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Study on Delay of Earthquake Countermeasures Due to Differences between Public Opinion and Individual Thinking



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ABSTRACT

Disaster countermeasures against earthquakes, *etc.* in Japan are currently not adequate. Moreover, citizens are less conscious of disaster preparedness, and therefore, preparations at the individual level are insufficient. In this paper, in addition to the study of earthquakes of the past, we introduce the preparation conditions for disaster for public institutions and individuals in the Kochi prefecture of Shikoku district where the first author lives. Furthermore, we record our thoughts and opinions about preparation for disasters.



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1. INTRODUCTION

Japan is a country where earthquakes occur very frequently. As shown in Table 1, earthquakes have occurred everywhere in the Japanese archipelago and cause severe damage to life or property. People die, and houses collapse, with furniture tilted or damaged. Earthquakes occur because of volcanoes in Japan and movements of the seafloor strata. However, the question remains as to why the Japanese cannot respond properly to the frequent earthquakes and prevent damage. It can be understood that it is difficult to respond immediately, since an earthquake happens without any warning, and we may not be prepared to tackle it. Still, people should be able to make use of experience. In this paper, attention is focused on countermeasures at the individual level in an earthquake, and the author's opinion is stated. Also, the first author currently lives in Kochi Prefecture, Shikoku district, which was also the area prepared for the Nankai Trough earthquake. Therefore, we will also introduce countermeasures for that location.

2. AUTHOR'S EXPERIENCE AND STATE OF MIND DURING PAST EARTHQUAKES

1) Hyogo Prefecture Nanbu earthquake

The first author of this article (JK) experienced earthquakes in Hyogo (1995), Ishikawa (2007), Tohoku (2011) among those listed in Table no 1. We write a little about his feelings and behavior at that time. Although the author's experience does not reflect the average appearance of the general public, it can be helpful.

When an earthquake in Hyogo (magnitude 7.3 scale) occurred, Kobayashi lived in Ishikawa (about 250 km away by linear distance), where tremors were not sensed. But his relatives lived in Osaka, whose area next to Hyogo also suffered damage, so memory is held relatively. Among the earthquakes that he heard and felt, the impact of this earthquake was great in that the place where he knew was enormously damaged for the first time in Japan. From television and newspapers, he learned that several buildings collapsed and the area looked like a burned-out field as depicted in a movie. There was food scarcity too all around. However, he did not think that his relatives were in such a situation. He felt unaffected, and it felt like an event in another world. Even though he heard that the housing situation was tough, he never visited the Kansai for a while.

So he could not feel how terrible the damage was. Better or worse, recovery was done at a rapid speed. His relatives had to secure a temporary residence somewhere as soon as possible and return to work. As a result, by being further away he could not get any additional information for a while. A celebrity was reported to be injured in this disaster, who was also involved in rescuing others. Temporary housing existed in the neighboring area where the earthquake had escaped for more than a year, but also gradually disappeared to be hidden. Although seemingly unbelievable, Japan has a thriving tourism industry. If reconstruction of a damaged site was not completed soon, tourists will not come. The Japanese workers had to conceal a lot of clutter while in the middle of a reconstruction or incomplete reconstruction as it was embarrassing for them. It seems that not being able to receive assistance from overseas was also characteristic of the Japanese. Not all residents regained their original lives soon, but several recovered early.

2) Ishikawa Prefecture Noto Peninsula earthquake

In the case of the Ishikawa prefecture earthquake (magnitude 6.9 scale), the author lived in the city part of the same prefecture (about 100 km away straight distance). He woke up in the morning, sensing a tremor, but did not know if he had to evacuate somewhere in particular. He learned from the television report that there was a large-scale earthquake in the Noto area, and houses have collapsed. There were a few collapsed houses in his vicinity but did not feel that earthquake damage was as terrible as in Hyogo. He learned about the following: 1) There were many old Japanese houses in the Noto area, and the houses often collapsed due to the weight of roof tiles; 2) Asbestos used for a long time because of heat insulation got scattered a lot after the collapse of houses, and secondary damage such as respiratory diseases was a cause of concern. In the case of this earthquake as well as the case of the Hyogo earthquake, he did not go to the site at once. Since no acquaintance was living in the Noto district, he was not conscious of the earthquake having any lasting influence upon him.

3) Great East Japan earthquake

During the earthquake of Tohoku area (magnitude 9.1 scale), he lived in Chiba (about 300 km in straight line distance). Earthquakes large enough to collapse shelves and TVs also occurred in Chiba; however, there was no necessity to evacuate from the building but only to hold on to things from falling at home. After the tremors stopped, he confirmed this experience with

news on a tsunami in the Tohoku region on TV, but he felt the images to be fake. He also experienced a situation where it was difficult to purchase gasoline and food items that were not present at the time of the previous earthquake. Gasoline seemed to have been out of stock for a while because priority was given for supply to emergency vehicles in affected areas. At shops, a bizarre phenomenon was observed that bread and canned goods that could be readily eaten and stored for long were out of stock, while warm daily dishes that had a shorter shelf life were lined up in supermarket stores in plenty. At Tokyo, public transport such as trains did not function because there was no electricity transmission, and as a result, to go to his office, the author had to walk the stretch for more than an hour. The local old bridge had cracked due to the earthquake and he could not cross over because there was a danger of falling. In the area along the sea in Chiba, the road was sinking due to liquefaction. Since only a manhole remained in its original position, it appeared that it was raised by several tens of centimeters above the height of the road.

4. Earthquake countermeasures of Kochi prefecture and Kochi citizen

Kobayashi is the first author who lives in Kochi prefecture in Shikoku area at present. When the Nankai-trough earthquake occurred, it was thought that enormous damage would occur (Nankai-trough is the area with submarine ditches where the Eurasia plate touches the Philippine Sea plate against each other, and where the Pacific coast in Shikoku-district is at the center). This chapter introduces measures against earthquakes by public organizations (Kochi Prefecture and Kochi City), and the general public as individuals. The author felt that there was a great deal of information from public organizations through brochures and posters and that there are many tsunami evacuation towers built along the coast as a countermeasure against tsunamis. Kobayashi has moved from other prefectures, so a difference is observed from measures in Ishikawa and Chiba prefectures. Both of these are phenomena that cannot be seen as measures in Hyogo and Tohoku. However, while such information is widely transmitted to the general public, the number of towers is not necessarily enough to evacuate the whole population. It also seems that only a few people absorb the information seriously. The Tsunami evacuation tower also has a playground for the park and is a sightseeing spot. There is no special difference in disaster prevention training itself, as is conducted in various places led by the local government other than Kochi. Because some residents have a sense of crisis, the frequency and number of participants may

be high (Table no 2).

What ordinary citizens living in Kochi are concerned about earthquakes and tsunami disasters is the altitude of the residence. There is a strong tendency to want to live in high places. Also, it seems that many people think that places away from the coast are safe from the effects of the tsunami and so on. This may be the effect of advertising by home sales manufacturers. Although details are not shown, it seems to be reflected in the price of rental housing. However, there is almost no sense of crisis that each house will be destroyed directly by an earthquake or a tsunami³. There are also a few residents who prepare food and store water stock and emergency supplies. This is not limited to Kochi (Figure no 2), but we feel a gap in crisis with the local government. In this way, while public agencies are concerned about the occurrence of earthquakes every day, citizens feel that it is normal not to think that there will be disasters so urgently. Even if the house is flooded, there is a tendency not to think that the car cannot be used. There is no assumption that bridges and roads cannot be used or public transportation networks are paralyzed. However, it is a fact that Kochi prefecture is the most difficult place to evacuate from disaster areas. This is calculated based on the route and time to go to the capital city of Tokyo. The development of high-speed railways and road networks is relatively delayed in the Shikoku region. Among them, Kochi prefecture is expected to be more affected by the tsunami because it faces the Pacific Ocean, and there are few places to escape from it. From these points, it is considered very important to prepare for disasters not only at the local government level but also at the individual level. Such awareness should be held at the level of citizen groups such as neighborhood associations.

3. RECOMMENDATION

From a twisted point of view, the local government does provide a lot of awareness; however, the citizens think that they are more strongly protected by the local government and fail to prepare for disasters individually. If it can be demonstrated the extent to which the local government can prepare for disasters and its limitations, it may help raise public awareness.

It is very difficult to spend time and money dealing with disasters that we do not know when they will occur. If it is a public institution such as a local government, it may be easy to find out the cost of anti-disaster measures such as expenditure for each fiscal year. In the case of an individual, the frequency and degree of preparation also relate to his or her income, which

may vary each year. Looking at the conditions of past earthquake disasters in Table 1, we observe that most of the damage is caused when the seabed is at the epicenter or when an earthquake exceeds the assumption at that area (or is larger than the scale of big earthquakes of the past). However, disasters are difficult to predict, and we do not know when or at what magnitude they will occur. The general public is required to make efforts to minimize damage by making preparations as complete as possible. In addition to that, if a disaster occurs, the attitude of helping nearby residents is very important, since there are limitations for preparation about individuals, as pointed out earlier. Recently, TV and other media reported that humanitarian assistance such as distributing food was provided free of charge by food makers and stores when the typhoon hit. The same effort should be possible for each citizen. It is considered that this will not only compensate for lack of preparation but will also help in the alleviation of isolation, should a disaster occur.

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Table no 1 Characteristics of major earthquakes in recent years

Date	Name	Maximum seismic intensity	Magnitude	Human damage situation
January 17, 1995	Hyogo Prefecture Nanbu earthquake (The Great Hanshin-Awaji earthquake, Great Hanshin earthquake)	7	7.3	6,437 dead or missing people
October 23, 2004	Niigata Chuetsu earthquake	7	6.8	68 dead
March 25, 2007	Ishikawa Prefecture Noto Peninsula earthquake	Upper 6	6.9	1 dead
March 11, 2011	Tohoku region Pacific Coast earthquake	7	9.0	About 22,000 people dead or missing
April 16, 2016	Kumamoto earthquake	7	7.3	258 dead
June 18, 2018	Osaka Prefecture Northern earthquake	Lower 6	6.1	5 dead
September 6, 2018	Hokkaido Tanshin Eastern earthquake	7	6.7	41 dead

It describes major earthquakes since 1995.

Table no 2 Participation rate of disaster prevention training (evacuation training)

Age and gender	Training participation rate (%)
10s male	50.0
20s male	16.0
30s male	25.6
40s male	32.2
50s male	30.8
60s male	24.8
10s female	39.7
20s female	12.7
30s female	11.3
40s female	10.4
50s female	21.2
60s female	19.0
Average	24.7

Survey of 10-60 men and women living in Japan in August 2012 (n = 1389)

It is not a confirmation of attendance of specific training.

Based on the data of Reference 2)

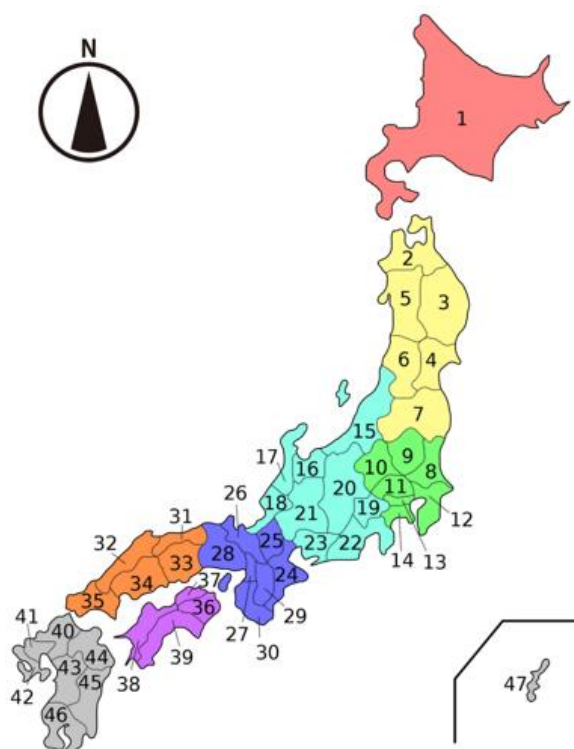


Fig. 1 Map of Japan

Regions and prefectures showed in the text are Hokkaido (1), Tohoku (2-7), Kanto (8-14), Shikoku (36-39), Miyagi (4), Fukushima (7), Ibaraki (8), Chiba (12), Tokyo (13), Niigata (15), Ishikawa (17), Osaka (27), Hyogo (28), Wakayama (30), Kochi (39) and Kumamoto (43).

The Noto peninsula is an area of northern Ishikawa prefecture, and the Ojika Peninsula is an area of eastern Miyagi prefecture.

The Pacific Ocean is the open ocean on the east side of the Japanese islands.

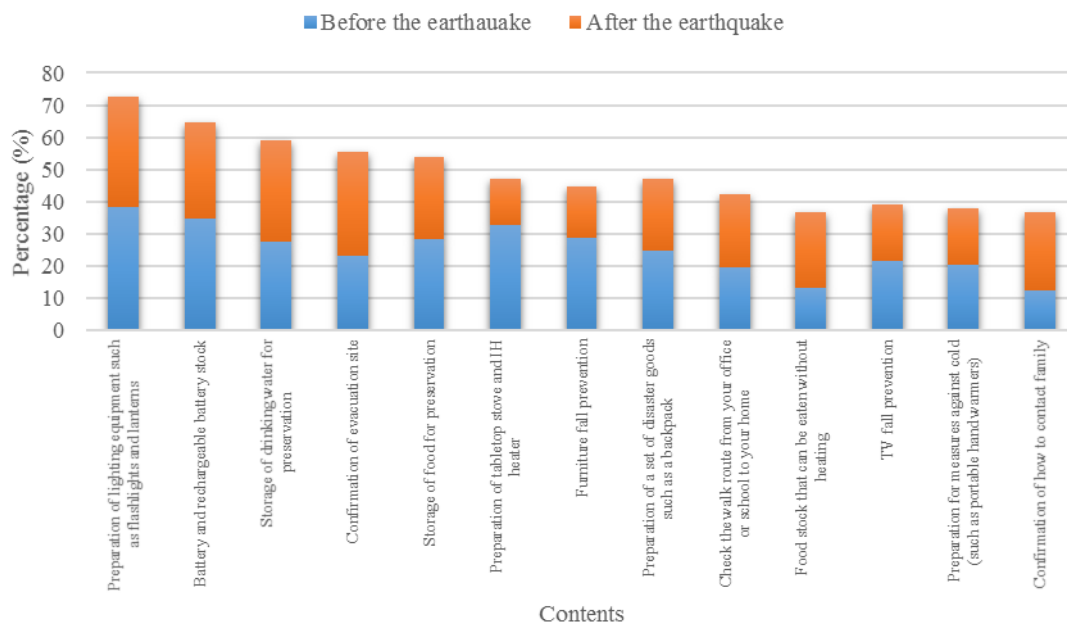


Fig. 2 Percentage of preparation for earthquake

In December 2014, Tokyo Gas Urban Life Research Institute surveyed citizens across Japan (n = 1200).



Based on the data of Reference 4)