Survey on Awareness and Knowledge of Earthquake Disaster Mitigation: Focus on High-rise Condominium Residents in TOKYO, Japan

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SUMMARY:
The possibility of a big earthquake in Tokyo in the future is high. When it occurs, many people will face problems returning to their homes, causing chaos in the city. It will be impossible for everyone to access emergency shelters. If buildings, like high-rise condominiums, remain standing and safe, it will be desirable that their residents take refuge at home. In this study, we investigate the consciousness of disaster mitigation needs among 500 residents of high-rise condominiums in Tokyo. We show that about 50% of residents take refuge at home. However, almost none of them have emergency supplies like water, food, or daily necessaries. This shows that many people will need to move to emergency shelters. By analysing these conditions, we hope to develop a method to avoid confusion after a disaster and educate building residents on their needs in a disaster situation and the actions they need to take.

Keywords: High-rise condominiums Long-period ground motion Awareness of disaster mitigation actions Refuge area Taking refuge in one's own residence

1. GENERAL INSTRUCTIONS

The possibility that a big earthquake will occur in Tokyo in the coming years is high. In central Tokyo, with its high population density, when a big earthquake occurs, many human lives will be lost and buildings destroyed. Moreover, many victims will be unable to return home. Presently, few shelters are available, and shelter accommodation in the event of a disaster will be inadequate. This is a problem especially in dense areas with many high-rise condominiums. Therefore, for the residents of those high-rises that remain habitable in the event of an earthquake, it will be desirable to prepare a refuge at home.

However, many people who will not be able to find space at a shelter have no fallback plan in the event of a disaster. Buildings can be damaged in an earthquake—for example, elevators can stop—and this will make it hard for the inhabitants of these buildings to function unless they have adequate stockpiles of supplies at home. Therefore, when an earthquake actually occurs, great confusion will arise in central Tokyo. As a step toward addressing this issue, we administered a survey on knowledge of earthquake disaster prevention to high-rise condominium residents.

2. OUTLINE OF THE INVESTIGATION

The respondents to our survey were 519 residents of high-rise condominiums (of 10 or more stories) in the 23 special wards constituting central Tokyo. The investigation assessed awareness of disaster mitigation, preparation for an earthquake, consciousness of refuge-preparation needs, etc. A part of the investigation outline is shown in **Table 1**. The survey was conducted between March 11 and March 13, 2011; the Great East Japan Earthquake occurred during the investigation. However, the earthquake did not have a notable influence on the results.

Table 1. Outline of the Investigation

Investigation date	March 11-13, 2011	
Investigation method	Internet questionnaire	
Respondents	High-rise condominium residents in the 23 special wards of Tokyo (A building is considered to be a high-rise if it is 10 or more stories.) (Inhabited story contains the 10th less than floor.)	
Investigation topic	Awareness of issues and needs for disaster mitigation, preparation for an earthquake, refuge-building, supplies, formal shelters, taking refuge in one's own home, etc.	
Respondent	519 People (20 to 79 years)	
Attributes	Breakdown by gender	male 51%, female 49%
	Number of stories	10 to 58
	Inhabited floors	first floor to the 56th floor

3. AWARENESS OF ISSUES THAT MIGHT ARISE AT HOME IN THE EVENT OF AN EARTHQUAKE

One question asked about points that caused the respondents anxiety when they imagined the occurrence of a major earthquake with its epicenter in the Tokyo metropolitan area. The results are shown in **Fig. 1**.

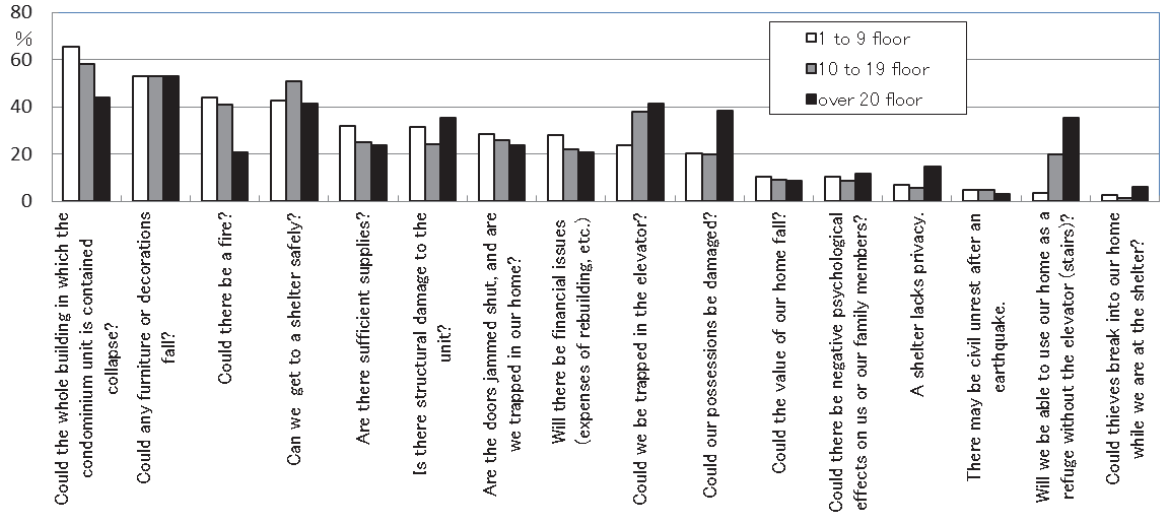

Figure 1. Sources of anxiety in the event of a major metropolitan earthquake

Major worries included, among people living on the higher floors, the possibility of being trapped in an elevator and the viability of stairs after the earthquake. Other issues mentioned included what would happen to pets, how to contact the family at home if the earthquake struck when the respondent was out.

4. RECOGNITION OF SHELTERS

Another question assessed recognition of official refuge areas. The results are shown in **Fig. 2**.

Less than half the number of respondents knew where the nearest refuge was. Respondents were also asked about rules of or provisions for refuge in their buildings in the event of an earthquake. The results are shown in **Fig. 3.**

Notable findings include the following: 25% of respondents answered, "There is no rule," and 45% answered, "I have not been made aware of any rule." Further, 35% of respondents living on the 30th

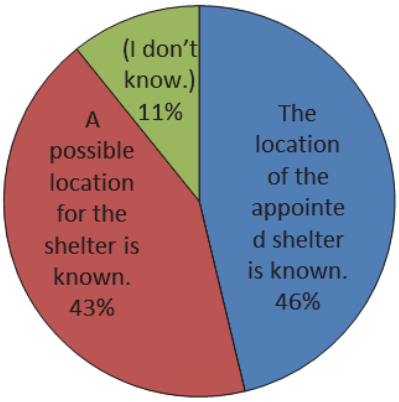

Figure 2. Recognition of the shelter area

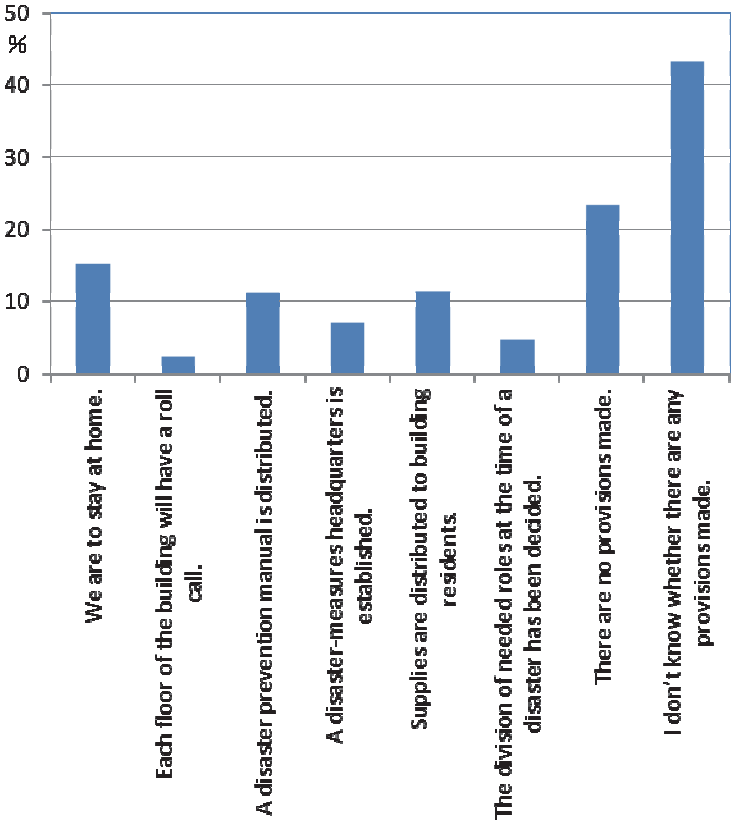

Figure 3. Recognition of building provisions and rules in time of disaster

floor or higher answered, "I don't know." Finally, for respondents living on the 20th floor or higher, more than 20% answered that the rule was to seek shelter at home.

These results show that many high-rise condominium residents do not know the rules regarding seeking shelter at the time of a huge disaster.

5. AWARENESS OF ISSUES CONCERNING TAKING REFUGE AT HOME

After a big earthquake, there is a strong possibility that almost all elevators will stop for a long period. Therefore, when high-rise condominium residents take refuge at home, the use stairs becomes necessary. Thus, a question was asked about the perceived difficulty of use of stairs in a disaster. The results are shown in **Fig. 4.**

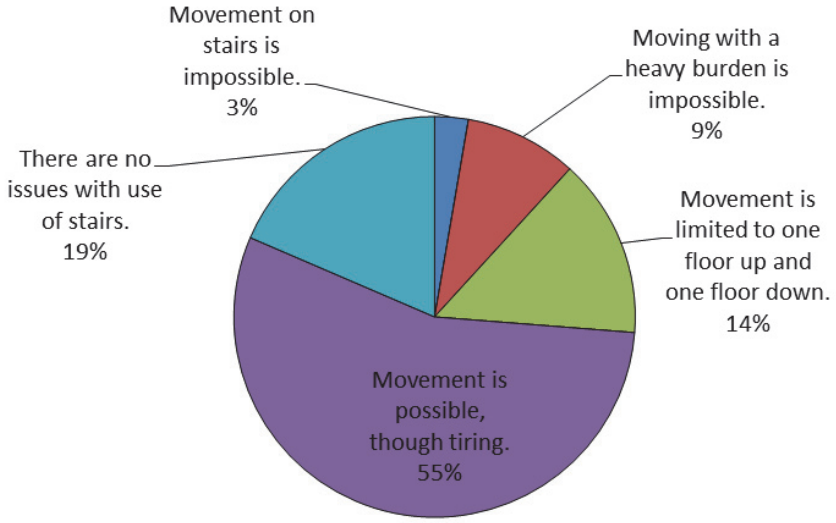

Figure 4. Usability of stairs in the event that the elevator stops

Although about 25% of respondents felt that there would be difficulties using stairs, this answer varied less by the floor on which the respondents lived and more by age. Respondents were also asked where they would choose to take refuge: at a shelter or at home. About 65% answered "at home," and about 35% answered "in a shelter." However, many people who answered "at home" also mentioned that they would see how the situation developed and might move to a shelter later. These replies were not influenced by the perceived difficulty of the use of stairs.

Next, respondents were asked about the supply situation at home. The results are shown in **Fig. 5**.

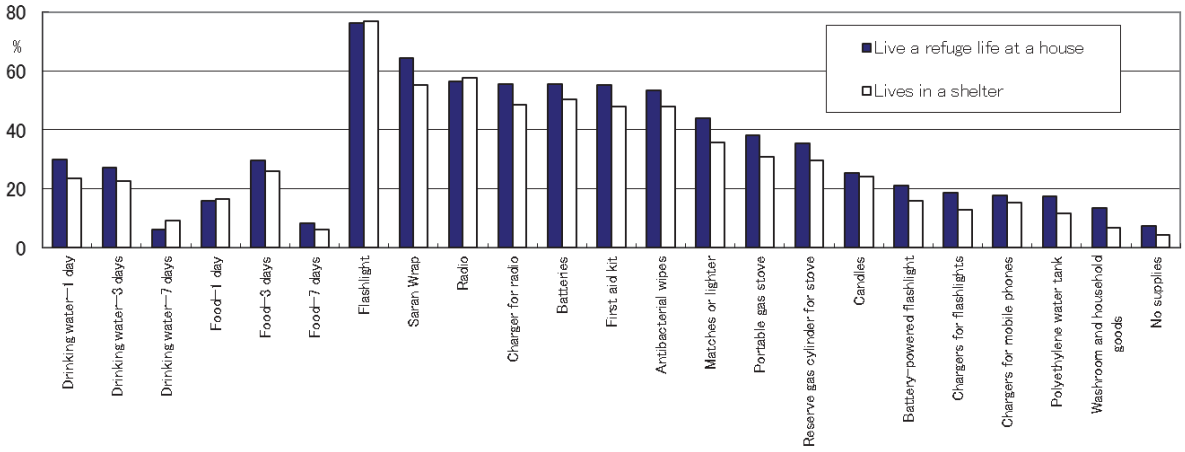

Figure 5. What is stored at the house?

People who answered that they would take refuge at home were better prepared in terms of supplies than those who said they would take refuge at a shelter. However, the difference between the groups was not so large. Although official guidelines specify that to prepare adequately for a metropolitan earthquake it is necessary to store enough water and food for seven days, fewer than 10% of respondents had fulfilled this condition.

6. AWARENESS OF LIFE ISSUES AFTER AN EARTHQUAKE

Respondents were asked about their reasons for choosing the refuges they did. The results are shown in **Fig. 6.**

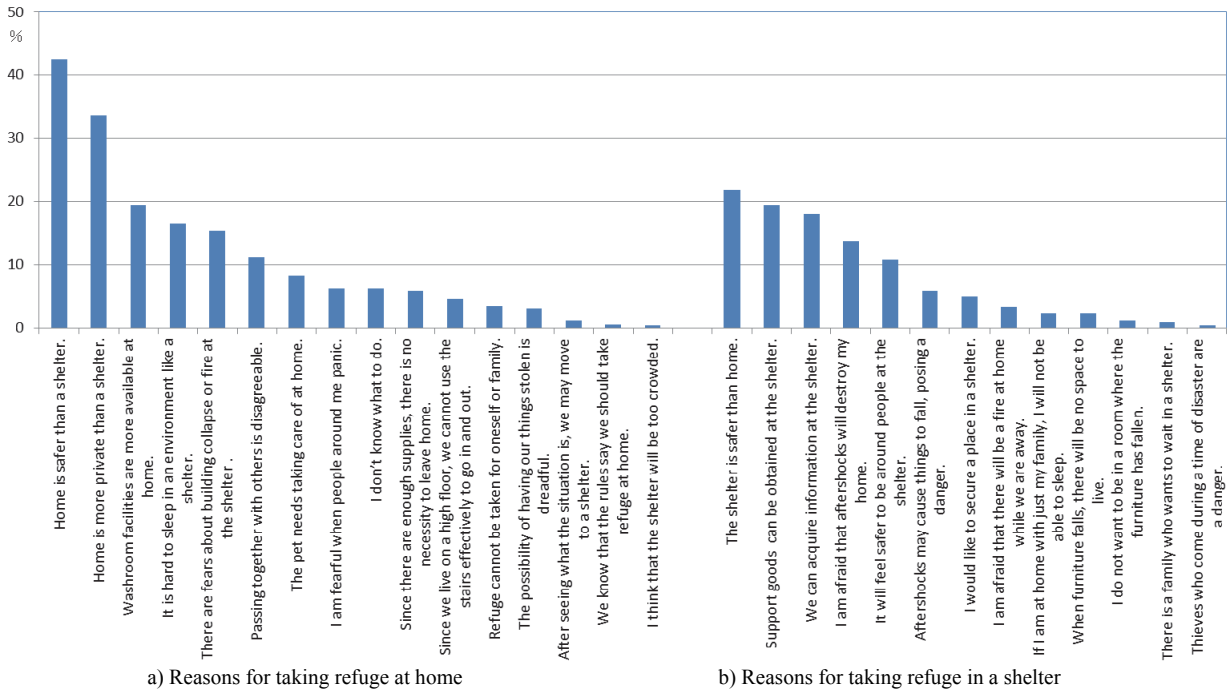

Figure 6. Reasons for selection of refuge area after a huge earthquake (when there is no damage to one's home)

People who said that they would take refuge at home cited the safety and privacy of their homes as reasons, while people planning to go to a shelter cited safety and the ability to obtain supplies and information.

The next question concerned the merits and demerits of living in a shelter. The results are shown in **Fig. 7**.

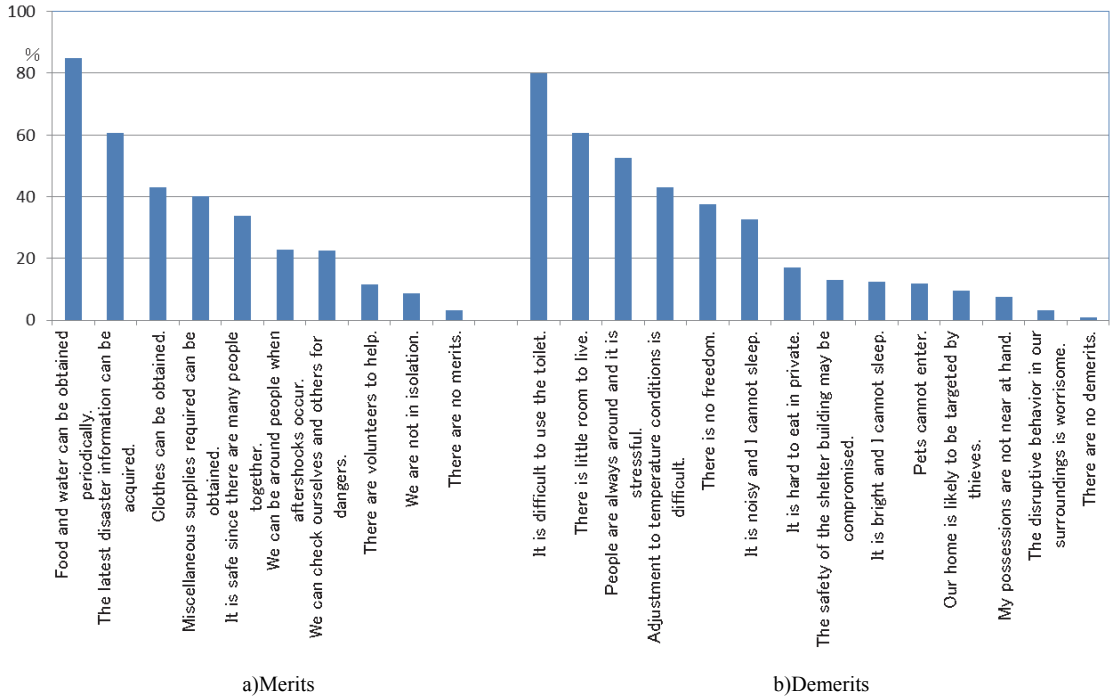

Figure 7. The merits and demerits of going to a shelter

As merits, the availability of supplies such as food, blankets, and clothing, as well as the opportunity to get information, were mentioned. Many people also replied that they valued the sense of security that would be obtained because there would be many people together. Demerits mentioned included the bad condition of washrooms and the lack of living space.

7. CONCLUSION

The purpose of this research was to examine approaches to refuge after an earthquake among residents of high-rise condominiums. Awareness of disaster mitigation, actions needed to develop a refuge, and the options for shelter for high-rise condominium residents were investigated.

The results showed that one-third of residents of high-rise condominiums would prefer to take refuge in a shelter than at home, which is the opposite of the officially preferred approach for these people: taking refuge at home if possible. To explain these peoples' attitudes, two points are important: they wish to acquire information and to secure needed supplies. However, the possibility that all the high-rise condominium residents in the 23 special wards of central Tokyo can be accommodated in shelters is slim.

Therefore, it will be necessary to raise the level of recognition that it is necessary to take refuge in one's own place of residence in the event of a disaster and to educate people about the needed arrangements and supplies. Developing a system to carry out these concrete methods is a subject for future research.

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