

Recognition on Tsunami Evacuation in Southern Thailand at Present

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1. Introduction: Tsunami risk country like Japan has already now highly recognized the natural disaster potential including tsunami. On the other hand, after the 2004 Indian Ocean event, newly experience countries such as Thailand and Indonesia have put their great effort to energetic their population to become aware of tsunami and earthquake which is quite rarely happened in this region compared to Japan. Also in Australia, even they had less affect from the 2004 event, but it alerts in many parts about the hazard. By the way, in most countries that even though the residents have a lot of knowledge and high awareness of tsunami. However, they still take no respond or checking a situation after they felt the shake or heard the warning. In addition, some misunderstandings still can be found in most locations.

2. Objectives: This study aims to find the reason why a coastal population discard such an evacuation and how can this situation can be improved. Questionnaire is subjected to the coastal population in the affected area from the 2004 Indian Ocean tsunami in Phuket and Phang Nga province in southern Thailand to observe the present condition of evacuation behavior after the fatal event have passed for 5 years. The questionnaire results will help for a future tsunami warning plan and evacuation process which play an important role as one of tsunami mitigation method in Thailand.

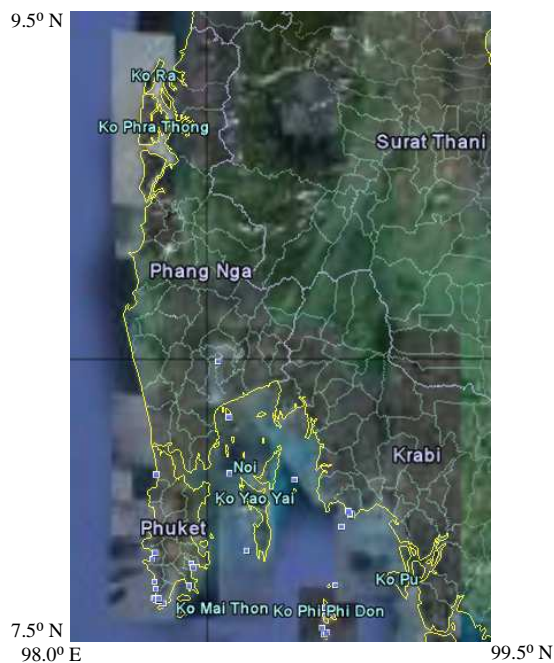


Figure 1. Location of the study area

3. Methodology: Example of questionnaire study for the 2004 tsunami in Thailand was conducted by Charnkol and Tanaboriboon, 2006. In their study, factor effecting evacuation process for a future tsunami is concluded according to their surveyed study. According to the questionnaire results, residents who living closer to the sea

or have experienced the 2004 event or have tsunami disaster knowledge is more like to evacuate faster. An increase in number of family members, number of children or number properties diminishes such as evacuation process. Teenagers are more likely in a slow response as they tend to underestimate the risks. Transients are more likely to evacuate faster than then who are permanent residents because they have more concern of protecting their own properties and living places. Imamura (2009) proposed three steps for safe evacuation after an earthquake and tsunami Firstly; collect the information and issue and official warning about natural phenomena such as strong quakes and abnormal sea levels on the coast. Secondly; make the decision to evacuate based on the risk perception and previous experiences of the residents of the area. Lastly, select a proper route and safe destination for the evacuees. This study uses a questionnaire to evaluate the present evacuation behavior. Field trip was conducted in the tsunami affected area in Phuket and Phang Nga province, Thailand during 18 – 21 March 2009.

4. Results and discussion:

4.1. General information: Total numbers of 57 questionnaires were obtained including 18 in Phang Nga and 39 in Phuket. General information is shown in Table 1. Most of them were female 63.16 %, where Male 36.84 %. The average age of respondents is 29.8 years. Most of them have studied until a secondary school (56.36 %), undergraduate (32.73%), primary school (7.27 %) and graduate school (3.64 %). Respondent's average living period is 16.3 years and about half (47.37 %) live closer than 1 km from the sea.

4.2. Experienced in the 2004 Indian Ocean tsunami: About one-third of the respondents had experienced the 2004 Indian Ocean tsunami. Most of them did not have knowledge about tsunami (94.74 %) but have better knowledge after the tsunami (92.86 %). About half do not know how to evacuate from a tsunami (49.12 %) and lost any of family, relative or friend (52.63 %). Education (50.88 %) and memorial (40.35 %) are the most effective media than word of mouth (28.07%) in terms of to encourage people to have awareness for a future tsunami.

4.3. Tsunami information: Most of the respondents still thinking that tsunami caused by a submarine earthquake only (50.88 %), size of a tsunami depends on size of an earthquake (70.18 %) and the first wave of tsunami is small and becomes higher and higher (70.18 %). Whereas, about two-third of them know that tsunami can come without any shaking (63.16 %) and it is impossible to escape if getting close to see the receding wave. More than half of the respondents are living in a place that able to hear a warning alarm (59.65%), be able to turn on a TV or radio for such warning information (70.18 %), having evacuation sign or map nearby living place (61.40 %), live in a place that information can transfer by word of mouth (80.70 %) and often catch up tsunami and earthquake news (77.19 %).

4.4. Decision making to evacuate: Most of them will start to evacuate if, they feel a shake or an unusual of the sea after an earthquake (50.88 %), receive warning information from the Meteorological agency (56.14 %), receive advisory from the disaster prevent radio or public announcer (71.93 %), considerable damage is occurred at living place (75.44 %) and considerable damage is occurred at neighboring place (57.89 %). Almost same number of respondents choose whether to evacuate or wait and see a situation for a while if, neighboring people start to evacuate (40.35 % / 42.11 %), some of family member is injured (36.84 % / 35.09 %) and an earthquake occurs at a nighttime (43.86 % / 40.35 %). Meanwhile, 47.37 % of respondents prefer to wait for a while after receive 4 Advisory from a local government staff or neighboring people and 57.89 % If there is a person who evacuates with difficulties and need help. Tsunami with a wave height of more than 5 m (33.33 %) will led the respondents start to evacuate and follow with 3 – 5 m (15.69 %), and 1 – 1.5 m and 0 – 0.5 m (9.80%). The preparation time for collecting their belongings and properties is 25 min, while 22 min is needed for evacuation time. In other words, total time required for such evacuation is about 47 min.

4.5. Selection of proper route: About more than three-fourth of the respondents will evacuate safely with selecting a proper route to safe destination as they know a safety zone for an evacuation during a tsunami (89.47%), know or understand the hazard map nearest to living place (70.18 %), have or ever seen a hazard map that provide an inundation zone (64.91 %), will wait at a safety zone until a cancelation of tsunami warning (84.21%), avoid narrow or crowed route such as road or parking area (89.47 %), able or ready to evacuate even at night (80.70 %), have evacuation route which is in good condition (68.42 %) and understand or have ever seen the tsunami signs (80.70 %). However, only 42.11 % of them had joined the evacuation drill or training course and 26.32 % have an emergency bag for using during a tsunami disaster. About half of residence will make decision to evacuate if the wave height is larger than 3 m (Fig. 2) and about 90% of residence could move to a safe place before the tsunami arrives after 90 minutes (Fig.3).

4.6. Parameters affecting evacuation process of coastal residence: The results were separately compared as for the possible affecting parameter namely, location, gender, experience, age, living period and distance from sea. Different in locations, Phang Nga and Phuket result the similar trend of residence's characteristic. Living period have little effect to wave height as residences that live in short period trend to evacuate with lower wave height compared to those who live in the area for long time. However, gender, experience, age, and distance from sea have considerable effect about 10 – 20 % to wave height but not arrival time. For example, women make decision to evacuate with a lower wave height because they have much concern about their children or properties than men. Those who have the 2004 experience get start slower because some of them may have correct understanding or underestimate the future tsunami. Large different can be seen when age is compared. Middle age and elderly start to evacuate faster than youngster after they concerned about their age. Moreover, youngster seemed to underestimate the power of tsunami. Residences who live near the sea (less than 1 km)

evacuate slower because they have to consider about their own family or properties such as shop. Therefore, only in case of a very high wave height encourage them to evacuate faster.

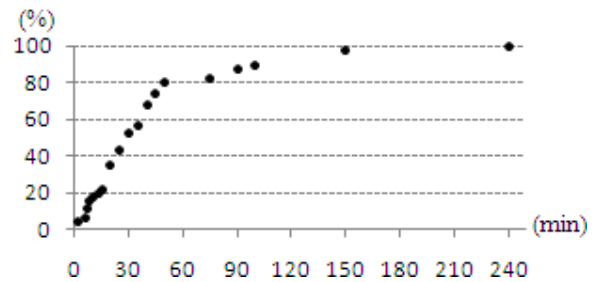


Figure 2. Accumulated no. of evacuation against wave height

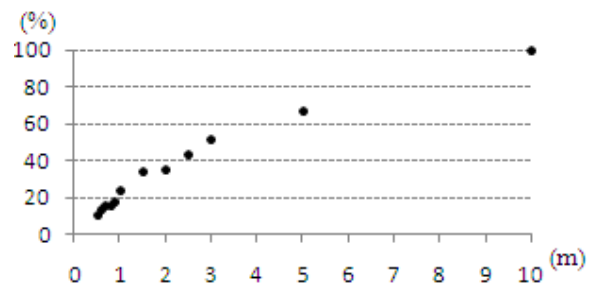


Figure 3. Accumulated no. of evacuation against time

5. Conclusion: After the 2004 Indian Ocean tsunami, residences should have better understanding about tsunami, make a better decision to evacuate and know how to safely evacuate. However, this study found that residences still believing that only submarine earthquake can generate tsunami, size of tsunami depends of size of earthquake and the first wave is the smallest. Advisory from local government and neighboring people seemed to be the most unreliable as most residence decided not to evacuate. Some of them have no experience of evacuation drill and have no emergency bag. Gender, experience in tsunami, age, living period and distance of house from sea were found to be the affecting parameters to the evacuation process.

Acknowledgements: We express our deep appreciation to the Ministry of Education, Culture, Sports, Science and Technology (MEXT) for the financial support for this study. Special thanks for Mr. Sorot Sawatdiraksa and Mr. Patiparn Thongsanta, Meteorologist, Southern Meteorological Center (West coast), Mr. Teeravee Suebpravit and Mr. Jaray Somsri, Civil Disaster Prevention Volunteer, Thepkrasattri municipal district for questionnaires, guidance and all support during our trip in Phuket and Phang Nga. Many thanks to the Royal Palm Beach Front hotel, Patong beach for accommodation. Finally, we express our deep gratitude to all local residences both in Phuket and Phang Nga who shared their valuable experiences.

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