PROBLEMS WITH REBUILDING LIVES AFTER THE GREAT HANSHIN-AWAJI EARTHQUAKE DISASTER, BASED ON SURVEY USING QUESTIONNAIRES AT RESTORATION PUBLIC HOUSING

Hiroyuki KITAMOTO[1], Michio MIYANO[2] And Ryoko IIJIMA[3]

SUMMARY

With this study, we conducted a survey using questionnaires on restoration public housing after the Great Hanshin-Awaji Earthquake Disaster to investigate some problems in the process of rebuilding lives after the earthquake for the people living in restoration public housing.

We separated some stages in evacuees' lives by the change of their space for living and the process of the lifeline restoration. On the day of the earthquake, the most serious problem was "safety," and it changed to "necessities of life" after one week, "life in future" at the shelters, and they demanded "administration support" when in restoration public housing.

In restoration public housing, the sufferers experienced "difficulties in making ends meet." With the lapse of time, this problem increased.

INTRODUCTION

The Great Hanshin-Awaji Earthquake Disaster caused approximately 320,000 people to evacuate their homes at the peak. The main causes behind their evacuation were the damage to the lifeline and the fact that the number of buildings completely destroyed by the earthquake including residential housing, which make up the very foundation of people's daily lives, reached approximately 100,000[1)].

The post-evacuation lives of the victims who lost their houses started in the shelters, tents, and the homes of relatives and friends and gradually moved on to emergency temporary housing and restoration public housing.
As a result of the loss of a tremendous amount of housing, reconstruction of housing for the victims became the most important issue with the highest priority for the administration. Construction of public housing for the purpose of reconstruction from the disaster has been promoted according to the master plan called the "Three-Year Plan for Hyogo Housing Reconstruction" which was drawn up in August, 1995 based on the proposals made at the "Hyogo Housing Reconstruction Meeting."

The Plan was partially revised in August, 1996 based on the changes revealed by research and the public housing availability was to be extended further. The total number of households up to the day of the research done for this study reached 42,911 from the first application (October to November, 1995) to the fourth application (September to October, 1997).
Whereas the problems meeting the victims who had to change the place they lived in each stage have been studied by Watanabe, Iijima and others[2)], Maki and others[3)], Maki[4)], Amakuni and others[5)], and Iijima and others[6)], no papers have systematically clarified problems in the flow of stages from the shelters to the emergency temporary housing and to the restoration public housing discussing the differences between the regions.

In this study, a survey was carried out in a questionnaire format to find out the help which was required in each stage (five stages of 1) day of earthquake, 2) 1 week after, 3) shelter period, 4) temporary housing period, and 5) restoration public housing period) and about the life in and moving into the restoration public housing.

[1] *3-3-138, Sugimoto, Sumiyoshi-ku, Osaka, JAPAN, 558-8585: OSAKA CITY UNIV.: k97h010@life.osaka-cu.ac.jp*
[2] *3-3-138, Sugimoto, Sumiyoshi-ku, Osaka, JAPAN, 558-8585: OSAKA CITY UNIV.: miyano@life.osaka-cu.ac.jp*
[3] *2-7-1, Nishi-Shinjyuku, Shinjyuku-ku,Tokyo, JAPAN, 163-0730: Pacific Consultants Co. LTD: Ryouko.Iijima@tk.pacific.co.jp*

In this paper, the progress of lifeline restoration and the transition of post-evacuation life are first studied and the stages of the post-evacuation life are distinguished between. The help which was required in the processes starting immediately after the disaster to moving into the restoration public housing are then discussed. Finally, the problems in the living environment of the restoration public housing are studied in comparison with those in the emergency temporary housing as well as the differences between regions (Kobe and Awaji), ages, and sexes.

CHRONOLOGICAL CHANGES IN VARIOUS ELEMENTS CONCERNING POST-EVACUATION LIFE

The progress of lifeline (electricity, gas, water supply) restoration and transition of post-evacuation life (number of evacuees in shelters, amount of emergency temporary housing, amount of restoration public housing) are first studied and the chronological stages of the post-evacuation life are distinguished between.

(1) Progress of lifeline restoration

The progress of the restoration of the electricity, gas, and water supply is shown in <Fig. 1>.

a) Electricity

The electricity facilities including the thermal power generation plants, transmission cables, transformer substations, and service cables suffered enormous damage, causing power failure to 2,600,000 households in parts of Hyogo and Osaka immediately after the earthquake, however, the number had already been reduced to 1,000,000 by 7:30 am of the same morning (61.5% restoration rate). As a result of supplying power to the hospitals and the likes in the area with mobile power generators provided by power companies from all over the country, the emergency power measure was completed by 3 o'clock in the afternoon on the 23rd of January, 6 days after the earthquake[8) 12)].

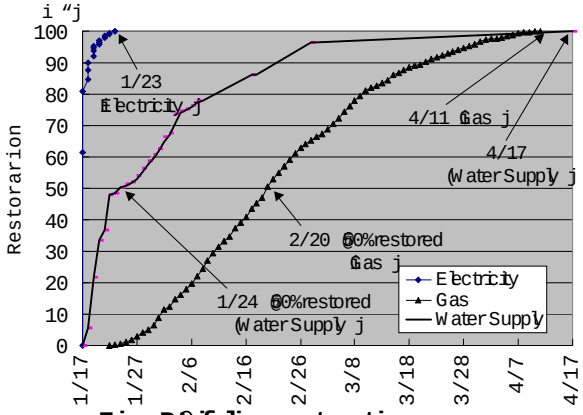

Fig., Pace of lifeline restoration process

b) Gas

As to the city gas facilities, the damage to the gas pipes was enormous. In addition to the gas not being supplied to 857,400 households[12)] in the affected areas, there was a rush of reports of gas leaks from areas where the supply had not been stopped. Alternative fuel supplies such as gas cartridges and cylinders were provided by the Osaka Gas Co., Ltd. and the restoration work continued involving other gas companies from all over the country as well. However, there were too many obstacles to the restoration work and the restoration rate only reached 33% by February 17th, a month after the earthquake. The restoration was completed by April 11th, except for households which were not expected to be able to use the service due to damage by fire and collapse (restored to 704,805 households)[15)].

For the users of LP gas, Hyogo Propane Gas Safety Association Foundation provided a consultation service by phone and completed safety inspections for households using propane gas by the 30th of January[12)].

c) Water supply

Water supply was interrupted to 1,270,000 households in Hyogo Prefecture immediately after the earthquake, posing serious difficulties in the lives of victims. The emergency water supply activities consisted of supplying water from water supply trucks, plastic containers, and PET bottles by the Self-Defense Forces and waterworks bureaus from all over the country, aided by individual and corporation volunteers. The restoration rate reached 50% by January 24th and 86% one month later on February 17th. The emergency water supply activities by the Self-Defense Forces, waterworks bureaus from other prefectures, and private sectors and individuals were completed by the 22nd of March and water was supplied to all households by the 17th of April, three months after the earthquake[8)].

(2) Chronological changes in the living space of evacuees

The transition in the number of evacuees at shelters, number of households in emergency temporary housing, and the number of households in restoration public housing is shown in <Fig. 2>.

The number of evacuees reached its peak at 316,679 on January 23rd. The number gradually decreased from then but more than 200,000 people were still forced to live in shelters on February 17th, one month after the earthquake. After that, it was reduced to 77,497 by August 17th, 50,466 by April 17th, and finally 8,491 by August 17th immediately before the last shelters were removed[11].

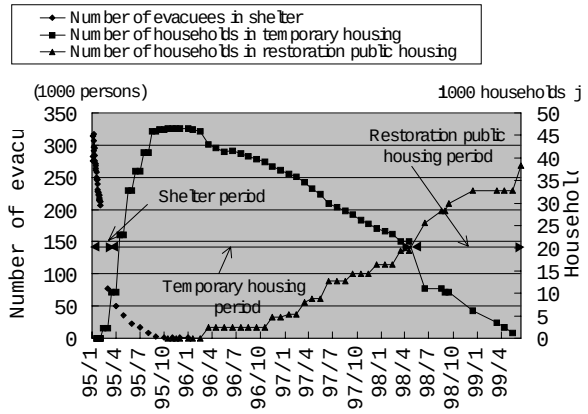

Fig.2 Transition of living space of evacuees

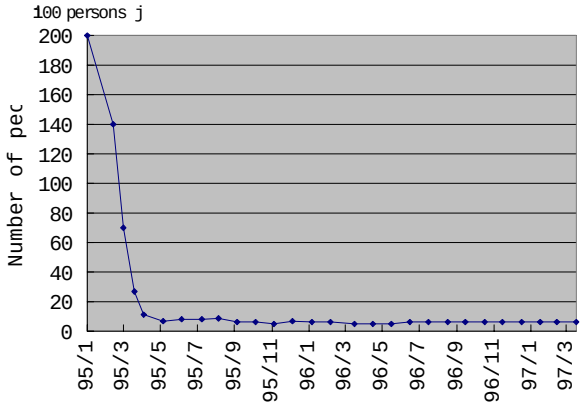

Fig.3 Average number of volunteers per day

Moving into emergency temporary housing started first of all on February 2nd in Goshiki Town of Awaji Island but the full-scale move did not start until March. Increasing numbers of households started moving into the emergency temporary housing in time for the closure of the last shelters on August 20th. The number of evacuees in the emergency temporary housing reached its peak at 46,617 in November. The number stayed approximately the same until around March of 1996 and gradually decreased as the move into the restoration public housing progressed[9) 10)].

The first batch to move into the restoration public housing was the group accepted in the first application made between October and November of 1995 (6,108 households). The number of households has reached 48,671 since then in the following applications: second application (July to August of 1996, 11,325 households), third application (February to March of 1997, 8,818 households), fourth application (September to October of 1997, 17,165 households), and fifth application (April to May of 1998, 5,760 households)[9) 10)].

The average number of volunteers per day for the first month after the earthquake (until February 17th) was 20,000 and has decreased since then to 14,000 in the second month and to 7,000 in the third month, and has been staying at 500 to 900 since the fifth month (May 22nd)[9)] <Fig. 3>.

Table.1 Profile of survey subjects

Age	Awaji	Kobe	Total
Younger than 30	19	18	37
30s	17	24	41
40s	29	32	61
50s	24	59	83
60s	37	90	127
70s and over	84	49	133
Blank	2	4	6
Total	212	276	488
Sex	Awaji	Kobe	Total
Male	88	140	228
Female	119	132	251
Blank	5	4	9
Total	212	276	488
Occupation	Awaji	Kobe	Total
Unemployed	92	101	193
Housewife	20	51	71
Company employee	40	60	100
Part-time worker	22	28	50
Public servant	3	1	4
Self-employed	12	16	28
Fishing	4	0	4
Farming	3	0	3
Other	11	12	23
Blank	5	7	12
Total	212	276	488

(3) Distinction of chronological stages of post-evacuation life

The stages of the post-evacuation life of a typical evacuee are considered to be 1) the shelter period, 2) the temporary housing period, and 3) the restoration public housing period. The point where the number of evacuees and number of households moving in cross is to the distinction point, the period until March of 1995, when the lifeline restoration was almost completed and a relatively large number of volunteers were still working, and can be distinguished as the shelter period, the period from April of 1995 to September of 1997 as the temporary housing period, and the period since October of 1997 as the restoration public housing period.

The shelter period can further be classified into the upsetting period immediately after the earthquake (the day of the earthquake), the confusion period of about one week after the earthquake before the lifeline restoration

was started and various other support systems started functioning, and the stable period after that.

SURVEY BY EVACUEES LIVING IN RESTORATION PUBLIC HOUSING

(1) Outline

The outline of the questionnaire survey carried out for this study is as shown below. The profile of the subjects of the survey is shown in <Table 1>.

<<Questionnaire survey of restoration public housing>>

Date of survey : December, 1997

Place of survey : Kobe (Hyogo Ward, Nada Ward, Higashinada Ward, Nishi Ward)
9 housing complexes, 1127 households;
Awaji Island (Hokutan Town, Tsuna Town, Higashiura Town, Ichinomiya Town, Goshiki Town, Awaji Town) 30 housing complexes, 764 households;
The questionnaire was distributed to a total of 1881 households.

Method of collection : Mail and post restante; 400 questionnaires were collected. (Collection rate: 26.0%)

Break-down by areas : Kobe (276 questionnaires, collection rate: 24.5%);
Awaji Island (212 questionnaires, collection rate: 28.1%); Blank (2 questionnaires)

(2) Survey results and study

a) Required help

Help required in each stage from the day of the earthquake to moving into the restoration public housing, "the day of the earthquake," "one week after the earthquake," "shelter period," "temporary housing period," and "restoration public housing period" is analyzed <Fig. 4>.

On the day of the earthquake (424 valid answers), the "information about the safety of family and friends" (206 answers, 48.6%) was most important, followed by the "aftershock information" (194 answers, 45.8%) and the "information about actions after the earthquake" (160 answers, 37.7%). It is evident that help (information) regarding the future actions and safety unlike physical help was required most. The earthquake may partially due to the fact that all everyone could do was to cope with the immediate problems of the damage cause it. It can be thought that on the day of the earthquake, the people had no room to think of needed help (information) and were only happy to have survived the disaster and were stunned by the extent of the damage. If there was help (information) they wanted, there probably was no way of obtaining the help.

In the one-week period following the earthquake (425 valid answers), the "aftershock information" (186 answers, 43.8%) and the "information about the safety of family and friends" (161 answers, 37.9%) are still

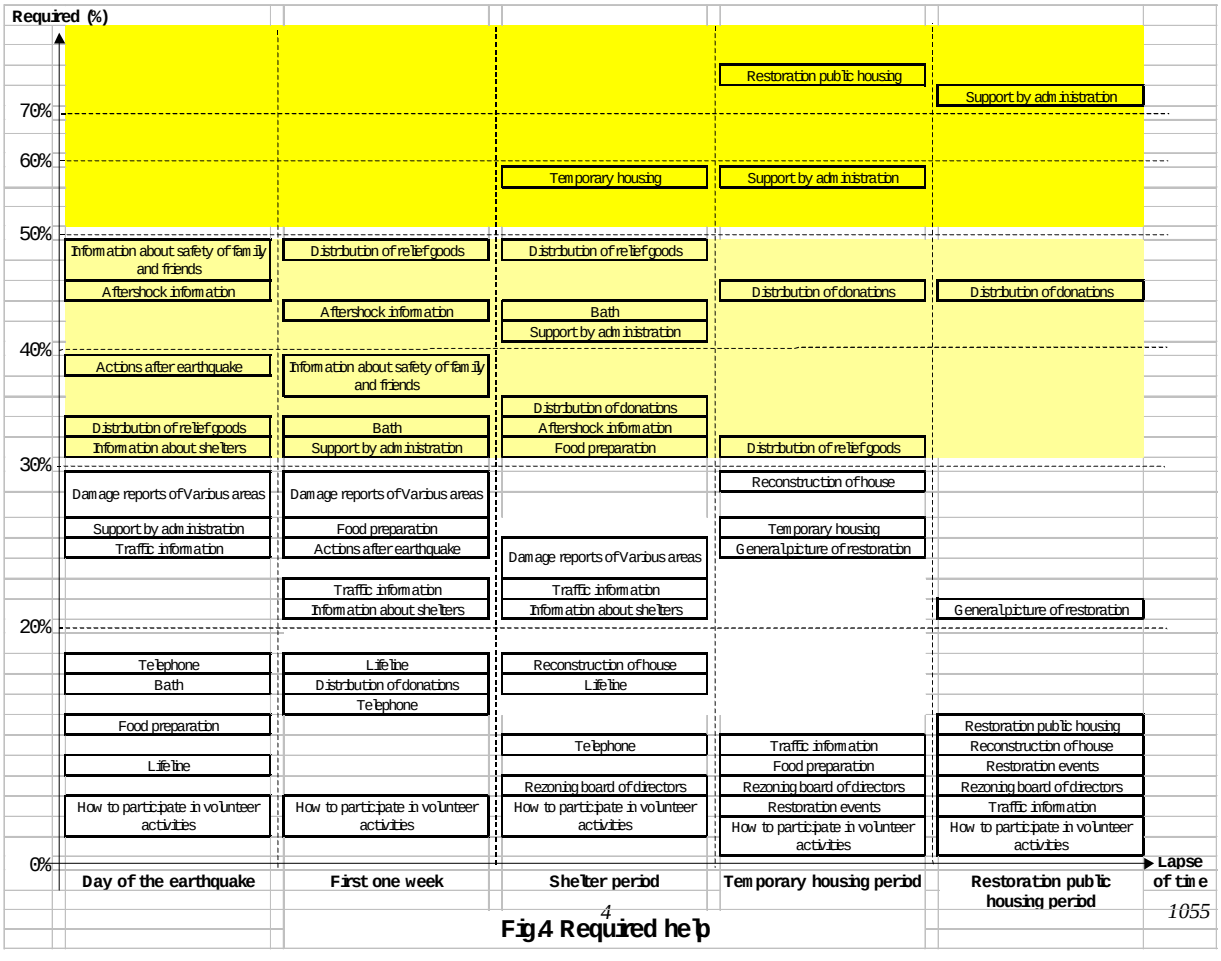

Fig.4 Required help

ranked highly but the most required help was "distribution of relief goods" (211 answers, 49.6%). The "food preparation" (122 answers, 28.7%) is also increased. It can be said that although the sense of insecurity still remained among the people, the immediate physical safety was secured and materialistic demands were increasing. The "bath" (143 answers, 33.6%) was also ranked highly.

For the shelter period, only those forced to live at shelters are subject to answer (352 valid answers). In this period, many listed help that has to do with concerns for future living such as the "information about temporary housing" (211 answers, 59.9%), "relief goods" (178 answers, 49.1%), "bath" (143 answers, 40.6%), "information about support by administration" (142 answers, 40.3%), and "distribution of donations" (127 answers, 36.1%). It can be recognized that, especially for those living at shelters, securing a place to live in the immediate future was the issue of the most importance and that the information about the support provided by the administration and donations were the matters to be noted with attention. The seriousness of these issues was to increase after that.

For the temporary housing period, only those who moved into the temporary housing are subject to answer (296 answers). The matter of most concern was the "information about restoration public housing" (213 answers, 72.0%) which was selected by more than 70% of the subjects. It is considered that the concerns of the people shifted to life after the temporary housing. The "information about support by administration" (172 answers, 58.1%) and "distribution of donations" (138 answers, 46.6%) which were mentioned in the shelter period had, without a doubt, increased. About 30% of the subjects selected the "reconstruction of house" (85 answers, 28.7%) and "general picture of restoration from disaster" (73 answers, 24.7%), indicating that they had finally started having time to think calmly about the surrounding situations.

For the restoration public housing period (393 valid answers), the most required help was the "information about support by administration" (278 answers, 70.7%) selected by more than 70% of the subjects, followed by the "distribution of donations" (176 answers, 44.8%). It can be noted that the people had started feeling settled down for the time being by gaining permanent housing in the form of restoration public housing and desired support from the administration which may compensate for the property and income lost in the disaster.

The difference between regions was that less people answered the questions about the required help on Awaji Island compared to Kobe (i.e. fewer complaints). This can be thought to be contributed to by the fact that the sense of community in daily life is higher on Awaji Island and it functioned as mutual support in the time of emergency after the disaster. It is also contributed to by the fact that the lifeline was restored much quicker on Awaji Island.

On Awaji Island, most households use LP gas and the victims in some areas were able to cook from the day of the earthquake. The overall restoration was completed by the middle of January, 1995[14) 15)].

The local fire-fighting teams made an enormous contribution by playing an active role not only in saving lives immediately after the earthquake but also by transporting drinking and water for living and participating in the administration of shelters.

It was also fortunate that support from the Shikoku Island was available from the early stages via the bridge.

b) Livability of restoration public housing

The answers to questions about the major problems noticed after moving into the restoration public housing are shown in <Fig. 5>.

The choices for the answers were the same ones used in the survey for the temporary housing conducted between April and May of 1996 (229 responses obtained in interviews at 10 temporary housing complexes. 200 responses obtained in interviews at temporary housing in 6 areas in Hyogo, Amagasaki, Ashiya, Takarazuka, Nishinomiya, Itami, and Kobe)[16)] for the same 10 items. All applicable answers were to be chosen.

The most selected answer was "difficult to make the ends meet" with 173 answers (40.2%) followed by "too far from own doctor" with 153 answers (35.6) %. The difficulty to make the ends meet, as was with the temporary housing, becomes more serious as time passes.

It can be seen that, compared with the shelter period shown in <Fig. 6/7>, the smallness of the rooms was no longer a problem. The problem of the noises from the neighbors has also considerably reduced in Kobe. That is, it can be considered that, by gaining permanent housing, the physical problems of the living environment were roughly eliminated.

On the other hand, the items that showed a significant difference by area•<Fig. 5> are "too far from own doctor," "noises from neighbors," and "not many friends." The fact that answers "too far from own doctor" and "not many friends" were relatively fewer on Awaji Island is due to the fact that people who had been

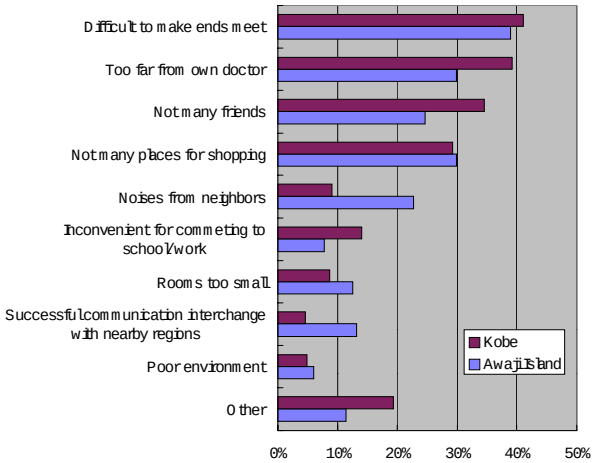

Fig.5 Problems noticed after moving into restration public housing (by area)

living in one area before the earthquake were gathered to live near the previous residential area. More on Awaji Island selects the problem of the “noises from the neighbors” probably because more people had lived in houses rather than apartments.

Differences by gender are that the item "not many places for shopping" is selected more by women and the "inconvenient for commuting to schools/work" by more men whereas the "not many friends" is selected more by men, indicating the difference between genders in the time spent at home and dependency on neighbors. <Fig. 8>

Differences by age are that the item "difficult to make ends meet" is less likely to be selected the older they are <Fig. 9>. As was also shown in temporary housing, older groups select the items “too far from own doctor and not many friends” more. Similarly, the items "noises from neighbors" and younger groups select “inconvenient for commuting to schools/work” more.

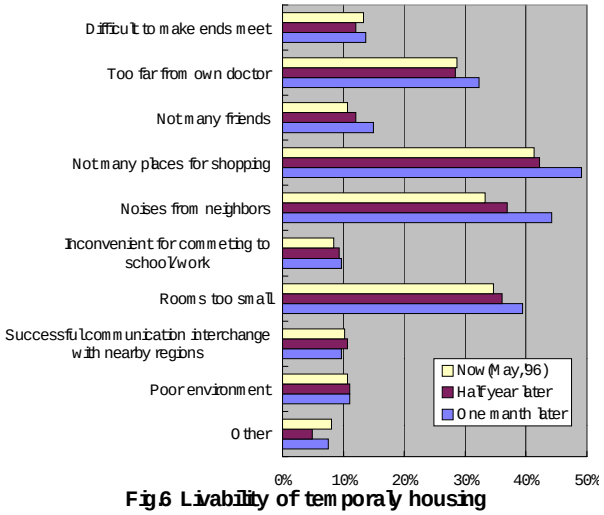

Fig.6 Livability of temporaly housing (Awaji Island)

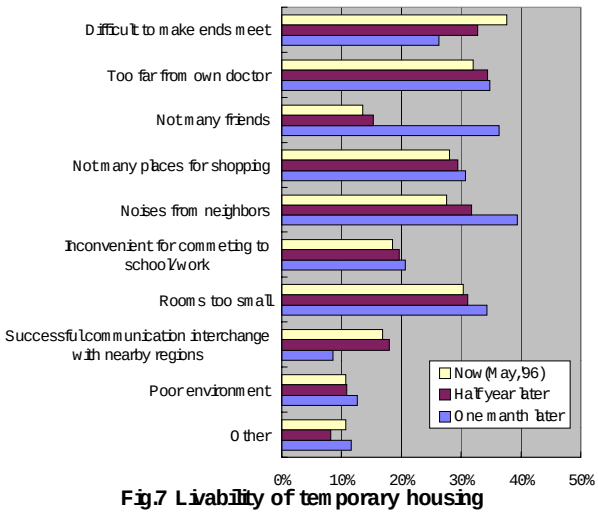

Fig.7 Livability of temporary housing (Hanshin Area)

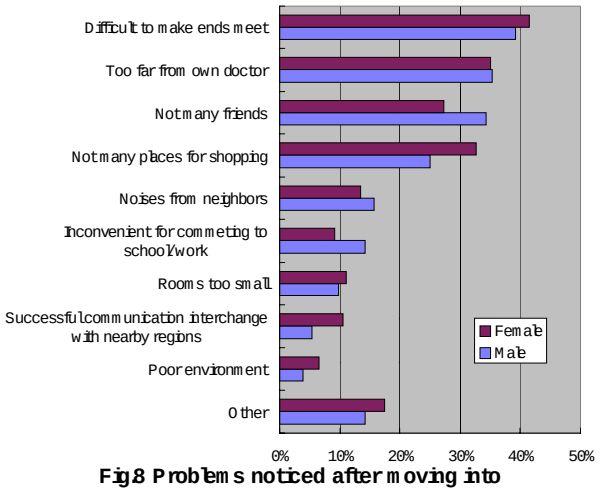

Fig.8 Problems noticed after moving into restration public housing (by gender)

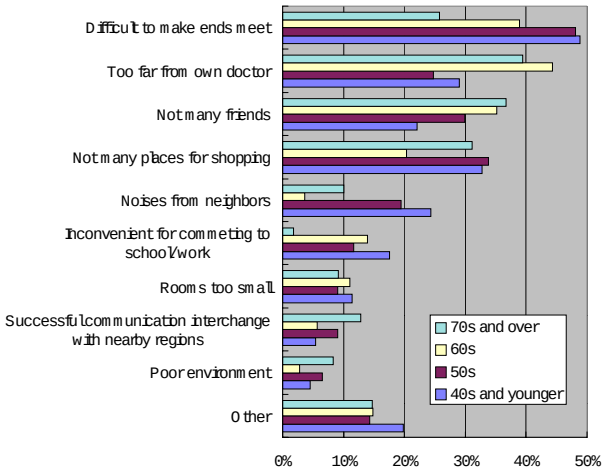

Fig.9 Problems noticed after moving into restration public housing (by age)

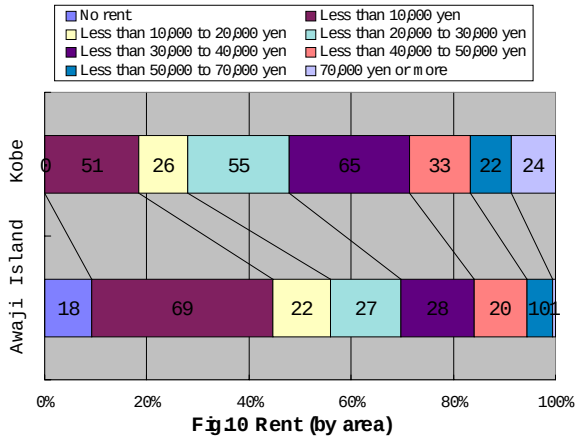

Fig.10 Rent (by area)

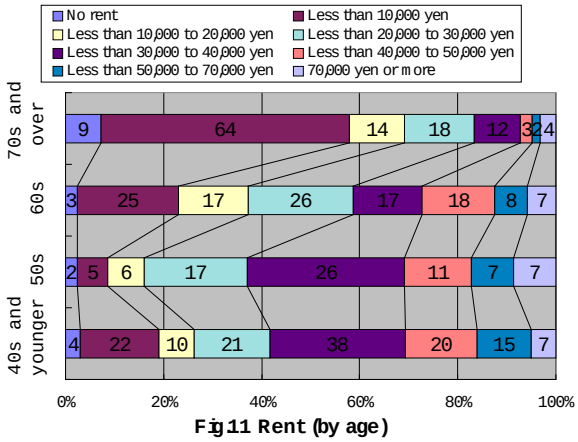

Fig.11 Rent (by age)

c) Rent of restoration public housing

The answers to the questions about the current rents of restoration public housing are shown in <Fig. 10/11>. The rent at the time of the survey had been decided to stay the same for 5 years.

The most prominent difference by area is the fact that almost half of the people on Awaji Island selected either "no rent" or "less than 10,000 yen" (44.6%). That is because the restoration public housing adopted the scaled rent system that charges people different rents according to their age and income. These results came about as there are more pensioners on Awaji Island.

The results by age show that the burden of rent is highest on the people in their fifties followed by the people in their forties and younger. Since the rent is scaled, this is a natural outcome, however, it can be considered that it is placing a restriction on the path to restoration.

Lastly, the number of times people moved house before moving into the restoration public housing was studied. As a result, it has been made clear that people moved an average of 3.47 times. Some of them moved 10 times, others changed shelters many times or moved from one relative to another.

CONCLUSIONS

In this paper, the problems in the restoration process faced by the victims of the Great Hanshin Awaji Earthquake Disaster were studied based on a survey carried out using questionnaires filled out by those living in the restoration public housing. The results of the survey are shown below.

The stages of the post-evacuation life starting immediately after the earthquake to moving into the restoration public housing are distinguished according to the transition of the post-evacuation life and lifeline restoration process.

The help required by the victims was not materialistic help on the day of the earthquake but was help (information) regarding future actions and safety. In the following week, although the sense of insecurity still remained, safety was secured for the time being, thus the demands for materialistic help increased. For the shelter period, more people selected items regarding the concerns for the future, with the most important issue being the securing of a living space. In the temporary housing period, the concerns shifted to life after moving out of the temporary housing while they started to gain time to observe the surrounding situation more calmly. In the restoration public housing period, people considered to have settled down for the time being by gaining permanent housing while they started to desire administration support which can compensate for the property and income lost in the disaster.

The following observations can be pointed out about the living environment of the restoration public housing.

The matter that worried the people most was the difficulty to make the ends meet and this gradually increased after the temporary housing period.

Compared with the temporary housing period, the comfort factor such as "rooms too small" has improved. However, the inconvenience for shopping or transportation has not yet improved. This is because the restoration public housing, like the temporary housing, was not necessarily built in convenient locations.

The answers such as "too far from own doctor" and "not many friends" were selected by more older groups as were for the temporary housing period.

As to the "noises from neighbors," about twice as many people complained on Awaji Island compared with Kobe. This is due to the fact that 80% of the subjects on Awaji Island had lived in houses instead of apartments and are not used to the troublesome factors of life in apartment complexes.

As to future tasks, there is a pressing need to study whether or not the help provided by the administration, energy-related corporations, and volunteers was appropriate for the needs of the victims in each of the distinguished stages of post-evacuation life.

REFERENCES

1) The National Land Agency: 1995 Bosai Hakusho (Disaster prevention white paper) (June 1995)
2) WATANABE, M. (June 1997), “Hinan Keikaku To Joho No Arikata (What evacuation plan and information should be)”, First Meeting of Continuing Symposiums "Saigai Ji No Taio Kodo To Hinan Ni Kansuru Keikaku No Arikata (What the plan about actions and evacuation at the time of disaster should be)”, pp.7-10
3) NOJIMA, N. / KAMEDA, H. (November 1997): “Awaji Dai Shinsai Ni Okeru Seikatsu Shisho No Anketo Bunseki (Questionnaire analysis on impediments in life after the Great Awaji Earthquake Disaster)”, *Chiiki*

Anzen Gakkai Ronbun Hokokushu (Papers of the Annual Conference of the Institute of Social Safety Science), No.7, pp.338-343
4) MAKI, N. (July 1997): Okyu Kasetu Jutaku No Jittai To Kongo No Kadai (The true facts of emergency temporary housing and future issues), Third Meeting of Continuing Symposiums "Saigai Ji No Taio Kodo To Hinan Ni Kansuru Keikaku No Arikata" (What the plan about actions and evacuation at the time of disaster should be), Jinsoku Na Fukkyu To Machi No Fukko Ni Tsunageru "Hisaisha Kyoju" No Arikata (What the life of disaster victims that leads to fast restoration should be), pp.9-12
5) AMAKUNI, K. and others (November 1996): Hyogo Ken Nanbu Jishin Ni Okeru Toyonaka Shi No Hinansha Jittai Ni Kansuru Kosatsu (Study of the true facts of evacuees of Toyonaka in the Southern Hyogo Earthquake), *Chiiki Anzen Gakkai Ronbun Hokokushu (Papers of the Annual Conference of the Institute of Social Safety Science)*, No.6, pp.223-234
6) IIJIMA, R. and others (November 1996): Okyu Kasetsu Jutaku Deno Hinan Seikatsu Ni Kansuru Kento (Study of evacuee life in emergency temporary housing) • 1995-nen Hyogo Ken Nanbu Jishin Ni Okeru Hokutan-cho Ni Tsuite (Regarding Hokutan Town in the 1995 Southern Hyogo Earthquake) •, *Chiiki Anzen Gakkai Ronbun Hokokushu (Papers of the Annual Conference of the Institute of Social Safety Science)*, No.6, pp.235-242
7) IMAI, N. / NAKAMURA, K. (June 1998): Problems of dwelling life at apartments of housing and urban development corporation in the disaster stricken areas of Hanshin-Awaji Earthquake (Part 1) Condition of difficulties and support in life just after the earthquake, *Journal of Home Economics of Japan*, Vol. 49 No. 6, pp.687-699
8) Shinsai Fukko Chosa Kenkyu Iinkai (Earthquake Disaster Restoration Research and Study Committee) (March 1997): Hanshin Awaji Dai Shinsai Fukko Shi (Journal of the Great Hanshin Awaji Earthquake Disaster)[Vol.1], (Zai) 21 Seiki Hyogo Sozo Kyokai (21st Century Hyogo Creation Association Foundation)
9) Shinsai Fukko Chosa Kenkyu Iinkai (Earthquake Disaster Restoration Research and Study Committee) (March 1998): Hanshin Awaji Dai Shinsai Fukko Shi (Journal of the Great Hanshin Awaji Earthquake Disaster)[Vol.2], (Zai) 21 Seiki Hyogo Sozo Kyokai (21st Century Hyogo Creation Association Foundation)
10) Shinsai Fukko Chosa Kenkyu Iinkai (Earthquake Disaster Restoration Research and Study Committee) (March 1999): Hanshin Awaji Dai Shinsai Fukko Shi (Journal of the Great Hanshin Awaji Earthquake Disaster)[Vol.3], (Zai) 21 Seiki Hyogo Sozo Kyokai (21st Century Hyogo Creation Association Foundation)
11) Hanshin Awaji Dai Shinsai Hyogo Ken Saigai Taisaku Honbu (Hyogo Disaster Headquarters for the Great Hanshin Awaji Earthquake Disaster) (July 1995): Hanshin Awaji Dai Shinsai • Hyogo Ken No 1 Kagetsu No Kiroku (The Great Hanshin Awaji Earthquake Disaster • Hyogo Reports for One Month), Hanshin Awaji Dai Shinsai Hyogo Ken Saigai Taisaku Honbu (Hyogo Disaster Headquarters for the Great Hanshin Awaji Earthquake Disaster)
12) Hyogo: Hanshin Awaji Dai Shinsai • Hyogo Ken No 1 Nen No Kiroku (The Great Hanshin Awaji Earthquake Disaster • Hyogo Reports for One Year) (June 1996), Hyogo Ken Chiji Koushitsu Shobo Bosai Ka (Fire and Disaster Prevention Section, Hyogo Governor's Office)
13) Hanshin Awaji Dai Shinsai Kobe Shi Saigai Taisaku Honbu (Kobe Disaster Headquarters for the Great Hanshin Awaji Earthquake Disaster): Hanshin Awaji Dai Shinsai • Kobe No Kiroku 1995 Nen • (The Great Hanshin Awaji Earthquake Disaster • Kobe Reports of 1995) (January 1996), (Zai) Kobe Toshi Mondai Kenkyujo (Kobe Urban Problems Research Institution Foundation)
14) Hokutan Cho Saigai Fukko Taisaku Shitsu (Hokutan Town Restoration Center): Hanshin Awaji Dai Shinsai Hokutan Cho No Kiroku (The Great Hanshin Awaji Earthquake Disaster • Hokutan Town Reports) (March 1997), Hokutan Town Hall
15) Osaka Gas Co., Ltd., General Planning Department, Earthquake Disaster Restoration Promotion Section: Hanshin Awaji Dai Shinsai Higai Fukkyu Kiroku (Records of restoration from damage by the Great Hanshin Awaji Earthquake Disaster) (March 1996), Osaka Gas Co., Ltd., General Planning Department, Earthquake Disaster Restoration Promotion Section
16) KITAMOTO, H. / MIYANO, M. (February 1999): Problems of Living in temporary housing after the Hanshin-Awaji Earthquake Disaster, *Journal of Japan Physiology and Anthropology*, Vol.4 No.1, pp.7-12
17) IIJIMA, R. (February 1998): Hyogo Ken Nanbu Jishin Ni Oite Hisaisha Ga Hitsuyo Toshita Enjo No Jikeiretsu Henka Ni Kansuru Kenkyu (Study of chronological changes in help required by victims in the Southern Hyogo Earthquake), Master's Thesis in Science of Living, Osaka City University
18) KITAMOTO, H. / MIYANO, M. / IIJIMA, R. (October 1998): Problems of Sufferer’s Lives after the Hanshin-Awaji Earthquake Disaster, Dai 3 Kai Toshi Chokka Jishin Saigai Sogo Sinpojiumu Ronbun Shu (Collection of papers from the third general symposium for urban local earthquake disasters), pp.439-442