

FINDINGS TO IMPROVE JAPANESE EARTHQUAKE PREPAREDNESS LEARNED FROM A CROSS-CULTURAL QUESTIONNAIRE SURVEY IN JAPAN AND THE UNITED STATES*

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Providing people with appropriate information is an essential element to enhance their earthquake preparedness. To be effective, balance between supply and demand should be kept in dissemination of the information. To seek the balance, a cross-cultural questionnaire survey was made. Respondents were from two groups in the United States and one group in Japan. The survey revealed that, contrary to the other two groups, the Japanese group showed overdependency on government initiatives rather than taking self-help action for earthquake preparedness.

Keywords : earthquake preparedness, questionnaire, self-help

1. INTRODUCTION

In 1978 the Large Scale Earthquake Countermeasures Act came into effect in Japan. A main target of this Act is the Tokai earthquake which is supposedly imminent and expected to occur beneath Suruga Bay where an earthquake of Magnitude (M) 8 or larger has been absent since 1854. Following this Act, instrumentation arrays were set up to monitor precursors of the earthquake and data from the arrays have been telemetered to Tokyo where the Japn Meteorological Agency will review them and judge whether meetings of the Prediction Committee will need to be held. A series of such government efforts tended to lead the Japanese to conclude that the state of earthquake preparedness in Japan is much advanced. This conclusion is indeed, an unfortunate illusion. Earthquake awareness of people and communities still remains at a low level and willingness to reduce earthquake risk appears to be reluctant^{1)~3)}.

Recently a variety of detailed checklists and survival guides has become available in Japan as well as in the United States. For example, the Bay Area Regional Earthquake Preparedness Project (BAREPP) has prepared many checklists for local governments, the media, hospitals, schools, neighborhood and Bay Area decision makers with a main focus on each household. Survival guides, which include first-aid treatments and general hints on what to do before, during, and after an earthquake, are described over ten pages in a telephone directory in the United States. These messages apparently constitute necessary conditions for earthquake preparedness, but not necessarily satisfactory ones. One should recall an old saying: "To know is one thing, and to practice is another".

Mere awareness of earthquake threat and knowlede of earthquake science will not promote people to take

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concrete preparedness actions⁴⁾. For this reason, a main subject of the current preparedness planning is on how to cope with such a stumbling block in human nature. In order to get a better result from preparedness planning, two unique approaches have been taken to date in the United States. One is a series of liability studies initiated by the Association of Bay Area Governments (ABAG)^{5),6)}, and the other is marketing for earthquake preparedness campaigns⁴⁾. The marketing approach seems to be applicable to dissemination of various kinds of earthquake preparedness information. Undeniably any information is better disseminated whenever the balance between supply and demand can be attained. To seek the balance, marketing research will be needed on such points; what kind of information is most needed at present and how should it be disseminated.

In this paper, measures to improve the current state of Japanese earthquake preparedness are discussed in reference to a cross-cultural questionnaire survey on earthquake information.

2. QUESTIONNAIRE SURVEY ON EARTHQUAKE INFORMATION

(1) Design of the questionnaire

Prior to designing the questionnaire, information on earthquake preparedness was classified into the following six categories, based on the author's previous study on related educational materials in Japan⁷⁾.

- a) Geo-science, which includes mechanism of earthquakes and tsunamis, intensity of ground motion and history of the earth.
- b) Earthquake damage, which includes not only direct damage to life and property but also indirect damage like fire disasters following earthquakes.
- c) Government initiatives, which include earthquake prediction, structural regulation and provision of refuge area.
- d) Human responses, which includes recommended immediate responses under various circumstances in order to minimize earthquake damage.
- e) Personal and/or voluntary preparedness, which includes family disaster plans, reduction of hazardous objects and storage of emergency foods.
- f) First-aid, which includes storage of first-aid kit, training of first-aid skills and rescue breathing, and principles of psychological first-aid.

The period after the Whittier Narrows earthquake of October 1, 1987 (M5.9) was considered the best opportunity for this questionnaire survey. Because in most major California newspapers of the following day, articles pertaining to all the above-mentioned six categories could be found. On this basis, the main part of the questionnaire was determined as shown in Table 1. Besides the questions shown in Table 1, each respondent was requested to answer his or her age, sex, city of residence, and occupation.

(2) Implementation of the questionnaire survey

The survey was conducted at three different places on three different dates. Groups which responded to the survey consisted of participants of the Environmental Volunteers' workshop held at Hillview Community Center, Los Altos, California; those of a seminar on earthquake engineering at Stanford University, Stanford, California; and those of a seminar on engineering seismology and earthquake engineering at the Graduate School at Nagatsuta, Tokyo Institute of Technology, Yokohama, Japan.

Of the above three organizations, the Environmental Volunteers (EVs)⁸⁾ is an independent, nonprofit organization founded in Palo Alto, California in 1972. It annually brings natural science lessons and preparedness information to over 8000 elementary school children and to 2000 adults in nearby communities. The core of EVs activity consists of about 100 volunteers. They are trained in a four-month, fourteen-session workshop course as shown in Photo 1. By the time the course ends, the volunteers should have the skills and knowledge necessary to deliver classroom presentations, as well as lead field trips to seismic fault trails.

Supposedly all the sample groups were regarded as special sets having higher awareness on earthquake

Table 1 Main Part of the Questionnaire Form.

[Q.1] On October 1, 1987, Whittier earthquake which hit Los Angeles,

a) Did you get news of the earthquake ? 1.no 2.yes
(In case of "1.no", please skip to [Q.2].)

b) How did you get the news first ? 1.newspaper 2.radio 3.TV
4.word of mouth 5.other (please specify:_____)

c) In the news, what kind of earthquake information were you most interested in ? Choose three items out of the following six.
1.geo-science 2.earthquake damage 3.government initiatives
4.human response 5.personal/voluntary preparedness 6.first-aid

d) After getting the news about the Whittier earthquake, what kind of information did you want to have in more detail ? Choose three items out of the following six.
1.geo-science 2.earthquake damage 3.government initiatives
4.human response 5.personal/voluntary preparedness 6.first-aid

e) Did you take any action to prepare for the next big quake after the Whittier earthquake ? 1.no 2.yes (in case of "2.yes", please specify:_____)

[Q.2] What kind of information do you think is most required for your earthquake preparedness ? Choose three items out of the following six.
1.geo-science 2.earthquake damage 3.government initiatives
4.human response 5.personal/voluntary preparedness 6.first-aid

preparedness than average citizens. Some comments on the survey such as dates, places and attributes of the groups are summarized in Table 2. Contrary to the seminar at Stanford University, that at Tokyo Institute of Technology was a spontaneous one to be held every three months and it is not accredited. Thus, almost all of the Tokyo Institute Technology group can be regarded as voluntary participants interested in earthquake engineering.

The same questionnaire written in English was used for the three groups. To avoid errors resulting from ambiguity in meaning, the questionnaire was vocally translated into Japanese in front of the Tokyo Institute Technology group. After all, no question was raised from respondents of any group during the survey.

3. RESULTS OF THE SURVEY

(1) Accessibility to information

Almost all the answers to [Q. 1] a) were "yes". In the EVs group, the only person who answered "no" was a retired woman over 60. This fact may suggest that special attention should be paid to dissemination for isolated aged persons. The Southern California Earthquake Preparedness Project (SCEPP) once conducted a study on information for people with disabilities⁹⁾, but seemingly, this study did not include information for isolated persons. Since such persons are increasing in number, information for them seems to require urgent solutions.

As for the answers to [Q. 1] b), they were expressed in terms of percentage for each group and plotted in Fig. 1. The three groups indicated quite different patterns in accessibility to information. Radio, word-of-mouth and TV were ranked top by almost half of EVs group, the Stanford University group and the Tokyo Institute of Technology group, respectively. This may suggest that accessibility to media is influenced by the time of day. The Whittier Narrows earthquake occurred at 7 : 42 AM on a Thursday. Around this time on weekdays, news from TV or newspapers can hardly reach many Californians in the commute rush.

(2) Information needs

In [Q. 1] c), [Q. 1] d) and [Q. 2], respondents were requested to choose three items out of six. But some respondents chose fewer items. The number of choices per respondent per question is shown in Table 3.

Regardless of this variation in the number of choices, results of these three questions were expressed in terms of percentage of the whole answers of each group and plotted in Fig. 2(a), (b) and (c), respectively.

It is understandable that everyone in each group was most interested in the damage in the earthquake news. What is noteworthy in Fig. 2(a) is that all three curves indicate almost the same pattern. Probably this pattern can be regarded as general preference for such earthquake news.

Curves in Fig. 2(a) and (b) show two kinds of information demand. Probably because interest in and demand for information about the damaging earthquake are closely related with each other, patterns shown in Fig. 2(b) are somewhat similar to those shown in Fig. 2(a). But fluctuation of demand among the six items appears less than that of interest.

Contrary to the other two patterns of the curves, curves in Fig. 2(c) show a remarkable difference between the three groups. The curve of the EVs group shows very high demand for information of personal/voluntary preparedness as well as first-aid, and very low demand for government initiatives. On the other hand, the curve of the Tokyo Institute of Technology group shows high demand for government initiatives. The curve of the Stanford University group lies in-between.

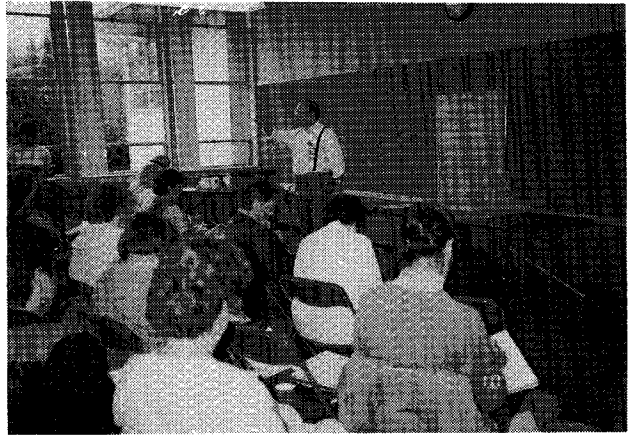


Photo1 EVs' Workshop at a Community Center.

Table2 Questionnaire Survey Comments.

Group Name	EVs	Stanford Univ.	Tokyo Inst. Tech.
Date	10/15/87	10/20/87	11/28/87
Place	Los Altos California	Stanford California	Yokohama Japan
Occasion	Workshop	Seminar	Seminar
No. of Resp.	17 ⁽¹⁾	26 ⁽²⁾	43 ⁽³⁾

Notes: (1) All were over 30 years old, including 3 of over 60 years old. Thirteen out of all were female.
 (2) Twenty-two out of all were between 20 and 40 years old, nineteen out of all were students, and all except two were male.
 (3) Age distribution was 16 in 20's, 11 in 30's, 9 in 40's, and 7 over 50. Thirteen out of all were students and 20' office worker. All except one were male.

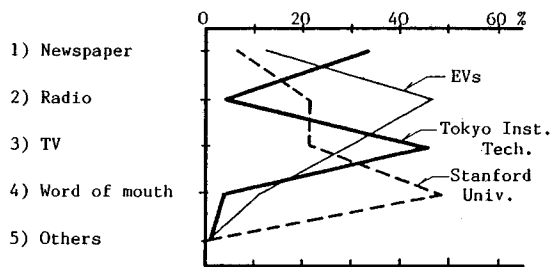


Fig.1 Answers to [Q. 1] b) Showing Accessibility to News.

Table 3 Number of Choices per Respondent per Question.

Group Name	[Q.1] c)	[Q.1] d)	[Q.2]
EVs	2.75	2.63	2.47
Stanford Univ.	2.42	2.50	2.65
Tokyo Inst. Tech.	2.92	2.95	2.86

Table 4 Number of Persons Who Acted or Did Not Act for a Next Big Quake after the Whittier Narrows Earthquake of October 1, 1987.

Group Name	Persons Acted	Persons Not Acted
EVs	6	10 ⁽¹⁾
Stanford Univ.	3	23
Tokyo Inst. Tech.	2	37

Note: (1) Two persons out of ten added the comments that they had "already prepared".

In order to interpret the results shown in Fig. 2, it is helpful to compare the answers to [Q.1] e) shown in Table 4. Table 4 shows a distinct difference among the groups, helping us characterize them. From the standpoint of earthquake preparedness planning, the preference pattern of the EVs group shown in Fig. 2(c) implies positive mobility to self-help activities, and that of the Tokyo Institute of Technology group implies the opposite.

4. DISCUSSION

As for low mobility to self-help activities of the Tokyo Institute Technology group, it cannot simply be attributed to a longer spatial distance between Los Angeles and Yokohama. Because it seems too optimistic to suppose that many citizens in Tokyo metropolitan area took concrete preparedness actions during the period following the 1978 Miyagiken-oki earthquake (M7.4) which seriously attacked Sendai City. Los Altos and Stanford are 500 km distant from Los Angeles, while Tokyo and Yokohama are 300 km distant from Sendai City.

Although the questionnaire survey is quite limited in sample quantity, and poor in organization, it would seem safe to summarize that the Japanese are over-dependent on government initiatives rather than taking self-help actions. In a strict sense, this summarization based on the limited survey may be somewhat subjective rather than objective. But it would be supported by many experts in Japan¹⁰ as well as those in the United States. Previously, C. Arnold pointed out some concerns and controversy regarding Japanese earthquake countermeasure planning¹¹, "one concern is that Japanese planning is over-dependent on centralized planning emanating from city hall and, as such, planning reduces the capacity of the Japanese to do the kind of improvisation that is always necessary in a disaster".

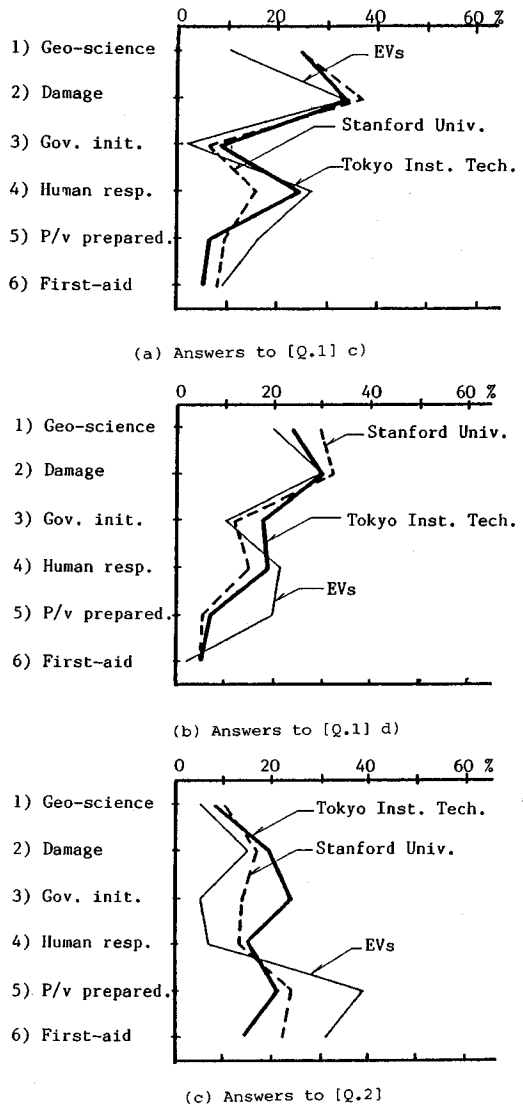


Fig. 2 Preference and Demand for Earthquake Information.

To the author's surprise, the over-dependency resides in Japanese human nature itself. This is a startling finding of great importance. According to H. D. Foster¹²⁾, reliance on government can lead to a public unwillingness to accept personal responsibility for safety in the belief that they will be rescued by the authorities. Apparently, his insight is consistent very well with the results of this questionnaire survey. With respect to the relationship between the Japanese over-dependency and the government's strong initiatives, an endless debate similar to a which-came-first-the-chicken-or-the-egg question may be raised. That is; if one insists that the Japanese over-dependency has naturally lead to the government's strong initiatives in disaster reduction, then the other will oppose by insisting that the over-dependency has gradually been produced as a result of many comprehensive efforts on the government's side which have often proved to be more efficient. To be productive, however, we had better focus on lessons learned from past earthquake disasters. Undeniably, one of the most important lessons is a fact that people cannot rely upon any centralized system, at least for awhile after a major earthquake. Thus, in view of the Japanese over-dependency, the first priority of Japanese earthquake preparedness planning should be placed in letting people understand this fact.

Meantime, it is worth noticing the highest mobility to the preparedness actions of the EVs group. In California, volunteers are active in not only developing educational materials but also in classroom presentations¹³⁾. This is partly due to the school system which is not subject to central control of the federal and state governments, but to decentralized control of local school boards¹⁴⁾. In such circumstances, school teachers are generally granted larger latitude and can easily introduce earthquake education provided by trained volunteers. In Japan, earthquake education for school children is rather stereotyped and hardly inspires their positive participation¹⁷⁾. To improve this situation, every effort to break the stereotypes should be made. For this purpose, it seems worth trying to extend teachers' latitude in, at least, earthquake education which includes curriculum making and development of educational materials. If any effort to cooperate with PTA and community volunteer groups is made in the education, it can induce additional effects on promotion of earthquake preparedness in the community.

Table 4 shows that a moderate damaging earthquake gives the best opportunity to remind people to prepare for future earthquakes. To make the best use of the opportunity, "pre-earthquake planning for post-earthquake rehearsal" is needed. This is another kind of PEPPER which was originally used for "pre-earthquake planning for post-earthquake rebuilding"¹⁵⁾.

5. CONCLUSION

Drawn from the limited questionnaire survey and some practical efforts in the United States, all the following findings will undoubtedly serve to improve the current state of earthquake preparedness in Japan.

(1) According to the cross-cultural questionnaire survey on earthquake information, Japanese are over-dependent on government initiatives rather than taking self-help action for earthquake preparedness. Thus, the first priority of Japanese preparedness planning should be placed in letting people understand the importance of self- and mutual-help activities.

(2) To break stereotypes, it seems worth trying to extend teachers' latitude in earthquake education. This will lead to not only development of more attractive curriculums and educational materials for school children, but also involvement of trained volunteers in the education, as can be seen in the United States.

(3) A moderate damaging earthquake like the 1987 Whittier Narrows earthquake gives a good opportunity to make people prepared for future earthquakes. To make the best use of the opportunity, pre-earthquake planning is needed at every level of a society which includes schools, neighborhood groups and households.

(4) In principle, the marketing approach can be effective in the planning for dissemination of

earthquake information. As preference and demand for the information vary with many factors such as generation and environments, the balance between supply and demand as well as accessibility to information should be taken into account in the dissemination planning.

(5) As for the accessibility, special attention should be paid to isolated aged persons whose accessibility to information is very low. In addition, accessibility to media is generally influenced by the time of day and persons' occupation. Accordingly, a wide variety of channels and media should be used in public dissemination of earthquake information.

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