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Preparation situation to storing supplies for disasters against residents of high-rise condominiums apartments in Tokyo, Japan

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Abstract

The possibility that a major earthquake could affect Tokyo in the future is high. In that event, buildings and the lives of people who live in them will suffer significant damage. Moreover, many people will be unable to return home after such a disaster. Because the downtown Tokyo population density is high, the number of high-rise condominiums in the area greatly exceeds the number of displaced person shelters. Even if inhabitants relocate to emergency shelters after an earthquake, the potential for confusion is high.

Therefore, the government has recommended that residents of relatively new high-rise residential buildings resist going to emergency shelters and instead remain in their own homes. However, most people are unaware of this information. We conducted a survey of over 800 residents living in high-rise condominiums (of 10 or more stories) in central Tokyo. The survey assessed awareness and knowledge about earthquakes and disaster preparedness. Results show that about 50% of residents would take refuge at home. Many of the key reasons for doing so are the poor living conditions at emergency shelters (e.g., small spaces, no privacy, and noisy surroundings), prohibition of pets in emergency shelters, and so on.

However, almost none of the respondents had emergency supplies available, such as water, food, or other daily necessities. This lack of preparedness would result in many people needing to move to emergency shelters during a disaster. If residents' own homes were to be unscathed, many respondents who still wish to evacuate to emergency shelters cite reasons such as the availability of information regarding aftershocks, damage to the local area, and damage to and restoration status of transportation facilities and lifelines. They also expect these shelters to distribute food, water, and daily necessities.

By analyzing 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 preparatory actions they need to take.

Keywords: high-rise condominiums residents, refuge in own home, evacuation behavior of citizens, central Tokyo

1. Introduction

It is considered that the possibility that a major earthquake will occur in Tokyo in the present years is high. In the central part of Tokyo with great population density, when a major earthquake occurs, many human lives and buildings may be lost. Moreover, it is considered that many victims will be unable to return home. However, there are few shelters, falling short of the accommodation number required for large quantities of evacuees. Therefore, not all citizens would be able to go to a shelter. This reality is especially prominent in areas with many high-rise condominiums. Therefore, for residents of super-high-rise condominiums intact after a disaster, it is desirable to prepare so that refuge may be taken at home. [1-5]

However, there are also many people of the opinion that many residents would take refuge in a shelter if an earthquake is encountered. It is difficult for those who do not hold a stockpile of supplies at home to live there after disaster, especially with the stoppage of elevator service, etc. Therefore, when an earthquake actually occurs, extensive confusion will arise in central Tokyo. With this situation in mind, an opinion poll regarding earthquake disaster prevention was performed for 845 high-rise apartment residents.

2. Investigation outline

Each respondent to the survey is a resident of high-rise condominiums with 10 or more stories in one of the 23 wards of Metropolitan Tokyo. The investigation was conducted on the topic of awareness regarding disaster mitigation, preparation for earthquakes, awareness of refuge considerations, etc. A part of the investigation outline and its attributes are shown in Table 1.

Table 1 Outline of Investigation

Investigation date	From February 22 to 25, 2012
Investigation method	Questionnaire on the Internet
Candidate	Condominium residents in 23 wards of Tokyo (for buildings with 10 or more stories, where a residence stories is 6 or more stories)
Investigation content	Awareness of a disaster mitigation, preparation for earthquakes, awareness of refuge activity, supply stockpiles, awareness of shelter, awareness of seeking refuge in own condominiums, awareness of information access tools, etc.
Respondent	845 people (from 18 years old to 83 years old)
Attribute	Men 48%; Woman 52% Number of stories of a building: 10 to 60 Residence stories: 6 to 60

3. Taking refuge at home: Examination by total number of homes in condominiums

This research examined residents of super-high-rise condominiums. The scale of the building as well as the building's number of stories (and the total number of homes) affect a resident's awareness and behavior after a major earthquake.

In this report, findings were analyzed according to the buildings' total number of homes shown in Fig. 1.

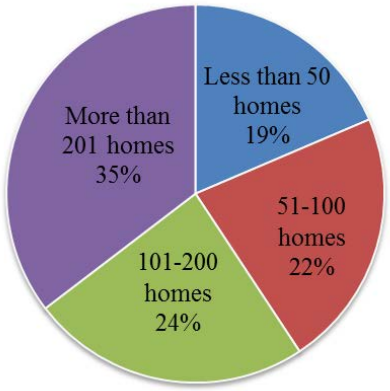

Fig.1 Total number of homes in condominiums

Small-scale, medium-scale, large-scale, and super-large-scale condominiums are defined as having fewer than 50 homes, up to 100 homes, up to 200 homes, and more than 201 homes.

The awareness of cooperation among residents after a large earthquake was checked. The results comparing every building scale are indicated in Fig. 2.

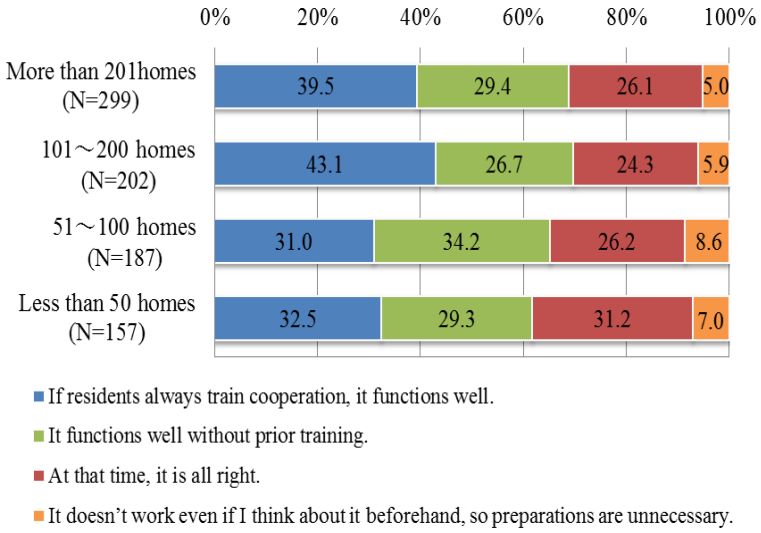

Fig.2 Awareness of cooperation among residents and preparation after a major earthquake

Residents of large-scale condominiums tended to think that prior training for disaster preparedness is necessary. In small-scale condominiums, residents tended to think "During a disaster, it will be alright". In large and super-large-scale condominiums, many residents expected prior training. Thus, there is a difference in the preliminary preparations expected by residents according to the scale of their condominium.

Fig. 3 shows the expected means of acquiring information when the electricity fails after an earthquake.

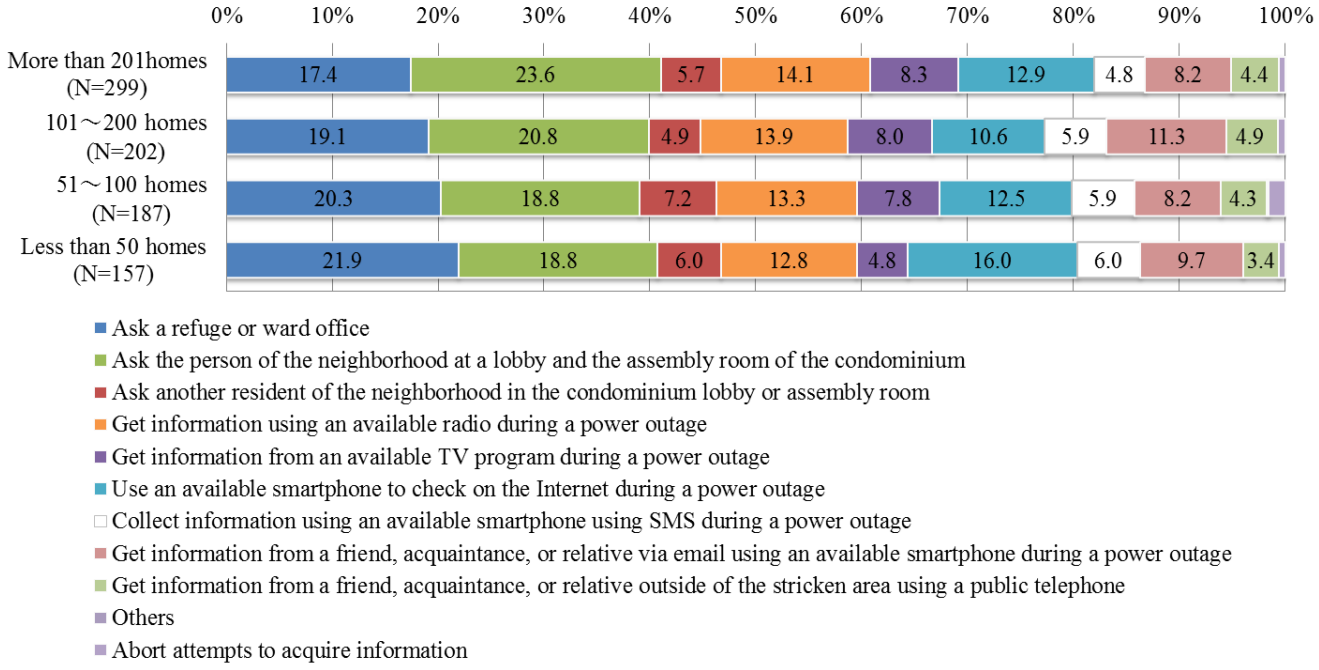

Fig.3 Awareness of information acquisition after a major earthquake according to total number of condominium homes

Residents of small-scale condominiums expect information from external sources, including the refuge or the ward office; but many residents of large-scale and super-large-scale condominiums expect access to information from inside their condominiums. In large-scale and super-large-scale condominiums, it is desirable to examine possible systems of information sharing.

Fig.4 shows that awareness of methods of sharing surplus storage between condominium residents and concrete methods of sharing information.

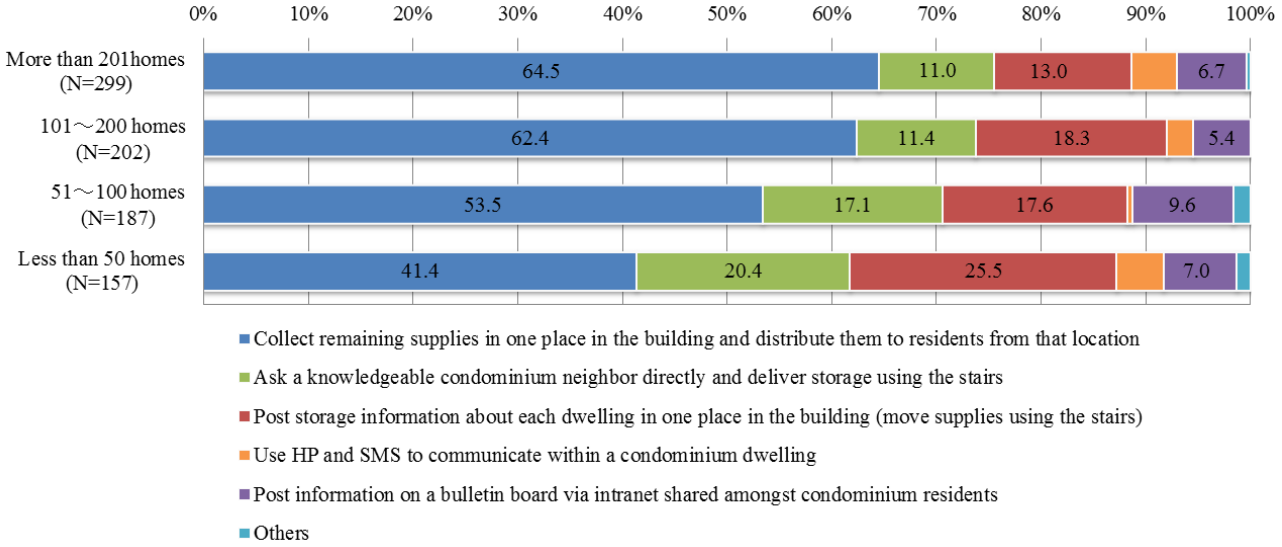

Fig. 4 Awareness of information sharing after a major earthquake according to total number of condominium homes

The response suggesting using the stairs between the first-floor lobby and the dwellings in the condominium as the means by which residents gather information was common among small apartment residents.
As the scale of the building becomes larger, the information acquisition becomes high in a ratio in hope of means to share with a turn system.

There are many high-rise condominiums in large-scale buildings; this is one of the factors that makes it unrealistic for each resident to move using the stairs. Thus, as for the measure and the preinclination supporting living in refuge after the damage, it is desirable for contents depending on an apartment scale to do.

4. Awareness of cooperation among condominium and neighborhood residents

When a major earthquake occurs in central Tokyo, because the refuge capacity is much less than the demand and many residents would encounter difficulty in returning to their residences, confusion is likely to occur. Fig. 5 shows the awareness of this situation: that neighboring victims would be unable to enter refuges and that many disaster victims would be unable to return home, consequently flowing into parking lots and the lobbies in condominium sites.

Many people believe that it is permissible to provide public spaces at a site to victims from elsewhere in the neighborhood. Furthermore, when devising a system supporting surplus storage in a condominium, residents were asked whether it could also supply many neighboring victims unable to enter refuges or to go home. Results showed that 60% of respondents would permit this while 40% would not.

Many of reasons for allowing this access obtained in free answers expressed the idea that “we should help each other in times of need,” and some respondents answered "that such access could be permitted for a short term”. Fig.6 shows the results of the free answers explaining the reasons for not allowing such access.

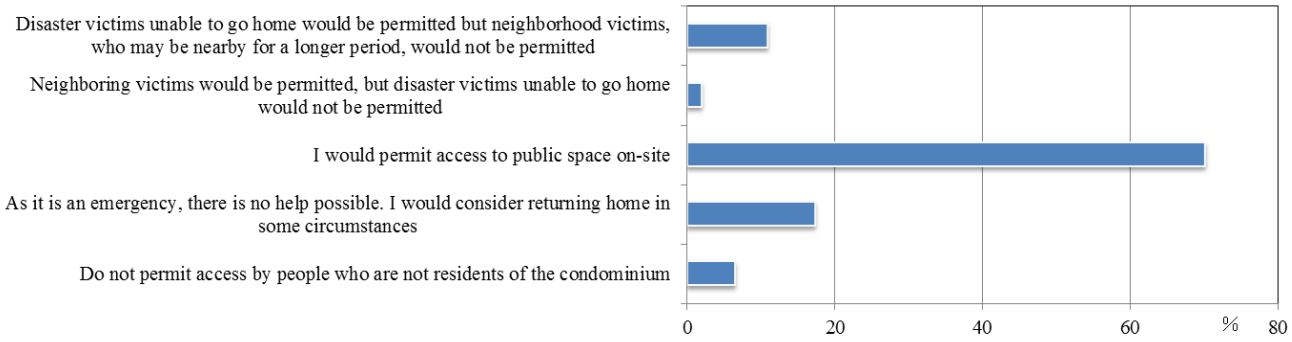

Fig.5 Beliefs regarding opening access to the condominium site after a major earthquake

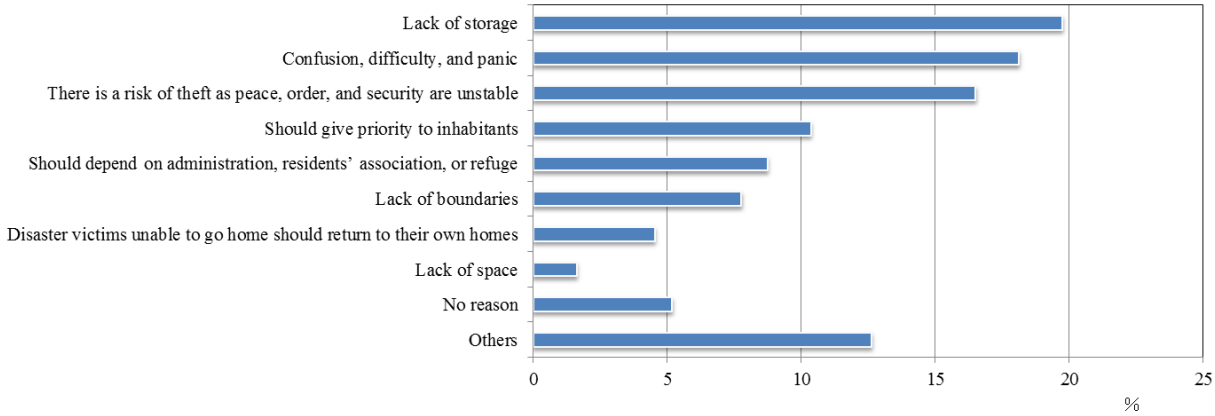

Fig.6 Reasons not to provide mutual assistance beyond condominium inhabitants

The most common reason given for not permitting access for neighboring victims unable to enter a refuge and unable to go home was that surplus storage is short. Moreover, many people cited the reason of concern for safety, peace, and order, and avoiding difficulty. In addition, there are some respondents of the opinion that "I could permit it only on the first day, but disaster victims unable to go home should be permitted to come into homes" and "that the administration, residents' association, and refuge should provide support." Respondents tended to permit leaving an in-service space on their site open, but there were differences in the way they thought about ways of helping each other.

5. Imaging life as an evacuee according to free answers from respondents

As a result of having asked about the image of damaged life after a major earthquake, the answer "I spent time in my own home for around one week" was the most common. Next, most common was the answer "to gather information positively, and to communalize the information". Regarding relations between inhabitants of the same apartment, opinions were divided into two by the opinion that "a person from the same condominium is reliable" and the opinion "I doubt whether people who do not know each other can help each other". In addition, one week after an earthquake, most people evacuate to a relative's or acquaintance's home, and many people assume that there would then be few people remaining behind in their condominium.

Many respondents thought that "information acquisition is more important than storage and supplies" and that "dense information sharing is important". Moreover, many respondents expected not only collection of information, but also gathering information from other inhabitants. Many respondents expected damage to be considerably more minimal than the damage assumed so that, for instance, "electricity is restored immediately". Furthermore, many answers indicated great expectations towards administrative storage to hold information.

Therefore, in the future it will be necessary to enlighten residents regarding the realities of measures involved in life as an evacuee.

6. Conclusion

The purpose of this research was to examine the state of refuges in super-high-rise condominiums focusing on the viewpoint of residents. Residents' awareness of disaster mitigation, refuge action, and shelter for a high-rise condominium was investigated.

In this paper, results were dependent on the scale of the respondents' condominiums.

As a result, there were differences in the measures and appropriate systems required according to the scale of the buildings. It will be necessary to examine correlations with the scale of condominiums in the future. In addition, many respondents indicated opinions in support of providing a part of the in-service space of their condominium to neighborhood inhabitants to mitigate the lack of refuge housing capacity, but, in terms of practical cooperation, there were many different opinions among residents of the same condominium. It is necessary examine each condominium individually with regard to these concrete measures.

In addition, what constitutes appropriate reporting and raising awareness among residents is a future problem because they have a strong awareness of their dependence on administration.

7. Acknowledgements

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