

IMPLEMENTATION OF TSUNAMI DISASTER EDUCATION FOR CHILDREN AND THEIR PARENTS AT ELEMENTARY SCHOOL

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Abstract: It is expected that many coastal regions in Japan will be attacked by huge tsunami in near future. Therefore, tsunami evacuation plans are considered in Japan. In this paper, tsunami disaster education was carried out for elementary school children and their parents. The purpose of this education was to encourage development of a family plan for tsunami evacuation. At first, children and their parents learned about tsunamis and how to evacuate safely during tsunamis. Second, they searched for safety tsunami evacuation places near their houses. Third, they made a tsunami evacuation map and developed the family evacuation plan based on this map. Through this education program, children not only got the knowledge about tsunami but also got the wisdom about tsunami evacuation.

INTRODUCTION

Problem about Tsunami Evacuation in Japan

There is a prevailing concern that a huge tsunami might be generated by earthquakes on the Sanriku, Toukai, Tounankai, or Nankai fault zone in Japan. It is clear that residents who live in coastal areas need to evacuate immediately after the earthquake occurrence in order to reduce the number of casualties that might result due to these tsunamis.

However, even if the Japanese government issued tsunami warning and evacuation information to the residents in coastal areas, there is a concern that residents might not understand or obey the evacuation order. For example, in a recently survey undertaken by T. Katada, et al. 2005, it was found that during Miyagiken-Oki

earthquake which occurred on May 26 2003 the percentage of residents evacuated in Kesenuma City Japan was 1.7%.

Therefore, tsunami disaster education is being carried out in various means in order to give residents information about the risk from tsunamis and encourage them to evacuate immediately following an earthquake occurrence. Moreover, many articles, games and simulators (text books, simulation system, educational tools card game, etc) have been published or developed (K. Yamori, et al. 2006) to educate residents about tsunami preparedness measures.

Low Level of Residents Participate in Tsunami Education

Tsunami disaster education faces several problems. Generally, the trend is that few persons attend these disaster educational forums and it is usually those who already have a keen interest in the subject matter that attend. On the other hand, residents who are not prepared or who do not have any interest in the subject matter tend not to attend the disaster educational forum. As a result, the facilitators of tsunami disaster education forum cannot communicate with the residents who do not participate in the discussions.

It is not surprising, that those residents who do not participate in the educational forums are less prepared and have a lower level of tsunami risk perception than those residents who do participate in the forums. As such those who do not participate are less likely to undertake evacuation immediately following the occurrence of an earthquake in the future. Moreover, research has indicated that there is a lower rate of participation among younger residents than among the elderly. Therefore, it is necessary to develop a method of tsunami disaster education that will encourage or enable communication with all residents especially those who have never participated in a disaster educational forum.

Tsunami Experience is Fading

In the past a number of coastal towns have been repeatedly affected by tsunami occurrences. Therefore, this has resulted in the development of a disaster culture (tsunami knowledge and wisdom) which is peculiar to each town based on their individual experiences of being affected by tsunamis. Until now, this knowledge and wisdom has been conveyed to children by parents and to grandchildren by children. This tradition of relaying tsunami experience and wisdom from generation to generation can contribute to a reduction in the number of casualties caused by the tsunami.

For example, over 220,000 people died in 2004, due to the Indian Ocean Tsunami. However, a lot of residents of Simeulue Island in Indonesia were able to survive the tsunami by evacuating to higher ground due to the tsunami wisdom which they referred to as “Smong”. This means “If the tide goes out unnaturally after a strong earthquake, a huge tsunami will occur, so one should evacuate to a higher ground immediately” (McAdoo, B. G, et al. 2006).

In Japan, similar traditions about tsunami wisdoms also exist in coastal towns, however, these traditional accounts of tsunami damage are gradually fading away. In research carried out by M. Kanai, et al. 2007, it was found that local tsunami knowledge/wisdom is beginning to disappear in the Kamaishi City, Japan. This location is known to have been repeatedly affected by tsunami occurrences in the past that have resulted in a number of casualties. And now it is predicted that Kamaishi City will be affected by Sanriku earthquake tsunami in the near future. According to the research carried out by M. Kanai, et al. 2007, most children in Kamaishi City have little knowledge about tsunami evacuation. For example most of them don't know where they should evacuate following the occurrence of an earthquake. This is because the occurrence of parents sharing with their children their knowledge about tsunamis has been decreasing. As the result, most household have never developed a family plan which should include; where to evacuate, how to contact each other, or what to pack for possible tsunami evacuation, etc.

Purpose of Tsunami Disaster Education

Based on the above issues, it is necessary for residents in tsunami-prone area to understand the tsunami risk of their domiciles and to know the safety evacuation places from tsunami in order to encourage more residents to evacuate from tsunami. Therefore, our research group carried out tsunami disaster education. The purpose of this education is as follows;

1. To share with children the wisdom of tsunami knowledge and evacuation, and to encourage them to evacuate promptly after an earthquake occurrence.
2. To encourage more parents to participate in tsunami disaster education.
3. To encourage families to develop tsunami preparedness and response plans for each household.

UNDERTAKING OF TSUNAMI EDUCATIONAL FORUM

In order to achieve the above three purposes, tsunami education forums were carried out with children and their parents from two Elementary Schools in Kamaishi City, Japan. Both schools are located at seaside areas. Therefore, when tsunami comes to Kamaishi, portions of each school zone are in inundation areas. The forum was carried out over three days. The flow of a forum is shown in Fig. 1. The number of children who participated in the forums and the date when forums were carried out are shown in Table 1. All schedules of the forum used our research group staff as the facilitators.

Lecture on Tsunami to Children and Their Parents

On the first day of the forum, the facilitator started the program by giving separate lectures on tsunamis to children and their parents. The contents of the lecture to children were different from those to their parents. Children were educated in traditional tsunami wisdom and where to evacuate safely in their town. On the other hand, parents were informed that their children have very little knowledge about tsunami, and encouraged to develop a tsunami family plan. Both lectures were carried out at school. The time of each lecture was about 90 minutes.

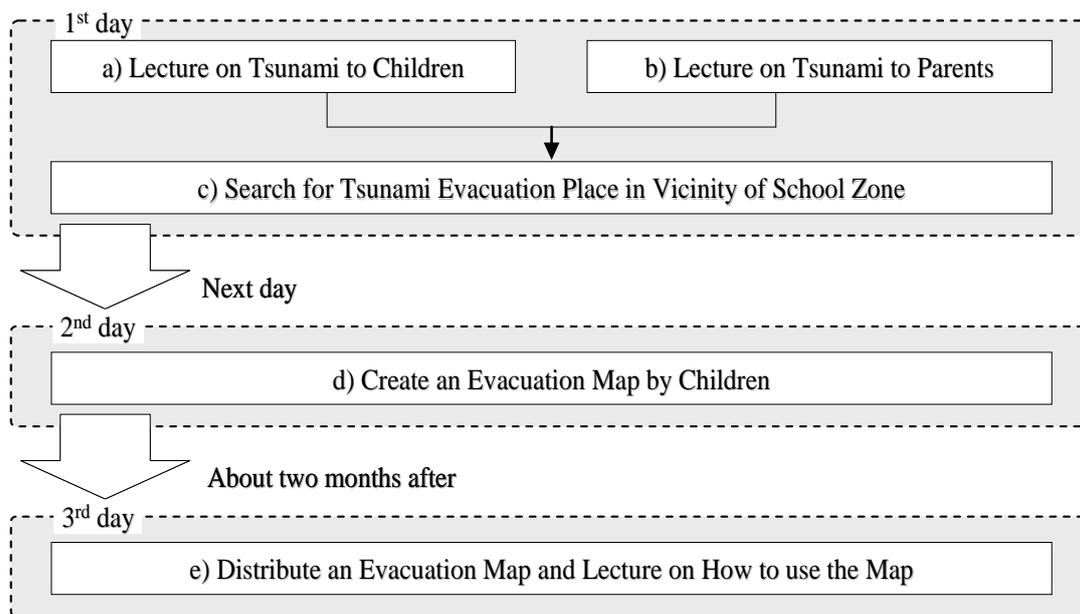


Fig. 1. Flow of Tsunami Disaster Education Forum

Table 1. Schedule of Tsunami Disaster Education Forum

School	Grade	Number of participants		Date of Lecture		
		Children	Parents	1 st day	2 nd day	3 rd day
School A	5,6	117	24	Aug. 30. '06	Aug. 31. '06	Nov. 1. '06
School B	4,5,6	71	10	Nov. 6. '06	Nov. 7. '06	Feb. 9. '07

Search for Tsunami Evacuation Place in Vicinity of School Zone

After lectures to children and their parents, children along with their parents searched for areas in the vicinity of their school zone that could be used to safely evacuate from a tsunami. The facilitator distributed the map of their school zone to each child. Children went back their houses from school with their parents. On their way, each child and his/her parent searched for areas where they think it is safe for tsunami evacuation place and noted the places on the map. Each child and his/her parent searched for as many places as possible and wrote all places onto the map. The child and his/her parent had a chance to talk about evacuation and to develop a family plan through this search. Children whose parents did not participate in the lecture talked about tsunami evacuation with their parents using the map after they went back home.

Create a Tsunami Evacuation Map

The second day of the forum was carried out at school the day after the first day. Children brought to school the map on which they had written tsunami evacuation places. The facilitator separated children into smaller groups according to their domicile. Children of each group wrote the tsunami evacuation places where they had searched the day before onto the large size map. Each child could find only places near the route from his/her house to school. Therefore, children can find more



Fig. 2. Investigation of Tsunami Evacuation Safe Places by children and their parents
 Left: Children and their parents were searching tsunami evacuation places
 Right: An example of child's investigation result



Fig. 3. Children making the Tsunami Evacuation Map
 Left: Children were writing evacuation places into map
 Right: The map which children wrote evacuation place

tsunami evacuation places once they put together the information that was developed for the school zone from all their individual searches.

Distribute the Complete Tsunami Evacuation Map

The third day of the forum was carried out about two months after of the map preparation. During this period, the facilitator confirmed the safety of the each evacuation place that children had written into the map and created a composite map that shown only safety tsunami evacuation places. At the third day of the forum, the facilitator distributed the complete tsunami evacuation map to children and taught them how to use the map. The facilitator told the children bring the map to their house and show it to their parents. The children were instructed to show the map to their parent, to check the tsunami evacuation places on the map and develop a family plan about tsunami evacuation.



Fig. 4. Complete Tsunami Evacuation Map

MESURING THE EFFECTS OF THE TSUNAMI EDUCATIONAL FORUM

The effect of the tsunami educational forum on children was measured in two ways. One was to measure the change of tsunami awareness and preparedness among children between before and after the forum. Another was to ascertain children's behavioral response following a government-issued evacuation order after an earthquake.

Change of Tsunami Awareness and Preparedness

A questionnaire survey about tsunami awareness and preparedness among children were carried out before and after the tsunami educational forum. The questionnaire survey before the forum was carried out in December 2005. The questionnaire survey after the forum was carried out after second day of the forum. Both surveys were carried out by teacher of each classroom at school and included some same questions about tsunami awareness and preparedness.

Fig.5. shows children's answer of the question "Do you think that tsunami will come to Kamaishi City? If yes, how about your house?" According to Fig.5, the rate of children who think that tsunami will not come to Kamaishi decreases from 10.3% before the forum to 1.4% after the forum. On the other hand, the percentage of children who think that tsunami will destroy their house increases from 30.8% before the forum to 35.7% after the forum.

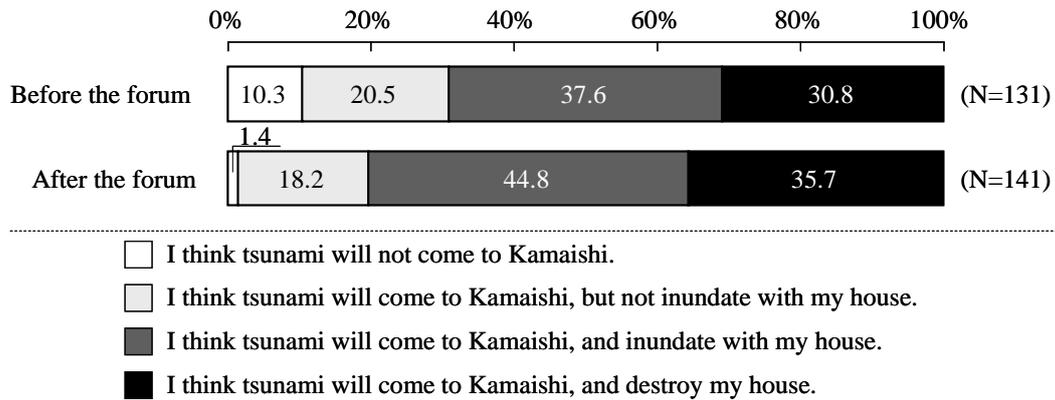


Fig. 5. Children’s answer of the question “Do you think that tsunami will come to Kamaishi City? If yes, how about your house?”

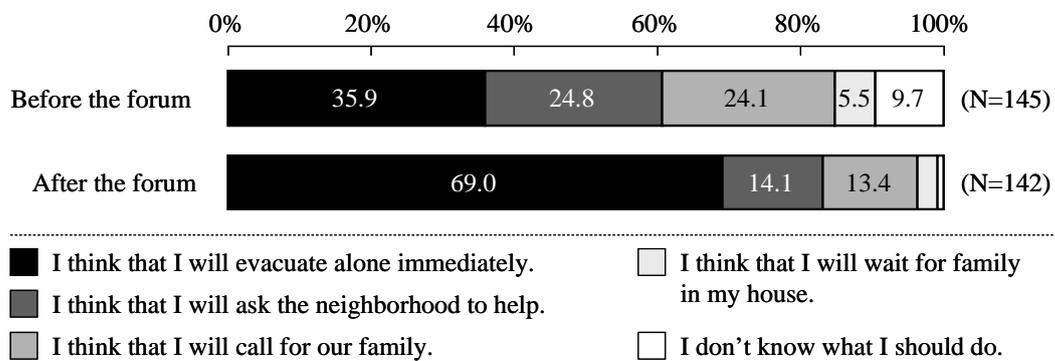


Fig. 6. Children’s answer of the question “If big earthquake occurs when you stay your house alone, what will you do?”

Fig.6. shows children’s answer of the question “If big earthquake occurs when you stay your house alone, what will you do?” According to Fig.6, the percentage of children who think that they will evacuate alone immediately increases from 35.9% before the forum to 69.0% after the forum.

Fig.7 shows children’s answer of the question “If big earthquake occurs when you go to school from your house, what will you do?” According to Fig.7, the percentage of children who think that they will evacuate to the nearest high ground increases from 47.3% before the forum to 81.8% after the forum.

These results of the survey revealed that following the educational forum there was an increased in tsunami knowledge among children.

Children’s Behavioral Response Following a Tsunami Evacuation Order

A large earthquake occurred near Chishima Island, Japan on 15th November 2006. Following the earthquake occurrence, the government issued the tsunami warning information and evacuation order for the residents of Kamaishi City. The survey which ascertained children’s behavioral response following a government evacuation

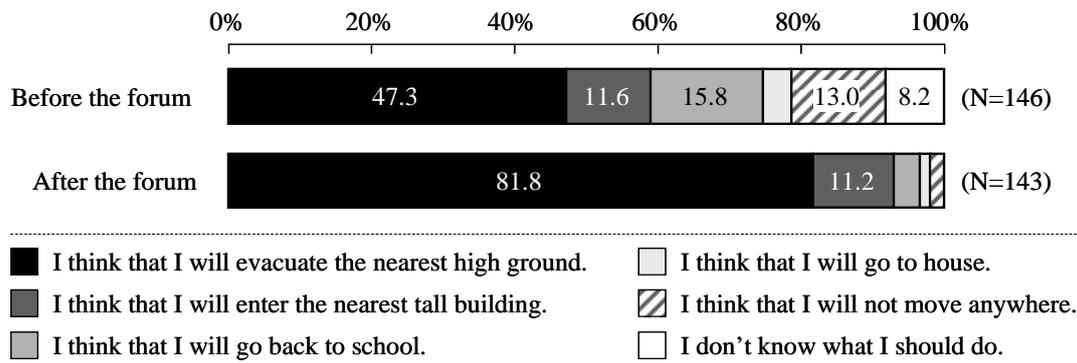


Fig. 7. Children's answer of the question "If big earthquake occurs when you go to school from your house, what will you do?"

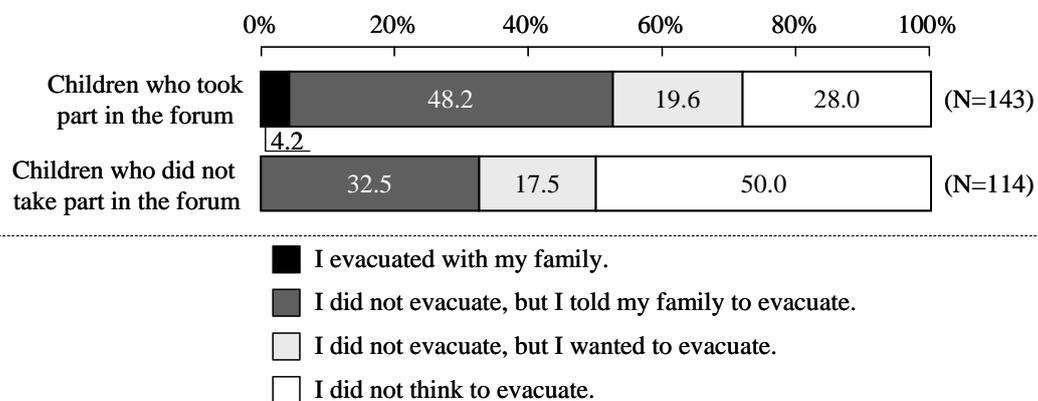


Fig. 8. Children's answer of the question "Did you evacuate after getting the tsunami evacuation order? If no, what did you think?"

order was undertaken in December 2006. This survey was carried out among both children who had taken part in the tsunami educational forum (Grade 5&6 students of School A&B) and among those who did not (Grade 5&6 students of School C). School C was located at seaside area in Kamaishi, and thus was at risk from tsunamis, but School C had not participated in the tsunami educational forum by our research group.. Both surveys were carried out by the teacher of classroom at school.

Fig.8 shows children's answer of the question "Did you evacuate after getting the tsunami evacuation order? If no, what did you think?" According to Fig. 8, the percentage of the children who told their family to evacuate was 48.2% among the children who took part in the forum and 32.5% among those who did not. The rate of the children who did not think to evacuate was 28.0% among the children who took part in the forum and 50.0% among those who did not. From these results of survey, more children who participated in the educational forum encouraged their family to evacuate from tsunami than those who did not participate in the educational forum.

CONCLUSION

In this paper, the tsunami educational forums for children and their parents were carried out in order to urge them to evacuate from tsunamis. The outline of this forum was as follows;

1. The facilitator gives a lecture on tsunami separately to children and their parents.
To children: To educate students about traditional tsunami wisdom and where to evacuate safely in their town.
To parents: To inform parents that their children have very little knowledge about tsunami, and to encourage them to develop a tsunami family plan.
2. Children along with their parents searched for areas in the vicinity of their school zone that could be used to safely evacuate from a tsunami.
3. Children created an evacuation map based on their investigation of tsunami safe areas.
4. Child and their parents developed a family plan using this map.

The effect of the educational forum on children was measured in two ways:

1. A questionnaire survey about tsunami awareness and preparedness among children were carried out before and after the tsunami educational forum. The results of the survey revealed that following the educational forum there was an increased in tsunami knowledge among children.
2. A subsequent survey was undertaken to ascertain children's behavioral response following a tsunami evacuation order from government. The survey was carried out among both children who had taken part in the tsunami educational forum and among those who did not. The results of the survey indicated that evacuation rate among both groups of children were low. However, among children who had participated in the educational forum, there were a greater number of them who encouraged their family to evacuate from the tsunami then among those who did not take part in the educational forum.

Now, our research group is carrying out the tsunami disaster education among school children in only Kamaishi City. Henceforth, we will carry out similar programs in other areas and verify the consistency of effects in this education program.

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