

# RECOVERY OF LIVELIHOOD FOLLOWING DISASTERS IN PRESENT JAPAN

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*Abstract* The objective of this study is to clarify the recovery process in the livelihood of victims of various disasters from the standpoint of victim. In the case studies the earthquake of 1984 and the city fire of 1976 were considered. The result of the questionnaire for each victim is concluded as follows: 1) each victim must basically recover the livelihood of his household by himself, in spite of the existence of administrative and volunteer services; 2) In a Japanese city of wooden structures, city fires sometimes offer a chance to improve or redevelop the old city. In the case of the Sakata City Fire of 1976, the land readjustment project for reconstruction of the central commercial district was carried out. However, the recovery of livelihood for individuals was late because the reconstruction took time; 3) The economic loss in each affected household and the cost of recovery were not insignificant. Especially in the case of the fire, loan to these households put pressure upon their livelihood for a long time.

**Key words:** recovery of livelihood, earthquake, city fire, restoration, reconstruction

## 1. Introduction

Restoration and reconstruction projects following a disaster are as important as the various countermeasures for damage reduction and prevention of disasters. Restoration projects for affected areas are especially important, because they must be comprehensive enough to meet the needs of all survivors and must be prepared in advance of a disaster. A disaster causes not only the destruction of buildings and urban facilities but also the breakdown of social systems, such as organizations, neighbourhoods, groups and families. Therefore, various information is necessary for the creation of a restoration plan, such as "how and what do the public sectors restore?", "how might victims bring about the recovery of their own livelihoods independently?" and so on. But there are few surveys of the latter in spite of the many official reports on the public sectors' restoration and reconstruction, which describe how successfully a city has been restored and reconstructed (Minnis, 1971; Mitchell, 1976; Haas *et al.*, 1977; Kreimer, 1984). There are also few studies on the way a victim recovers his livelihood in Japan (Nakabayashi, 1987, 1988).

The objective of this study is to clarify, from the point of view of the victim rather than the official, the recovery process among families or the managements of small scale

industries that have suffered a disaster.

## 2. Outline of Disasters

In this study, the following two disasters are considered. The locations of the case study areas are shown in Fig. 1.

One is the Nagano-Ken-Seibu Earthquake (M=6.9) that occurred at the foot of Mt. Kiso-ontake (volcano) in the central Japan on the 14th of September, 1984. Ohtaki-mura (village), at the epicenter of the quake, was hit strongly. Ohtaki-mura has a population of 1,768 and 427 households. In spite of the fact that it is a small village, 80 % of the householders are salaried workers, engaged in the forestry and tourist industry. A branch office of the Forestry Bureau is located and Mt. Kiso-ontake is one of the national parks. Agricultural land is scarce because of the slope of volcano. The avalanche of earth and landslides following the earthquake took the lives of 14 persons and left 14 missing. It caused the collapse of 87 houses and partially damaged 340 (see Fig. 2 and Table 1).

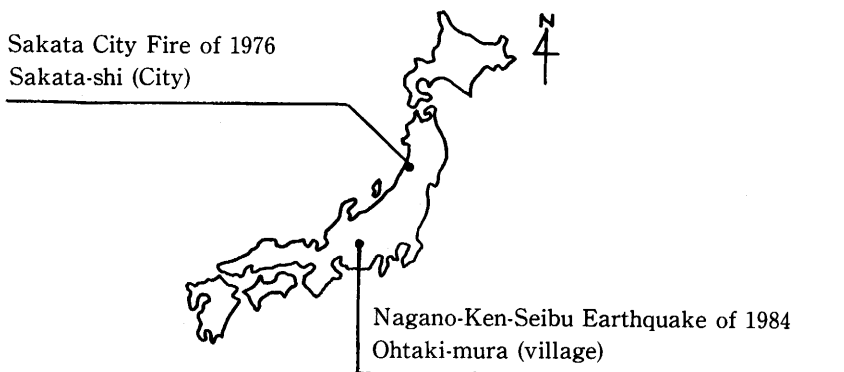
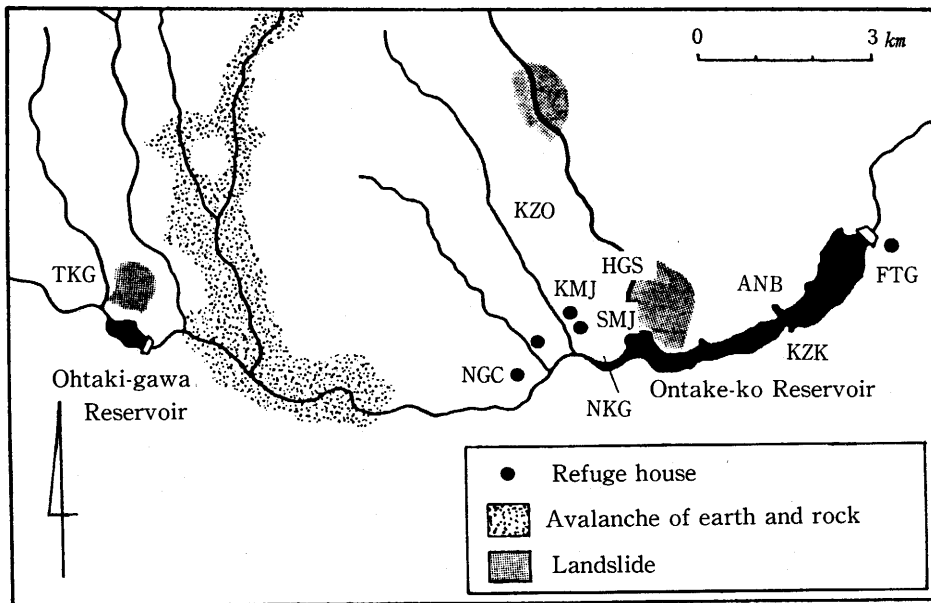


Fig. 1 Locations of case study areas

The other disaster is the Sakata City Fire, the most notorious city fire in recent Japanese history. The biggest fire in Japan during the present century was the Fire that followed the 1923 Great Kanto Earthquake except for the air raid. However, the Sakata City Fire is the biggest fire to occur since the period of the high economic growth in Japan. The fire broke out at 17:40 on the 29th of October, 1976 and was extinguished by 5:00 the next morning. Sakata-shi (city) has a population of 97,700 and 26,400 households. The 22.5 hectare of central commercial district in Sakata was burnt down and 1,774 houses were lost. As a result, 3,300 persons from 1,023 households were burnt out of home and shop (see Fig. 3). Sakata-shi began to plan out the reconstruction of the central district soon after the fire. A land readjustment project was carried out according to this plan and the shopping malls, promenade and some parks were constructed (see Fig. 4). After the land readjustment, houses and shops were rebuilt by each victim.

**Table 1** Outline of questionnaires

Area		Number of Households	Collected Questionnaires
Futagomoti	FTC	16	11
kuzurekoshi	KZK	6	5
Anba	ANB	4	4
Higashi	HGS	63	46
Nakagoe	NKG	67	41
Shimajoh	SMJ	45	36
Kamijoh	KMJ	114	92
Noguchi	NGC	60	55
Kuzoh	KZO	16	15
Takigoshi	TKG	19	11
Others		20	—
Total		427	316



**Fig. 2** Map of investigated area in Ohtaki Village (after Kosaka *et al.*, 1985)

### 3. Research Method

The questionnaire to each victim was adopted so as to clarify how recovery of livelihood and business was sought after the disaster.

The research in Ohtaki-mura was carried out two months after the earthquake. The questionnaires were distributed to all the affected households. The number of answers received was 316 (see Table 1). The ratio of answers is 74 %.

The research in Sakata-shi was carried out a decade following the Sakata City Fire. Two kinds of questionnaires were prepared. One was for the residents who lived in

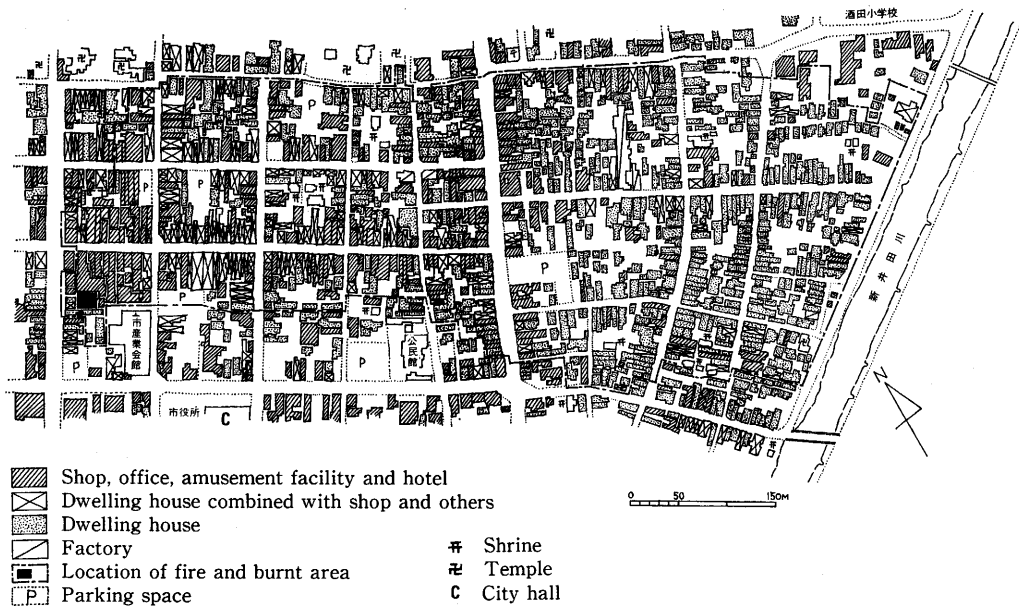


Fig. 3 Building use of central commercial area before the fire

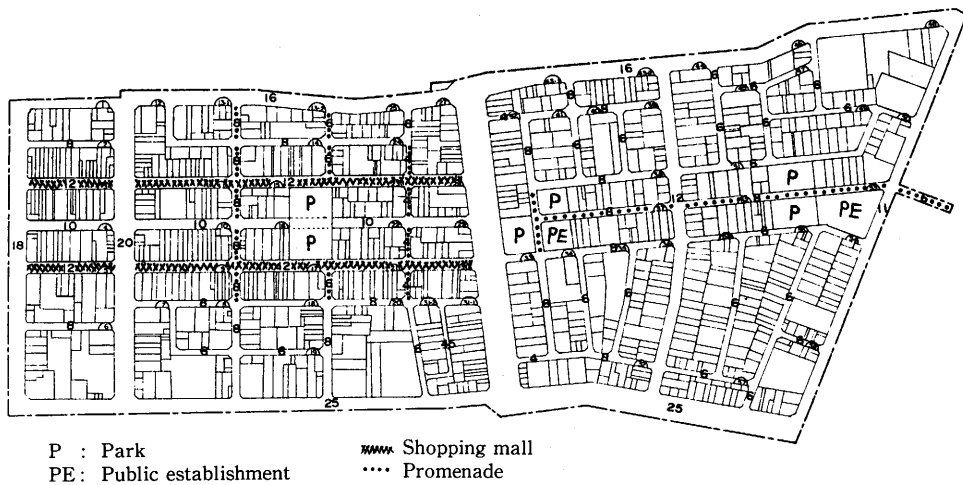


Fig. 4 Reconstructed area by land readjustment project

independent houses. The other was for the owners of private enterprises, such as merchants, industrialists and so on, who lost their shops, offices and factories and have since reconstructed them in the stricken area. The answers from individual home residents numbered 164 (57.5 %) and those from merchants numbered 153 (39.4 %).

#### **4. Case Study on the Recovery from the 1984 Nagano-Ken-Seibu Earthquake**

##### **Damage in Ohtaki-mura**

The result of case study on the 1984 Nagano-Ken-Seibu Earthquake is summarized as follows:

The disaster caused not only human loss such as death, injury and mental disorder but also the economic loss brought on by the collapse of a house and damage to various properties. To the exclusion of human losses, the economic loss averaged 3.12 million yen a household. This is equal to 53 % of the average annual income for all the residents affected. Nineteen point one percent of all households suffered an economic loss of more than 100 % of each annual income.

Soon after the earthquake, a large part of residents took refuge in a school and were afraid of the aftershocks. They were strongly inconvenienced by the shortage of water, the inability to live in their own houses and the interruption of traffic service between their villages and the others.

On the average, 72 % of the householders did not return to work for two weeks after the earthquake. During this period, many cleaned up their houses and searched for missing persons. Some took ill or were injured. Two months after the earthquake, 87 % of the householders returned to their business. But 13 % went out of business or continued to suspend their return to their employment.

##### **Recovery process in Ohtaki-mura**

The recovery process for an individual household after an earthquake can be shown by accumulating the recovery ratio for each item concerned with a household's livelihood. Figure 5 shows the recovery process of all residents and Fig. 6 shows the recovery process of those whose houses were severely damaged. The recovery curve was drawn individually for 13 different items. The recovery process is classified into five stages according to the date when 70 % accumulation of recovery ratio for each item was reached.

The first stage is the period of refuge during the first two days following the earthquake. People took refuge in a school according to the instruction they received.

The second stage is the period of preparing for temporary measures in each house. During the 5 days after taking refuge, more than 70 % of families took a bath for the first time and began to clean up their houses. And a member of each family came back to home alone to prepare it for dwelling.

The third stage is the period of furthering the temporary measures at home. In the period of 3 days after the second stage, such materials as batteries, food, milk and so on were bought in more than 70 % of households. People began to bring water and gas into their homes for cooking, washing and bathing. People ate 20 times the relief foods prepared by public sectors and foods given them by relatives before cooking on their own.

The fourth stage is the period when victims find their lives resuming a sense of

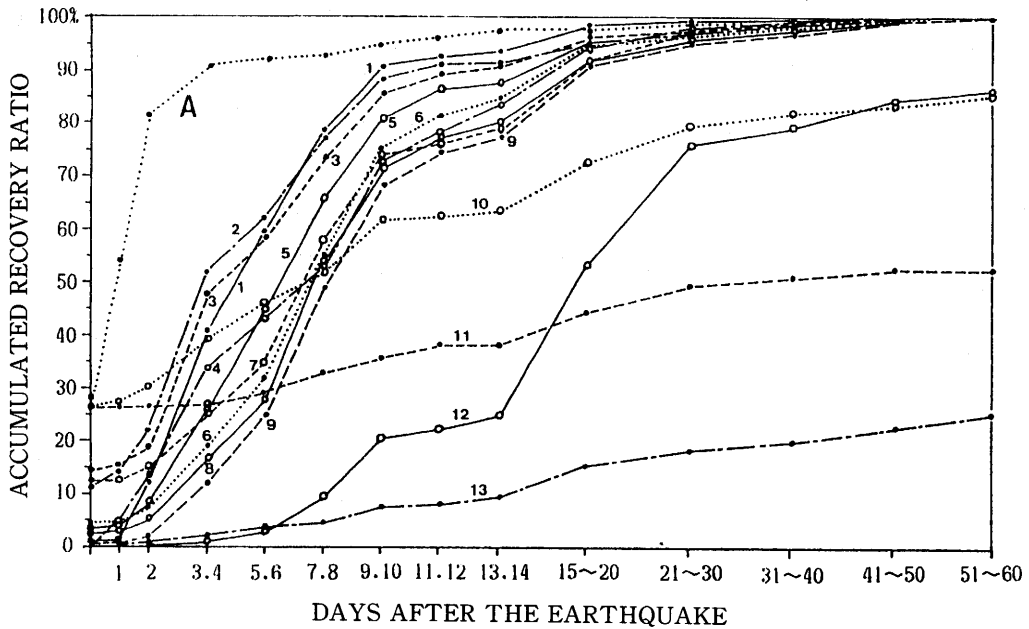


Fig. 5 Recovery curve of livelihood following the 1984 Nagano-Ken-Seibu Earthquake by households

A. Ratio of people who did not take refuge in a school; 1: Take a bath for the first time; 2: Begin to clean up house; 3: Come home to stay; 4: Bring gas into home; 5: Buy materials for survival; 6: Begin cooking at home; 7: Bring water service into home; 8: Begin to wash clothes at home; 9: Take a bath at home; 10: Begin temporary repairs on home; 11: Finish up temporary repairs on home; 12: Lives have settled down; 13: Withdraw money from a bank for livelihood

quietude. It is the date when people recognized that their lives had quieted down. According to Fig. 6, it is clear that the beginning of repairs to the houses leads to this sense of quietness. It was about 3 weeks after the earthquake that 70 % of the householders began to repair their houses and found a return to a quietness in their lives.

The fifth stage is the period of recovery of a household's livelihood. In the case study on the Nagano-ken-seibu Earthquake, this refers to the time when a household's livelihood was recovered, following the repairs or reconstruction of the house. In two months after the earthquake, 50 % of all householders finished temporary repairs on their houses and 30 % of them withdrew some money from a bank for the reconstruction of their livelihood as shown in Fig. 5. And 35 % of householders whose houses collapsed finished the repairs on their houses as shown in Fig. 6.

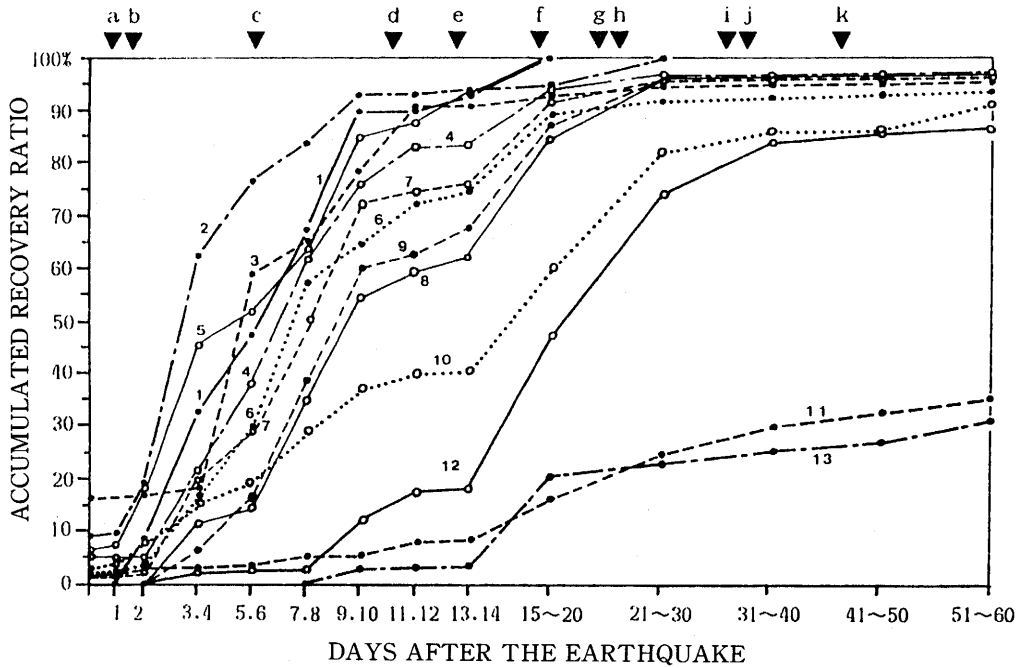


Fig. 6 Recovery curve of livelihood following the 1984 Nagano-Ken-Seibu Earthquake by households whose houses were severely damaged

1 to 13; see the legend of Fig. 5

(a to k; restored by public sector) a: Restoration of electric service; b: Inspection gas safe guards; c: Restoration of telephone service; d: Reopening of elementary and middle school; e: First gift of money to victims; f: Restoration of water supply; g: Construction of temporary houses for survival began; h: Cleaning up roads; i: Restoration of main road to central town; j: Second gift of money to victims; k: Instruction of refuge is cleared

## 5. Case Study on Recovery from the 1976 Sakata City Fire

### Damage and characteristic recovery in Sakata-shi

According to the case study, the damage caused by the 1976 Sakata City Fire is summarized as follows:

The economic losses of private houses and other properties averaged 31.3 million yen a household and 34.8 million yen a shop, which represent 6 or 8 times an individual's annual income. In the case of a fire, the losses are bigger than those in the case of an earthquake. An earthquake damages a wide area, meaning that those affected are relatively large in number; but the loss per individual is not always significant. On the other hand, fire renders great losses to individual victims; but, because both a house and whole other properties are burnt down even if the damaged area is not so wide. The

houses which were located outside the burnt area were almost without damage.

This is significant, especially in a small city like Sakata-shi, because most victims were supported in all aspects of their lives by their relatives who live in and around Sakata-shi but who were not burnt out. In some cases, the period of support reached two years or more until the reconstruction of their houses.

The businesses and jobs of 10 % of the householders were suspended in order to clean up the burnt houses, or as the result of injury, illness or emotional disorder. Four percent of the householders lost their jobs as a result of the fire or bankruptcy following it. The period of suspending or losing jobs averaged 5 months after the fire.

On the other hand, all burnt-down shops and offices were closed after the fire. Business was suspended for 75 days on average. After this, 80 % of them resumed their businesses on a temporary basis, and the period of temporary businesses averaged 650 days.

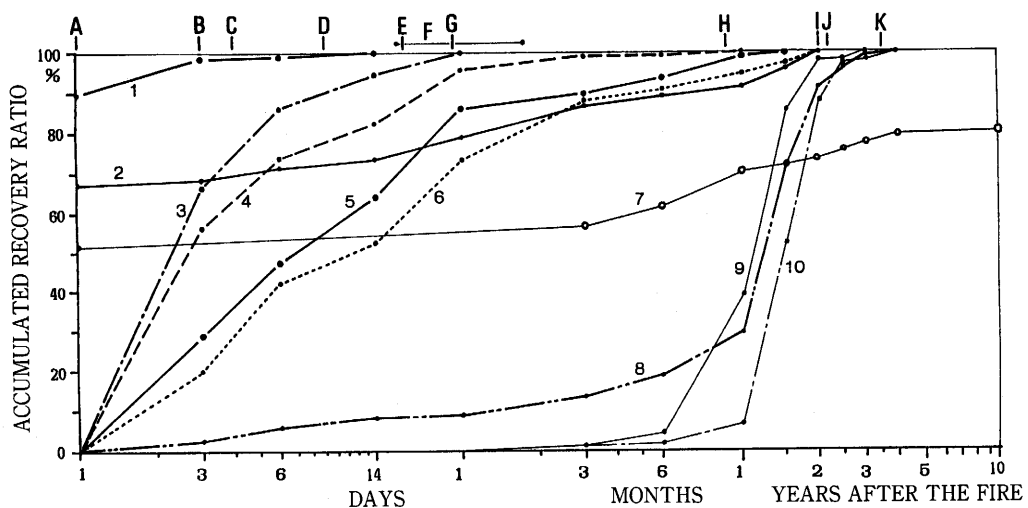


Fig. 7 Recovery curve of residents' livelihood following the 1976 Sakata City Fire

A: Discussion of reconstruction planning began; B: A draft of reconstruction plan prepared; C: Public hearings on reconstruction plan draft started; D: Location of temporary shops decided; E: Project scheme of reconstruction drawn up; F: Temporary houses for survival began to be constructed; G: Land readjustment project for reconstruction was permitted; H: Redevelopment project of central shopping center was permitted; I: Central shopping center "Marine 5" was opened; J: Parking building for shoppers was opened; K: Commemoration of reconstruction was held in Sakata City;  
 1: Taking refuge in public establishments; 2: Separation of family for refuge; 3: Buy materials for survival; 4: Beginning of cooking by oneself; 5: Withdraw money from a bank for livelihood; 6: Lives have settled down; 7: Income of each household recovered; 8: Period of temporary dwelling; 9: Each dwelling house began to be rebuilt; 10: Rebuilding of each dwelling house was finished



### Recovery process in Sakata-shi

In Fig. 7, the recovery process in a resident's livelihood can be shown by the recovery curves of each accumulated ratio for 10 different items concerned with private life. And also the recovery process in a merchant's livelihood and business is shown by each recovery curve for 15 different items in Fig. 8.

According to the date when the recovery ratio reached 70 % for each item, the recovery process for residents can be classified into five stages, and the recovery process for merchants can be classified into six stages. The characteristics of the recovery in the case of fire are summarized as follows, compared with the above case of the earthquake disaster in Ohtaki-mura.

The first stage is living in a refuge-facility. The period of public refuge after the fire is somewhat shorter than that after the above earthquake and the ratio of those who were living in a public refuge-facility is smaller than that in the case of an earthquake. Because there are some aftershocks in an earthquake disaster and the survived victims are very afraid of the aftershocks. And damage is done to wide area where the most of their relatives are also damaged by the same earthquake. On the other hand, most victims took refuge not in a public facility but in their relatives' houses soon after the

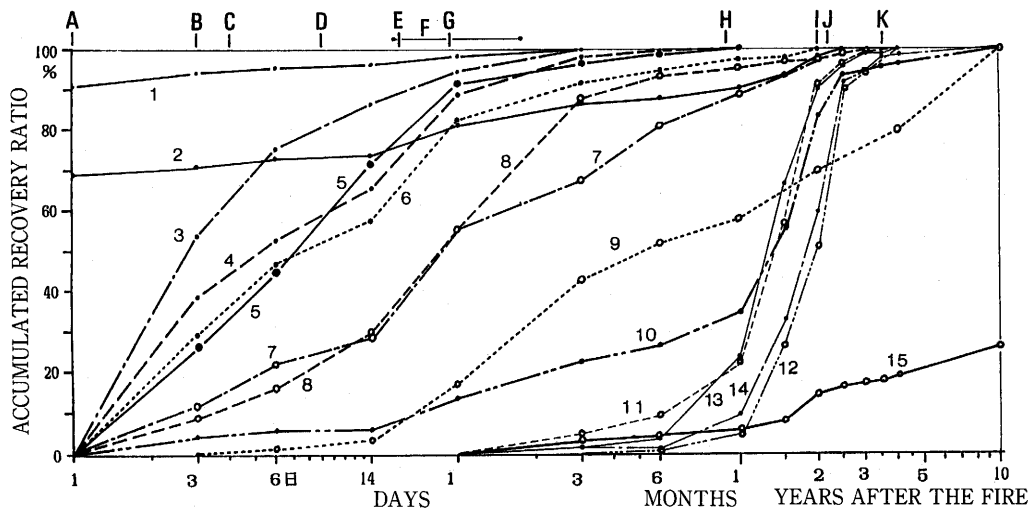


Fig. 8 Recovery curve of merchants' livelihood following the 1976 Sakata City Fire

A to K: see the legend of Fig. 7

- 1: Taking refuge in public establishments; 2: Separation of family for refuge;
- 3: Buying materials for survival; 4: Beginning of cooking by oneself; 5: Withdrawing money from a bank for survival; 6: Lives have settled down; 7: Borrowing money from banks for business; 8: Temporary business began; 9: Each business have settled down; 10: Period of temporary dwelling; 11: Each shop began to be rebuilt; 12: Rebuilding of each shop was finished; 13: Each dwelling house began to be rebuilt; 14: Rebuilding of each dwelling house was finished; 15: Sales of each business was recovered

Sakata City Fire. In addition, most victims had some relatives in and around Sakata-shi, whose houses were large enough to support the victims.

The second stage is the period of buying at a store and cooking on one's own in an effort to temporarily resume one's life. Seventy percent of the residents bought some materials for their livelihood 3 days after the fire and began cooking for themselves 5 days after, earlier than in the case of an earthquake. But merchants were not able to resume so early as this. They bought materials 6 days after the fire and began cooking two weeks after. Because a merchant took the emotional disorder more severely than a resident. During these periods, they ate at their relative's home or took many gifts of foods from the relatives.

The third stage is the period of a return to quietness in the lives of the residents. Two weeks after the fire not only the residents but also merchants withdrew the money from a bank for the measures for temporary lives. Three or four weeks afterwards their temporary measures for survival brought a sense of quietness. However, the reconstruction of their houses did not yet begin. In the case of an earthquake, this quietude was brought on by the beginning of repairs to the houses.

The fourth is the stage wherein 70 % of the merchants began a temporary business 50 days after the fire and raised funds for a temporary business 100 days after the fire. These temporary businesses were continued during the period for reconstruction. In spite of these efforts, sales in each shop did not recover, and it took two years or more before a quietness returned to the business of 70 % of the shops.

The fifth stage is the reconstruction of houses and shops. Because the reconstruction of dwelling houses and shops could not be begun before the completion of the land readjustment project, it was 16 months or more before 70 % of residents began to reconstruct their dwelling houses. After 17.5 months, 70 % of them started to dwell quietly at home; and, after 20.5 months the reconstruction of their dwelling houses was completed. On the other hand, 70 % of the merchants began to reconstruct their dwelling houses combined with their shops 18.5 months after the fire and their shops 20 months after. Because of the lateness in completing the land readjustment project in commercial area, the reconstruction of shops was rather late. Therefore it was 26 months after the fire that 70 % of them finished the reconstruction of their shops.

The sixth stage is the recovery of the business. It is significant that the recovery of sales and purchases was unaffected by not only temporary business measures but also by the reopening of reconstructed shops. Only 25 % of the merchants have been able to recover the sales and income a decade after the fire. There are various reasons for this delay in business recovery. One is that the change in the urban structure meant that the population of the inner area decreased and several big stores were built on the new developed suburbs during the reconstruction period and after. As a result, there was bankruptcy among the shops after the reconstruction. Most of the affected shops, through not yet bankruptcy, suffer an enormous debt due to rebuilding costs, in addition to the losses by fire.

## 6. Conclusions

From the analysis of the above mentioned case studies, three points on the livelihood recovery from disasters can be concluded as follows:

1) Basically, each victim is responsible for bringing about his own recovery. But it is significant that in a small city, like Sakata-shi, the relatives of each victim, who live near the stricken area, support the victim temporarily following disasters. This can facilitate a return to a sense of quietness for the victims, physically and mentally, during the period of temporary survival measures. But it is impossible in a metropolitan region, additionally in the case of an earthquake, for the relatives to support each other. In a metropolitan area, most residents have not their relatives in the neighbouring area.

2) Disasters sometimes bring the chance to improve or redevelop the city. In Sakata-shi, a land readjustment project for reconstruction was carried out. As a result, it was long before victims recovered their livelihood. It was especially long before the sales and income recovered as before. This makes the victims have a bitter experience, in addition to increasing the private debt for temporary survival measures and rebuilding. The townscape can be reconstructed by the public sector, but the livelihood of each victim cannot be recovered for a long time. Reconstruction plan must not only improve the central commercial district but also make the victims happy.

3) Finally, it must be clarified what and how the public sector has to do in order to support the recovery of a victim's livelihood in every period, such as a refuge, a preparedness for temporary measures for survival, the quietness of life, the reconstruction of houses and the recovery of business and income. Even if a victim's private life has to be recovered by himself, it is important for promotion of the recovery in the affected area, especially in the case of an earthquake in a metropolitan area, that not the relatives but the public sectors support the recovery of a victim's live for a long time.

The author wishes to dedicate this article to Professor Sohei Kaizuka with profound respects on the occasion of Dr. Kaizuka's retirement from Tokyo Metropolitan University.

## References Cited

- D'Souza, F. (1984): Recovery following the south Italian earthquake, november 1980: Contrasting examples. *Ekistics*, **51** (308), 476-482.
- Haas, E. J., Kates, R. W. and Bowden, M. J. (eds.) (1977): *Reconstruction Following Disaster*. The MIT Press, Massachusetts, 331p.
- Kosaka, S., Horiguchi, T. and Mochizuki, T. (1985): Study on human response in earthquake, part 3: the Nagano-ken-Seibu Earthquake of 1984. *Comprehensive Urban Studies*, **26**, 113-120.\*

- Kreimer, A. (1984): Housing reconstruction after major disasters as a vehicle of change. *Ekistics*, **51**(308), 470-475.
- Minnis, M. S. (1971): *The Voice of the People in Disaster and after: A study in residential integration*. Texas Tech. University, Lubbock, Texas, 1-10.
- Mitchell, W. (1976): Reconstruction after disaster: The Gediz earthquake of 1970. *Geographical Review*, **66**, 296-313.
- Nakabayashi, I. (1987): A case study on the recovery process in people's livelihood in and after the 1984 Nagano-ken-seibu Earthquake. *Journal of Architecture, Planning and Environmental Engineering*, **374**, 71-81.\*
- (1988): Research on recovery process of people's business and livelihood in a decade after the 1976 Sakata City Fire. *Comprehensive Urban Studies*, **35**, 123-153.\*

(\*: in Japanese with English abstract)