	2.8	3	10 ⁴	not available
Cost (USD)	5,000	Not available	28,000	Not available	Not available	5,000
Lead organisation	Ministry of Public Works	National University of Bogotá	Regional (prefecture) government	Municipality	National Reconstruction Commission	Regional and local administration
Strategic planning	For procurement	None	For procurement	None	None	None

to bring out the essential elements of the temporary housing programmes and to present the data in a unified form for comparative purposes. The references provided in the text offer the reader opportunities to obtain more contextual information. Each case report describes:

- the disaster and its context (summarised in Table 1);
- the temporary housing programme and the overall reconstruction, including the organisations involved and the project process (summarised in Table 2); and
- the outcomes of the temporary housing projects.

Earthquakes in the Marmara and Bolu regions of Turkey, 1999

The disaster and its context

In the latter half of 1999 two large earthquakes struck the eastern Marmara and Bolu regions of Turkey, to the east of Istanbul, killing over 18,000 people and leaving over 300,000 people homeless. Especially in the first earthquake, the affected areas were heavily populated and fast-growing industrial towns. The widespread destruction and high death tolls were largely a result of shoddy building construction in the 15 years before the earthquake, when a lack of supervision and accountability led to the improper

use of materials and construction techniques in five- to eight-storey reinforced concrete apartment buildings.

Temporary housing and overall reconstruction

To house the vast numbers of people made homeless by the earthquakes, the government of Turkey responded with a three-step reconstruction strategy: *tents* offered by the military and Kizilay (the Red Crescent); *prefabricated temporary housing* built by the government and NGOs, and *permanent housing* built by the government using World Bank credits.

For the temporary housing phase, affected families were given either rent subsidies from the government or the free use of a prefabricated temporary housing unit. A total of 40,621 prefabricated temporary housing units were built by the government and NGOs between December 1999 and June 2000. These were located throughout the affected region in 136 settlements and had an occupancy rate of 97.5 per cent (Auditor Chief of the Turkish Republic, 2003). The overall programme was managed by the Ministry of Public Works and Settlements (MPWS), a body with a long history of providing temporary housing after disasters in Turkey. The international NGOs involved in building temporary housing cooperated with local NGOs and municipalities to undertake projects in the region with local support. Various governmental bodies, and in a few cases private owners, offered available land for the temporary settlements, and the relevant government directorates installed infrastructure such as transport links and electricity and water supplies.

The decision to build temporary housing was based in part on the fact that local manufacturing capacity was sufficient to supply the total number of units in a few months. The MPWS set the price of a 30m² prefabricated duplex unit at USD 3,300, giving a total price per unit inclusive of infrastructure costs of around USD 5,000 (Auditor Chief of the Turkish Republic, 2003). The temporary housing units were procured from existing Turkish private sector manufacturers of prefabricated buildings using a tender process. NGOs also bought units from Turkish manufacturers, although in some cases they imported units from their home countries.

Choosing the locations for the temporary housing took longer than expected and slowed the construction. Since no areas had been pre-identified, it took time to find adequate numbers of plots. Contracts had to be negotiated with private landowners for the rental of land not owned by the government.

Outcomes of the project

Although some temporary housing settlements were built on small parcels of land inside the cities, the majority were located in large settlements of up to 2,000 units on the outskirts and resembled suburban-style developments complete with access roads, bus routes, refuse disposal and postal services, markets, schools, clinics and daycare centres—in other words, all the services necessary for a functioning community.

Those who had been homeowners before the earthquakes were rehoused in permanent reconstructed dwellings about three years later and therefore left the temporary

houses in 2002. However, tenants and new migrants remained in the temporary units until they were eventually forced out in 2003–05 by the government cutting off all services and dismantling the settlements. Many of the sites still contain residual infrastructure and foundations.

Earthquake in the Armenia coffee growing region, Colombia, 1999

The disaster and its context

An earthquake in the east region of central Colombia on 25 January 1999 left more than 800 people dead and over 6,000 houses damaged or destroyed in the cities of Armenia and Pereira and the surrounding coffee-growing areas.

Temporary housing and overall reconstruction

According to Gonzalo Lizarralde, who conducted field research in Colombia in 2002 (reported in Johnson, Lizarralde and Davidson, 2006), the government set up a new body shortly after the disaster, FOREC (Fondo para la reconstrucción física y social del eje cafetero), to manage reconstruction resources and outsource projects. FOREC selected 32 NGOs to develop different reconstruction projects throughout the region. Temporary housing was not included as one of FOREC's projects and there was a proliferation of spontaneous illegal settlements after the disaster as households met their need for temporary housing through self-help.

It was not until one year after the disaster that FOREC engaged the National University of Bogotá (NUB) and the Centre for Disaster Prevention to manage the temporary housing phase. The NUB was given the task of organising and consolidating illegally built spontaneous temporary housing and building new temporary housing units on vacant plots in Armenia. For both the spontaneous and new settlements the NUB spent time and resources negotiating contracts to rent land—either from private landowners or, in the case of publicly held land, from the government. It was agreed that all the parcels of land, some of which were community playgrounds, would be returned to its original owner, unoccupied and cleared of all debris, within three years.

In total 6,000 temporary housing units were managed by the NUB in 107 spontaneous or planned settlements of 15–150 units. Most of the planned units were extremely basic wooden structures of 24m² with a mono-pitch corrugated iron roof, one door, one small window and an electricity supply. Most of the buildings were constructed in groups of four units and the lack of cross-ventilation coupled with the corrugated iron roofs made them very hot inside. Communal kitchens and washrooms, which serviced several families, were located outside the units. Those housed provided free labour for the construction (and deconstruction) of the units and infrastructure (roads, drainage, septic tanks and electricity supply), although private contractors and sub-contractors oversaw their work.

Outcomes of the project

As part of the temporary housing programme, NUB worked with the families to make certain that they had plans for permanent housing and helped them to apply for government loans and subsidies. Despite NUB's efforts to ensure that families had permanent housing by the end of the temporary housing programme and could therefore vacate the temporary housing after the three years, and despite the very rudimentary conditions in the units, 21 of the temporary housing settlements remained occupied over the long-term. These settlements quickly became crime-ridden communities operating outside the law and occupied by new migrants and those that could not qualify for permanent housing.

Great Hanshin earthquake in Kobe, Japan, 1995

The disaster and its context

On 17 January 1995 a large earthquake affected Kobe City, a port located in the Hyogo prefecture, causing levels of damage then unprecedented in a modern city. Although there was extensive port and infrastructure damage, housing represented over 95 per cent of the total building damage and 50 per cent of the total value of the damage. It was estimated that 400,000 housing units in 192,000 residential buildings were damaged. Some modern concrete housing suffered damage, but most of the damage to housing was concentrated in the densely populated city centre wards where vulnerable older wooden homes had been built with heavy tile roofs made for storm protection, and using post and beam structures and mud walls with little lateral bracing. The demographic composition of the affected areas was the more vulnerable sector of society: the elderly, students, the working class and the poor (Comerio, 1998).

Temporary housing and overall reconstruction

In the months following the earthquake the displaced lived in temporary shelter in schools, parks and public buildings (Comerio, 1998). Temporary housing was provided according to Japan's Disaster Relief Law. The tasks of building and sourcing temporary housing were assigned to the governor of the prefecture and financed by the national government. The governor was able to apply an existing strategy to the organisation of temporary housing, the design of units, calculating projected costs, putting a supply chain in place and profiling beneficiaries (Tomioka, 1997). Flexibility in this strategy allowed for changes in numbers, supplies and organisation to take account of the specificities of the Kobe situation.

In total 48,300 temporary housing units were built by the prefecture, housing 100,000 people. It was originally planned to build all the settlements in two months, but it took seven months to complete all the settlements and close the temporary shelters. The need for such a huge amount of prefabricated building materials presented a challenge for the Japanese market. Some units were therefore imported from international sources and others were built using non-prefabricated products (Maki et al.,

1995). The houses were 20–30m² and of two types: one room plus kitchen and two room plus kitchen. Settlements were designed using a communal arrangement for elderly residents who required care. The cost of a 29m² unit was USD 28,527.⁵ It was originally planned to vary the size of the units to offer larger dwellings for larger families, but later agreed that only two types would be offered in order to save construction time (Tomioka, 1997).

Finding locations for the temporary housing was particularly challenging. The temporary housing was set up in parks and schoolyards inside the city, wherever possible, but 69 per cent of the houses were located in the suburbs or on Awajishima island, sometimes two hours from the city centre by bus or train. This meant that many people were relocated far from medical and shopping facilities. Comerio (1998) describes the settlements as resembling refugee detention centres.

Priority placement in temporary housing went to the elderly, the disabled and single parents. These groups accounted for 70 per cent of the total population in the settlements. In many instances people were separated from extended family and services in order to be housed. Cases of depression and suicide among the temporarily housed population were attributed to loneliness linked to such separation (Maki et al., 1995).

Outcomes of the project

Japanese regulations usually specify that temporary housing is occupied for two years after a disaster, but in this case the temporary housing programme was extended to three years in recognition of the size of the demand (Tomioka, 1997). Three years after the earthquake, 45 per cent of the temporary houses were still occupied because of deficiencies in the supply of affordable permanent housing (Hirayama, 2000).

The temporary housing programme in Japan was blamed for subsequent social and economic polarisation (Hirayama, 2000). To qualify for temporary housing a family had to be living in one of the shelters. Similarly, to be considered for government permanent rehousing, a family had to be living in temporary housing. All other households were excluded from public programmes. The reconstruction of permanent housing followed a dualist model where low-income households were rehoused together and better-off households encouraged to purchase their own housing from the private sector house-purchase or rental markets.

Earthquakes in Kalamata City, Greece, 1986

The disaster and its context

Kalamata City, population 41 911, is a small manufacturing and port city that sustained heavy damage or collapse to 44 per cent of its buildings after earthquakes on 13 September 1986 and 15 September 1986, which measured 6.2 and 5.4 on the Richter scale, respectively.

Temporary housing and overall reconstruction

Miranda Dandoulaki (1992) in *Disasters and the Small Dwelling* reports that, because of the scale of homelessness and the threat of aftershocks, tents were distributed to the whole population. The City Council decided a few weeks later to build temporary housing units to house people for the coming winter. It was estimated that 2,870 housing units were needed to meet the demand from those whose homes were unsafe or uninhabitable.

Inadequacies in the existing legislation for emergency situations hindered coordination and delayed the identification of suitable land for temporary housing. This meant that it took six months to complete the temporary housing instead of the expected four months. The Greek Ministry of Public Works completed the plans for the layout of sites and site preparation was completed in a collaborative effort by the Ministry of Public Works, the municipality and private contractors. Time pressure and the lack of experience of the parties involved meant that many mistakes were made, especially with regard to the drainage systems which had to be repaired once the sites were inhabited. Greek suppliers were unable to meet the demand for prefabricated units so contracts were awarded to international suppliers that both supplied and constructed the units on-site. The municipality was responsible for allocating the units and managing the sites.

After the units had been allocated there were many complaints about the lack of services and facilities, such as telephones, postal services, refuse collection, schools, nurseries and community centres, in the settlements. Families found it difficult to access the city or shops from the sites since many were located outside town. Leaking units, faulty electrical systems and bad foundations were common complaints among the residents and the municipality had to spend significant amounts to upgrade the units and provide amenities in the settlements.

Outcomes of the project

On the second anniversary of the earthquakes the Mayor of Kalamata stated that 'the existence of prefabricated units is the most severe political and social problem of the city'. A deadline of the end of 1989 was set for the units to be emptied. Even though permanent housing had already been constructed by then and families had moved into it, the temporary housing was still being rented by households unable to afford post-earthquake rent increases in the permanent housing market, or as storage or second homes for those in permanent housing. Some incentives were given by the municipality to entice people to leave the prefabricated units but this process proved to be lengthy, arduous and politically unpopular.

In addition to these social and political problems, there were technical problems with dismantling the units. It was originally thought that the units could be stored for future use, but most of the units needed repair and the difficulty and expense of finding spare parts for the imported designs, not to mention the size of storage space required, made this unrealistic.

Earthquake in Mexico City, 1985

The disaster and its context

On 19 September 1985 an extremely powerful earthquake caused severe damage to modern constructions and slum dwellings in the historic centre of Mexico City. Housing damage was mostly concentrated in a few high-rise public housing developments built as part of a government low-cost housing programme in the 1960s, and in many dilapidated low-rise tenement buildings known as *viviendas*. Working- and middle-class families had occupied the *viviendas* for 20–30 years, paying very low-rents for overcrowded (an average of 10 people in 23m²) but well located and affordable properties (Comerio, 1998).

Temporary housing and overall reconstruction

Soon after the earthquake a new body, the National Reconstruction Commission (NRC), was formed and given a two-year mandate to complete all reconstruction work. This body was given considerable political power and a large funding base from the World Bank. According to Dynes, Quarentelli and Wenger (1990), the NRC was formed to assist the homeless and thereby avoid a potentially explosive political situation. The NRC oversaw four different reconstruction programmes, which built or repaired 88,000 permanent housing units, and a temporary housing programme was also included. Nonetheless, countless families were left out of the formal programmes and forced to rely on community groups and self-help.

The temporary housing programme consisted of rental assistance to 20,000 families as well as the construction of 400 provisional camps of prefabricated units, which housed 22,000 households. The prefabricated units were extremely basic 20m² boxes constructed using corrugated iron sheets, and kitchens and bathrooms were shared by groups of 20 families (Comerio 1998).

Crucially, in this case the units were all located in the affected communities—on small open spaces and along rights of way next to the damaged buildings. This meant that families could maintain their social ties and remain close to work. It also helped them to have a voice in the permanent reconstruction programme.

Outcomes of the project

As is mentioned above, the NRC managed both the temporary and the permanent housing, which meant that the two programmes were closely integrated. Temporary housing was regarded only as a means to house people while reconstructing permanent housing, and families knew about the plans for their permanent rehousing from the outset (Bolton, 1997). In order to not detract from the reconstruction programme, the temporary dwellings were rudimentary—overcrowded and with only shared kitchens and bathrooms—and cheap, but they were only intended for use for a very short period.

Earthquake in Friuli, Italy, 1976

The disaster and its context

Two major earthquakes in 1976 in the province of Friuli, Italy, caused extensive damage over an area of 4,800 km² containing many mountain and hill towns of the Friulian people. The earthquakes reduced to rubble many settlements rich in cultural heritage that had been occupied for centuries.

Temporary housing and overall reconstruction

After the first earthquake on 6 May 1976 Friulians adopted the slogan, 'dalle tende alle case' (straight from the tents into new houses). They wanted to skip the temporary housing phase and go straight to reconstruction. However, the second devastating earthquake, which struck in September 1976, left 70,000 people homeless and it was decided that a mass evacuation over the winter was necessary. Temporary prefabricated housing would be built to return to in the spring (Geipel, 1982).

A total of 25,000 people were evacuated that winter to tourist hotels and apartments in the coastal towns along the Adriatic Sea. The tourist industry was a major source of income for the region, so the hotels and apartments had to be vacated before the beginning of the next tourist season in mid-April 1977. This set the timetable for the construction of temporary housing.

The programme was officially terminated on 30 April 1977. The prefabs had all been constructed in an eight-month period following the second earthquake. In total 21,000 prefabricated units were built: 49 per cent by the Italian Emergency Commissioner; 45 per cent by the regional administration and 6 per cent by foreign governments and private relief organisations. All the settlements were provided with water and electricity supplies and sanitation and, wherever possible, these were hooked up to existing infrastructure. Thirty-six diverse designs of prefabricated housing were provided by as many manufacturers, all of which offered different levels of comfort. The variations in quality caused some resentment among those housed because some households received much higher quality housing than others. Some refused houses on the grounds that they were not suitable for the climatic conditions (Geipel, 1982). On average 12m² per person of living space was provided and the total cost of construction worked out at USD 1,750 per person (1978 dollars) (Geipel, 1991).

The location of the settlements varied according to the situation in the particular commune (local government administrative area) and local representatives were responsible for designating land. In most cases, 'Baracopolis' settlements (as they were locally named) were located just outside the built up area in long rows of houses. Some communes managed to push for the prefabs to be located inside the communes or next to the damaged houses (Geipel, 1982).

It was found that grouping the prefabricated housing offered an opportunity for the community to re-establish a certain level of cohesion and for community involvement in the town planning process for reconstruction. One commune set up the prefabs around courtyards that corresponded to the pre-earthquake residential pattern in the

old towns. Representatives from each of the courtyards were involved in planning the reconstruction programme for the commune (Geipel, 1982).

Outcomes of the project

As in the Turkish and Greek cases, the temporary housing in Friuli was inhabited for much longer than intended. Permanent reconstruction began about 18 months after the disaster and took until 1982, when almost all the families had either repaired or rebuilt their houses and given up their right to a temporary unit. However, in June 1986, 10 years after the earthquakes, 8,206 families, or 13.3 per cent of the area's total population, were still living in temporary housing. Only 35 per cent of the families living in temporary housing had a legal title to be living there because they still lacked a reconstructed or repaired place to live. The remaining 65 per cent were effectively squatting (Geipel, 1991). The duration of use was related not only to the timetable for reconstruction but also to the fact that squatters, young families and elderly people used the temporary housing as more or less permanent residences.

Socially, the temporary housing provided opportunities for many families. In the long term, however, it became a burden on the government and the communities that hosted these settlements. According to Geipel (1991, pp. 40–41), 'Care was not taken to make sure that once ready-built homes were provided, the occupancy of prefabs would be terminated. More efficient supervision or other suitable measures should have been enacted in order to make leaving the huts more attractive'.

Findings

Any temporary housing programme or project is a reflection of the housing needs at a particular point in time, as well as the availability of money, supplies and manpower. The decisions about why and how to provide temporary housing, as well as the overall effect of such provision on recovery, reflect the particular social, economic and political situation of the country in question. Nevertheless, a synthesis of the findings from the case studies offers the ability to draw some conclusions about issues related to temporary housing projects and about strategic planning for temporary housing. These conclusions are presented below as direct answers to the research questions posed above.

Research question 1: how has strategic planning been implemented in temporary housing projects?

Pre-disaster strategic planning occurred in Turkey and Japan but not in the other cases. The use of such strategic planning in Turkey and Japan meant that the temporary houses were built relatively quickly and were therefore successful in terms of timing, although the projects suffered in other areas.

In Turkey the temporary housing programme drew heavily on pre-existing organisational structures, policies and laws for post-disaster reconstruction. The General Directorate of Disaster Affairs (GDDA) at the Ministry of Public Works and Settlements

(MPWS) is a division experienced in post-disaster reconstruction, including the procurement and production of temporary housing after previous disasters in Turkey.

The strategic planning undertaken by the Japanese government was more systematic than that in Turkey. It provided precise definitions for organisational design and for the magnitude of the response before the disaster. The plan specified that the governor of the prefecture would be in charge, financing would come from the national government, up to 30 per cent of people who lost their homes could qualify, the size of unit would be 26.4 m² and that the length of stay would be two years. Because of the extent of the damage and the profile of the affected households, some of these decisions had to be revised after the disaster.

In Greece there was no strategic planning before the earthquakes and the temporary housing project was therefore the result of post-earthquake tactical planning, which tried to respond to the situation at hand. Existing organisations with little experience of emergencies, such as the Municipality of Kalamata, the Ministry of Public Works and private contractors, were brought together after the disaster to work as a temporary multi-organisation. While these organisations were well positioned in terms of power and resources, they had had little collaborative experience—in particular of working under such stressful conditions. The problems with this project arose out of the need to make decisions quickly after the disaster. However, few plans and little expertise were available and this delayed the projects significantly.

In Italy, as Alexander (1986) points out, the policy for disaster planning relied on extraordinary measures after a disaster rather than pre-disaster preparedness planning. The lack of strategic planning meant that appropriate building specifications and pre-set procurement methods had not been predetermined. Many of the prefabs coming sourced from international suppliers did not meet the necessary standards for the cold climate in the mountainous Friuli region. For example, the Emergency Commissioner purchased 37,000 m² of prefabricated housing from a Canadian company, Atco, which was not well suited to the environment and subsequently required further investment to install new roofs and heating equipment. Furthermore, since procurement methods had not been identified, representatives from the prefab companies tried to exert influence over commune governments to buy their product. Geipel (1982, p. 119) writes, 'it must be taken into account that the hasty assignment of major responsibilities in more or less chaotic conditions subjects the integrity of decision makers to a severe test of sturdiness. Prosecutions in the summer of 1977 showed that not all of them could resist the temptations of corruption'.

Research question 2: derived from an understanding of project organisation, process and outcomes, what kinds of issues arise in temporary housing projects?

Based on the findings from the case studies, it is possible to identify a number of common issues in temporary housing projects. These issues are described as general objectives for planning temporary housing and are grouped under nine headings.

Timing: having temporary housing available quickly

The most important aspect of any temporary housing programme is that it be available for those affected as soon as possible to enable them to return to their daily activities and begin the recovery process. It is often the case that greater expenditure is needed, such as procuring housing units from abroad, or that trade-offs have to be made regarding choice of location to ensure that the temporary housing is available in a timely fashion. The case studies show that, irrespective of the total number of units built, it took between six and eleven months to complete the projects.

Interestingly, neither the supply of building materials nor the construction of units or infrastructure was found to be problematic in any of the cases. Finding suitable locations proved to be the main hindrance in the rapid provision of temporary housing. In every case, the identification of a suitable location and securing leases for these locations (either from government or private landowners) slowed the provision of temporary housing.

Cost: relative to country standards and cost of permanent housing

The cost of temporary housing is an important issue because the cost varies greatly from country to country and temporary housing is expensive in relation to its lifespan. However, the reuse, sale or recycling of units (where economically, technically or politically possible) may reduce overall lifecycle costs.

A comparison of temporary housing units with similar specifications in Turkey and Japan shows that in Japan one unit cost USD 28,000 each while in Turkey the price was USD 5,000. This underlines the problem of importing temporary housing units from industrialised countries to developing countries. While it is fine for Japan to acquire units from anywhere on the open market, countries with weaker economies find the price of importing units from industrialised countries too high, although such units will sometimes be given as donations.

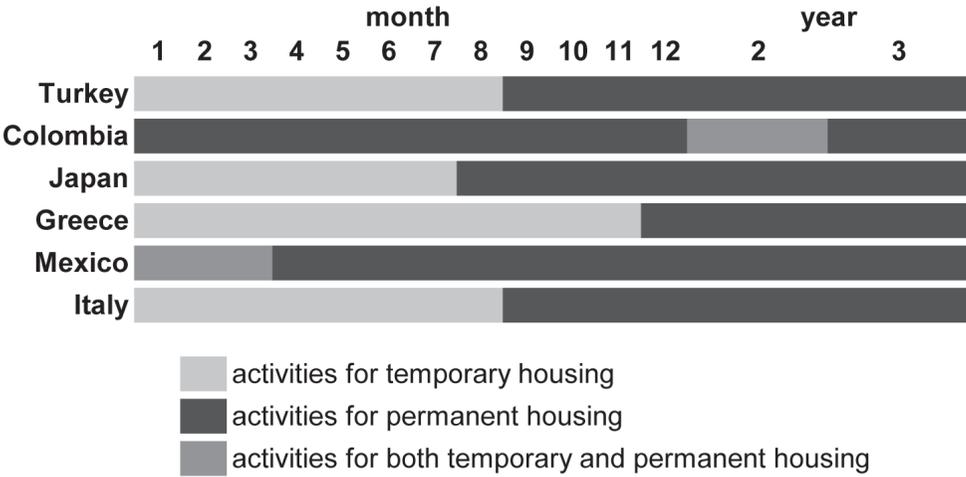
Generally, temporary housing is extremely expensive in relation to both its lifespan (probably only a few years) and the cost of a permanent house. For example, in Friuli, Italy, the construction and demolition of the temporary housing worked out at USD 560 per 1 m² which, as reported by Geipel (1991), was only slightly less than the average building cost per m² for permanent living space in Italy.

The overall reconstruction strategy: consideration of all stages of reconstruction

Temporary housing is usually only one phase of the overall reconstruction programme, which will probably also include tents or mass shelters and permanent housing. Any reconstruction programme has a limited amount of financial, human and machinery resources and if temporary housing consumes disproportionate amounts of resources, it may negatively affect the ability to carry out other parts of the reconstruction programme.

Maki et al. (1995) argue that in Japan proportionally large investments made in temporary housing were at the expense of government investments in permanent

Figure 2 Timeline for temporary and permanent housing activities for each case



housing. It was expected that market forces would solve the permanent housing supply and, while a public housing scheme was planned shortly after the earthquake, the government made no solid financial commitment to it even though it was spending many millions on temporary housing. A few years later, the poor people from the inner city who could not afford market rates for permanent housing were accommodated in permanent public housing, but only in inconvenient locations on the outskirts of the city.

Similarly, in Turkey heavy investment was made in temporary housing (estimated at USD 225 million) and many were fearful that this would negatively affect the reconstruction of permanent housing (results of social survey by Dr Ayfer Bartu reported in Annex 13 of World Bank, 1999). An extensive permanent housing programme did exist, on which work began one year after the earthquakes (a few months after all the temporary housing was completed). However, the government had to seek funding through loans from the World Bank and other international lenders to finance the permanent housing projects.

These cases can be contrasted with the reconstruction programmes in Mexico and Colombia, which offered very basic and inexpensive temporary housing and spent most of the resources on permanent housing. Figure 2 shows that in Mexico and Colombia the major objective was to solve the problem of permanent housing, and that these programmes got under way immediately after the disaster. Temporary housing was only proposed as a stopgap to shelter families while work on permanent reconstruction was in progress.

Unit design: adequate levels of comfort for the local conditions

A temporary house is meant to provide safety from the elements and from fire as well as at least a minimum level of sanitation, but the level of comfort it provides must

match local living standards. The exact meaning of the term ‘adequate’ must be defined locally because what is deemed an adequate temporary house depends on the climate and local living conditions. In some disaster areas a basic wooden structure with shared kitchen facilities and an outdoor bathroom is tolerable, while in another disaster situation temporary housing would not be adequate without insulation, hot water and private sleeping space.

In Colombia and Mexico infrastructure and unit construction costs were comparatively lower than in the other cases because basic materials such as corrugated iron and wood were used, and communal kitchens and bathrooms were provided. Meanwhile, in Japan, Turkey, Greece and Italy temporary houses were comparatively high-quality manufactured units with their own kitchens and bathrooms.

While it is not within the scope of this research to judge whether the basic dwellings in Colombia and Mexico were adequate compared to local living standards or, on the other hand, whether it was necessary to provide such comparative luxury in the other cases (criticisms of unit designs occur in every case), the point to be made is that the quality of the temporary units has to be linked to local living standards.

Location: provide convenient access to jobs and social networks

As is noted above, finding suitable locations for temporary housing is problematic. While it is preferable to have temporary housing located in or close to disaster-affected areas, the case studies show that it proves difficult to find enough vacant government land. Agreements can also be made with private landowners, but this often takes time. For the agencies involved it is often quicker and less complicated to build temporary housing in periphery areas. However, this means that agencies must provide extra services. In addition, the locations are not convenient for work or income-generating activities and can cause social isolation for the households rehoused. A frequent and inexpensive bus service is a necessity if a periphery location for temporary housing is chosen.

In Mexico, and some of the projects in Italy, communities were able to take a larger role in reconstruction activities because the temporary housing was located in or near the areas where rebuilding was taking place.

Services: provide or provide access to necessary services and amenities

It will be necessary to provide extra services, such as schools, medical clinics, public transport, shops, cafés, religious buildings, post offices, and so on, for those living in temporary housing if the housing is located at a distance from existing city services. If temporary housing is in the city, families can use existing services—assuming that they were not too badly damaged in the disaster.

In Turkey and Japan the vast majority of the temporary housing was located outside the cities, making it necessary to provide services. For example, in Turkey the settlements resembled new suburbs, complete with mosques, community centres, shops and coffee shops. This added to the overall cost of the project.

Social networks: enable occupants to maintain pre-disaster social ties or develop new ones

Another reason for locating temporary housing in or very close to the disaster-affected areas is that families can benefit from supportive social ties, which is important during recovery. As was exemplified in the Japanese case, if families must move out of the area for temporary rehousing, it is preferable that they have some choice about the community they move to. This is especially true in the case of the elderly. It may be necessary to provide social spaces and organised activities to enable people to meet others.

Institutional support: help families to secure permanent housing

In a US study Bolin (1982) finds that families that lack a clear or feasible plan for getting back into permanent housing find it more difficult to recover psychologically from a disaster. In the case of Colombia the National University of Bogotá helped families to secure permanent housing by navigating them through government loan programmes or organising them into community groups. In Mexico it was found that families tolerated living in the basic temporary housing because they knew about their options for permanent housing (Bolton, 1997).

Long-term use or outcomes for units: consider what will happen to the temporary houses

There are two points regarding the issues around temporary housing in the long term: first, temporary housing is always inhabited for longer than anticipated; and second, the units—or some materials from the units—can be reused for another purpose once vacated. These points are examined below.

In all the cases presented above the temporary housing was inhabited for longer than anticipated because of the lack of available affordable housing in the earthquake-affected areas. Even when permanent housing has been repaired or constructed, temporary housing remains in use because of one more of the following reasons:

1. Permanent housing is not available for all sectors of society; renters cannot afford the increase in market rents after the disaster and do not qualify for the permanent-housing subsidies usually aimed at homeowners—and therefore try to remain in temporary housing.
2. New migrants come to the area and take up residence in the temporary housing because of the relative affordability of this housing (it is sometimes free).
3. The availability of temporary housing allows the modernisation of family life— young families or elderly people reside in the temporary housing, giving them the opportunity to live apart from the rest of the family.

These realities highlight the fact that the long-term use of temporary housing offers many positive opportunities for the community, especially when affordable housing is in short supply. However, it was found that, for example, in Colombia there were also negative social consequences because the residual temporary housing settlements

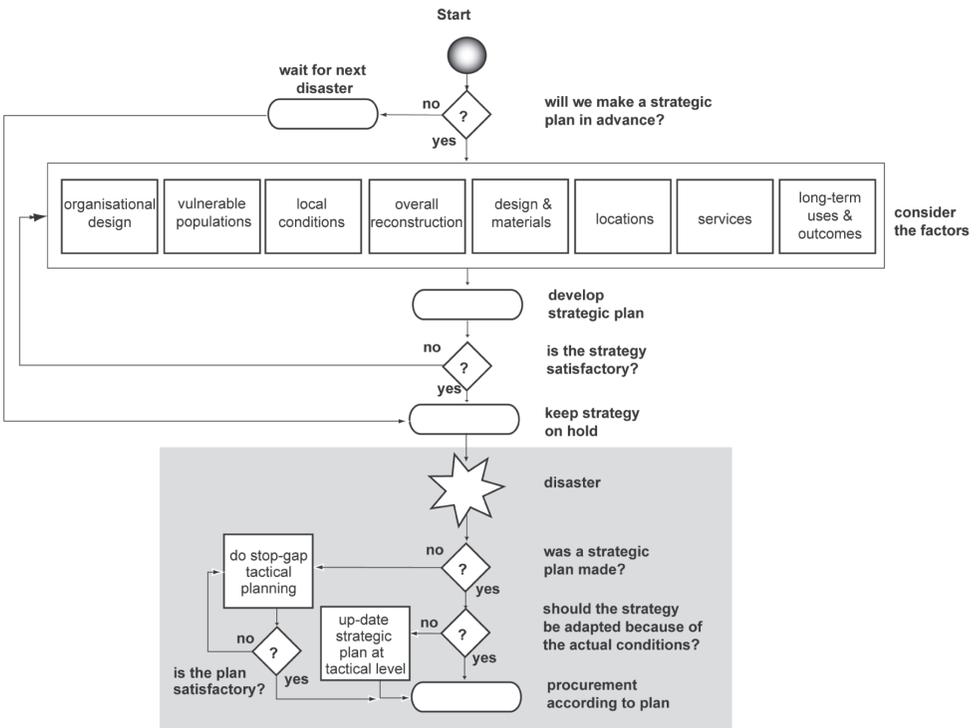
became areas of high crime. In Greece, Turkey and Italy the long-term use of temporary housing was expensive for the government, which had to subsidise the administrative and operating costs of the facilities for an extended period.

In all the cases the temporary housing units, or materials from the units such as wood or corrugated iron, could be reused, stored or recycled. In Turkey the units were either refurbished and stored for later use or sold by the government for approximately USD 1,200 each to businesses, institutions and families for reuse as houses, sheds, dormitories or other facilities. In Greece the government was planning to store the units but found that the cost of this was prohibitive. In Colombia materials from the units could have been recycled had there been policies in place that allowed the users to buy them after the project was finished. What is important to note here is that the temporary housing unit or materials had a useful ‘second life’ but some type of organisational strategy was needed to facilitate this.

Research question 3: based on the difficulties identified above, what must be addressed when planning for temporary housing?

Combining the decision-making sequence outlined in Figure 1 with the common issues described above, Figure 3 outlines the proposed planning factors that can be integrated into a strategic planning framework for temporary housing.

Figure 3 The decision-making sequence adapted specifically to planning temporary housing



Based on Figure 3, if it is decided to adopt a strategic plan in advance of a disaster, strategic planning will need to take account of:

1. *Organisational design*: appointing an organisation that is responsible for the overall reconstruction strategy and defining the temporary multi-organisation involved in the reconstruction programme and the methods used to form it (e.g. procurement policies).
2. *Identifying the vulnerable populations*: it is often renters or people living in marginal areas who will be the most in need of temporary housing.
3. *Understanding local social, economic and climatic conditions* to understand what sort of housing is most appropriate.
4. *Developing an overall reconstruction strategy*: temporary housing is only one part of the overall reconstruction programme.
5. *Design and materials*: identifying, as far as possible, designs and suppliers that use locally available materials or units that can be supplied in a quick and cost-effective manner.
6. *Choosing suitable locations* as close as possible to affected communities or easily accessible.
7. *Identifying services* that will need to be part of the project and the organisations that will provide them.
8. *Planning for long-term uses or outcomes for the temporary houses*: whether the units will be rented, sold, or dismantled and stored; what kind of site clean-up will be needed, when is this likely to happen and who will be responsible for it.

Once such a strategy has been completed, it can be kept on hold. If—or when—a disaster occurs, the strategic plan must be updated at the tactical level to correspond with the particular disaster situation. If the ‘wait for next disaster’ scenario prevails, these same factors will still need to be addressed. However, there will be little time to gather information and, consequently, the quality of decision making will be prejudiced.

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Endnotes

- ¹ The official government count was 76,000 housing units damaged, while an investigative report by the Tokyo Metropolitan Government estimated 100,000 (Aritake et al., 1986) and newspaper accounts from Mexico City News estimate 180,000 (taken from Comerio, 1998).
- ² NGOs and charitable organisations contradicted official estimates (Mexico City News, 19–23 September 1986, taken from Comerio, 1998).

³ Taken from state statistics for 2000, <http://www.die.gov.tr>.

⁴ This is the average family size in the houses affected by the earthquake, not the national average.

⁵ The cost was quoted by Tomioka (1997) as 2,867,000 yen (USD 28,527 in 1995 dollars, where 1 USD = 100.5 Japanese yen).

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