

Landslide Hazards: Household Vulnerability, Resilience and Coping in Malaysia

Jamilah Ahmad¹, Habibah Lateh² & Saifudin Saleh³

Abstract

Landslide is one of the common hazards occurring globally and Malaysia is not spared as well. Over the past four decades, Malaysia has played host to a number of landslide incidents, resulting in significant loss of lives and damage to property. The magnitude of landslide destruction is quite high in Malaysia. A survey has been carried out on 143 respondents in selected areas. This paper presents the findings on how Malaysians react towards landslide incidents, who their landslide informer are and to whom they preferred to disseminate information on landslide incidents. The result from this study indicates that the majority of the respondents agree that factors such as education and proper land use are important to mitigate landslide incidences. Additionally, the respondents also agree that they will take action if landslide occurs in the future. Most of the respondents agree that they preferred information from landslide expert. However, majority of the respondents indicates that they have less trust towards the media's landslide information and are also reluctant to disseminate landslide information to the media. Therefore, a further research on media, public and landslide issues in Malaysia should be conducted in the future.

Keywords: Landslide, hazard, media, Malaysia

1. Introduction

In recent years, landslide incidents were frequent in Malaysia and the occurrences attracted serious attention from various parties, especially the government.

Landslide is a tragedy associated with soil and rain that can cause property damage and threatens human lives and public security. Typically, climatic factors such as rainfall and human negligence such as unregulated slopes development were often associated with landslide incidents.

As we noted, Malaysia is a country located near the equator and its climate is categorised as equatorial which is hot and humid throughout the year. In many tropical countries like Malaysia, the average annual rainfall received is high, which is about 2,500 mm per year. Therefore, rain becomes the major cause of landslide occurrences in Malaysia (Mohd Asbi, 1994).

In addition, human factors such as unsustainable development on slopes and hill areas also contributed to the landslide occurrences in Malaysia. Various authors believe that slope failure incidences are frequent in Malaysia (Qasim et al., 2012). House and building projects constructed in hills areas still continue although many landslide cases have been reported recently. The explosive growth of hillside developments in urban areas was a result of population pressure and rapid urbanization (Schuster & Highland, 2007)

¹ PhD, School of Communication, Universiti Sains Malaysia, 11800 Pulau Pinang. Phone: 04-6533603 Email: jahmad@usm.my
Fax: 04-6577736

² PhD, School of Distance Education, Universiti Sains Malaysia, 11800 Pulau Pinang.

³ School of Communication, Universiti Sains Malaysia, 11800 Pulau Pinang.

In Malaysia, people always view hillside developments as a “prestige” place to live in. Therefore, trends of hillside developments in Malaysia nowadays are more towards the development of luxury homes that promises attractive scenery and exclusivity. People are not even aware of the risk of living in hillside areas. People are more concerned on the aspects of “prestige” and “exclusivity” rather than their safety. The landslide incident in Bukit Antarabangsa, Selangor in 2008 is one example of luxury hillside unsustainable development that not only destroyed fourteen bungalows but also killed five people. Therefore, it is pivotal for Malaysians to understand about the risk of living in hillside areas and to be concerned on how to cope with landslide hazards in the future.

1.1 Landslide in Malaysia

Landslides are serious geological hazard that occurs around the world. Landslide can be understood as a downslope movement of soil and mass rock under the influence of gravity without the primary assistance of a fluid transporting agent (Brunsden, 1979).

Pokharel (2005) defined landslide as the movement of soil or rock along a distinct surface of rupture, which separates the slide material from more stable underlying material. Landslides can involve flowing, sliding, toppling, or falling, and many landslides exhibit a combination of two or more types of movements, at the same time or during the lifetime of a landslide (Cruden and Varnes, 1996).

In Malaysia, landslides can be considered as a common incident. Almost every year we can hear about landslide incidents whether in a small or huge scale. A list of landslide incidences in Malaysia can be seen on table 1.

Table 1: Landslide Incidences in Malaysia

Year	Place / State
1961	Cameron Highlands, Pahang
1993	Pantai Remis, Perak
1993	Highland Tower, Ulu Klang
1995	Genting Highlands, Pahang
1996	Gua Tempurung, Perak
1996	Pos Dipang, Perak
1999	Ulu Klang, Selangor
2002	Ulu Klang, Selangor
2003	Bukit Lanjan, Selangor
2006	Ulu Klang, Selangor
2007	Kapit, Sarawak
2008	Cameron Highlands, Pahang
2008	Kajang, Selangor
2008	Petaling Jaya, Selangor
2008	Terubong Jaya, Penang
2008	Kuala Kubu Baru, Selangor
2008	Jalan Semantan, Kuala Lumpur
2008	Ulu Klang, Selangor
2011	Hulu Langat, Selangor
2011	Jalan Bukara, Sandakan Sabah
2012	Bukit Setiawangsa, Kuala Lumpur
2013	Jalan Penampang-Tambunan, Sabah
2013	Ukay Perdana, Kuala Lumpur

(Adapted & Improvised from Khairiah & Habibah, 2012)

According to table 1, within 52 years, there are 23 landslide incidents that have been reported around Malaysia. The Ulu Klang area has the highest number of landslide incidents with five incidents occurred in 1993, 1996, 2002, 2003 and 2008. Among all landslide incidents in Malaysia, the Highland Towers tragedy that witnessed the collapsed of one of the towers is the most serious incident involving 48 deaths. In sum, most of the landslide incidents in table 1 are associated with hillsides housing and building and tourism development in Malaysia.

2. Literature Review

There are many landslide researches that have been conducted in Malaysia and overseas. Habibah & Jamilah (2011) have conducted a research on undergraduate students' environmental knowledge, attitude and practice in Universiti Sains Malaysia Penang, Malaysia. From the study, they found that most of the students did have the general knowledge on landslides and understood the nature of landslide hazards and how they occur. The students also felt anxious and desired to know more about landslide incidents. This shows that students living in this area had a positive attitude towards landslide issues in Malaysia.

On a similar note, Habibah & Vijaya (2012) have conducted a research about secondary school students' awareness on landslide hazard in Penang Island, Malaysia. However, the survey result showed that students' awareness of landslide hazard is moderate. This is different from the results of Habibah & Jamilah (2011) which showed that university students have high knowledge and practices on landslide hazard. Both studies indicated that school students and university student can have different level of awareness, knowledge and practices towards environmental issues like landslide incidences and hazards.

Eric et al. (2011) on their research emphasized that the importance of effective management of hillsides development is to ensure the equilibrium between the safety, welfare of property owner and sustainability. The most important is an effective decision making effort during the preconstruction stage, which must always be set as a priority.

Khairiah & Habibah (2012) have conducted a study on the relationship between demographic variables and four key construct of community preparedness, namely attitude, knowledge, practice, and awareness towards landslide.

The result of the study found that the same findings are compatible with Habibah & Jamilah's (2011) study which marked out education level as the significant factor that has impact on awareness, knowledge and practice towards natural disaster. The result of this study also can be used as a guideline for developing a landslide preparedness program among society.

Landslide not only occurred in Malaysia but in many other countries. Various international scholars such as Diko (2012) have conducted research about landslide and community engagement. From his research in Limbe, Southwest Cameroon, he found that proper communication channels and workshops or seminars are vital in order to engage community on landslide issues. Most of the people in Limbe are low income earners (living on <1USD/day) and could not afford communication via cell phones. Therefore, it is important for the government to distribute landslide information through other sources such as workshops and seminars.

Sundar (2012) also conducted a case study on landslide treatment in Gokarna forest, Kathmandu, Nepal. From the study, the researcher suggested to local community to use green technology such as "bamboos" and "stones" to mitigate the landslide. The green technology has been proved very effective and economical to treat landslide naturally. It is very appropriate for the local people in Nepal who have limited funding instead of buying expensive equipments and advanced technology.

Ganapathy & Hada (2012) on their research about landslide hazard mitigation in the Nilgiris District, India stated that society and planners have lack of awareness towards landslide issues.

The researchers emphasized on the importance of awareness among community leaders and general public about the cost-effectiveness and benefits of taking landslide hazard mitigation measures. They also emphasized on the improvement of landslide hazard communication as until now there is no clear early warning system employed in India.

Overall, the previous studies in Malaysia or overseas emphasized on the importance of education, awareness, engagement and communication in landslide hazard. Without these four main pillars, community will still easily be affected to the hazards of landslide and this problem will occur on an ongoing basis.

3. Objective of the Research

The main objective of this research is to analyze on how the Malaysian society cope with landslide incidences in Malaysia. The research objectives are three fold: To identify respondents knowledge on landslide hazards and how they mitigate landslide incidence, who is their landslide information provider and to whom they will inform landslide information.

4. Methods

The data for this study was obtained through a questionnaire with the Malaysian community in the selected areas. A questionnaire was developed in this regards and it mainly consist of four categories: personal and demographical information, respondents' action to mitigate landslide, respondents' opinion about landslide information provider and respondents' action if landslide occurred. The sample size for this survey was 143 respondents and these respondents were selected randomly based on the landslides susceptible locations.

5. Results

5.1 Demographic Profile of Students

Table 2: Number and Percentage of Respondent

Sex	No	Percent (%)
Male	40	28
Female	103	72
Total	143	100

Table 2 above shows that female respondents are the majority of respondents (72 percent) as compared to male respondents (28 percent). The total number of the respondents in this research is 143 respondents.

5.2 Respondent Actions to Mitigate Landslide

Table 3: Number and Percentage of Respondent Actions to Mitigate Landslide

Actions taken to mitigate landslide	Agree Percent (%)	Disagree Percent (%)	Unsure Percent (%)
Research on landslide	97.1	1.4	1.4
Education on landslide	97.8	0.7	1.4
Warning system on landslide	95.0	2.9	2.2
Engineering standards	92.8	0.7	6.5
Law enforcement	95.7	0	4.3
Environmental management	96.4	0.7	2.9
Proper land use	97.8	0	2.2
Deforestation with control	96.4	0.7	2.9
Proper road construction	93.5	0.7	5.8
Proper solid waste disposal	80.4	8.0	11.6
Proper underground water supply	85.1	0	4.3
Proper farming	81.2	3.6	15.2
Proper industrial allocation	92.0	2.2	5.8

Table 3 above shows that all respondents agreed that all the actions are pivotal in order to mitigate landslide. Education on landslide and proper land use are the highest percentage (97.8 percent) for both. However, only 80.4 percent respondents agree that proper solid waste disposal is an important action to mitigate landslide. Similarly, only 81.2 percent and 85.1 percent respondents agreed that proper framing and proper underground water supply can contribute to landslide mitigation. Overall, more than 80 percent respondents agreed that all thirteen actions as listed in table 1 are vital to mitigate landslide.

5.3 Respondents' Opinion about Landslide Information Provider

Table 4: Number and Percentage of Respondent's Opinion about Landslide Information Provider

Landslide information provider	Agree Percent (%)	Disagree Percent (%)	Unsure Percent (%)
Local government	92	2.9	5.1
Landslide expert	94.3	2.1	3.6
Media	83.9	8.8	7.3
Friend and neighbour	63.7	13.3	23

Table 4 above shows that majority of the respondents (94.3 percent) agree that landslide expert are the best landslide information providers as compared to local government (92 percent), the media (83.9 percent) and friends or neighbours (63.7 percent). However, 13.3 percent disagreed that friends or neighbours can be a landslide information provider to them.

5.4 Respondent Action if Landslide Occurred

Table 5: Number and Percentage of Respondent's Action Taken if Landslide Occurred

Types of actions	Agree Percent (%)	Disagree Percent (%)	Unsure Percent (%)
No action	2.2	91.9	5.1
Tell family members	95.6	2.2	2.2
Call the media	53.7	24.3	22.1
Report to the authority	95.8	0.7	3.5
Inform neighbours	90.6	4.3	5.1

Table 5 above shows that majority of the respondents (91.9 percent) disagreed for not taking any actions if landslide incidents occur in the future. Majority of the respondents (95.6 percent) also agreed that telling or informing family members is important if landslide occurs. Most of them (95.8 percent and 90.6 percent) will report to the authority and inform neighbours if landslide happens. But only 53.7 percent respondent agree to call the media if landslide occurs and 24.3 percent of them disagree to contact the media and 22.1 of them are unsure whether to call the media or not.

6. Discussions

In sum, this study indicates that education play a vital role on landslide mitigation. Through formal education in school for instance, one can easily promote preparedness in behaviours and make students more aware about the risk of landslide hazard or disaster (Menard et al. 2011). Previous research like Habibah & Jamilah (2011) showed the importance of education level towards landslide awareness. However, in Malaysia, disaster or hazard education in school or university is still at a moderate level. Disaster education is only taught through certain subjects such as Geography and Science.

It is different from developed countries like Japan where disaster education is one of the official curriculum and the subject is taught at all levels, from kindergarten to high school. Therefore, Malaysia should learn from Japan in order to improve people's knowledge and awareness towards landslide hazard. This is evidence to suggest that disaster education not only can enhance public awareness and knowledge on disasters but also can enhance disaster preparedness actions (Tanaka, 2005).

Additionally, respondents also agreed that proper land use is important as a tool to mitigate landslide. The Malaysian government gives significant emphasis in its role in land use, planning and development especially on the setting up of policies and laws (Adibah, 1997). Therefore, the public should support land use decisions taken by the government. Improper land use like deforestation, logging, hillside cultivation and excavation play central roles in triggering landslides. In Malaysia, hillside development is considered one of the main factors for landslide occurrence. It is important therefore to minimize this kind of activities before landslide occurs.

In addition, the research finding shows that respondents prefer to trust landslide experts as their landslide informers. Experts are those who are professional and are recognized as the best within their profession with the highest skills and abilities (Shanteau, 1987). Therefore, a landslide expert usually is someone who works intensively in landslide research. It can be a geographer, geologist or academician. These people are utterly pivotal to talk and share about landslide information to the public. However, the finding of this study also indicated a unique result in which respondents have less trust towards media as compared to other sources.

This kind of situation should not happen because media can play a critical role before, during and after landslide incidents. Scholars also agree that sometimes social media such as Facebook or Twitter is the only functioning communication method in disasters (Acar and Murakami, 2011 in Peary et al., 2012). For instance, during the Virginia earthquake in 2011, Twitter users in New York City and other locations saw tweets about the earthquake, up to 30 seconds before it was felt, showing that information moves faster through social networks than the earthquakes themselves (Peary et al., 2012). Therefore, it is important for people to have a good relationship with the media whether it is a traditional media like newspaper or new media.

Similarly, this study found that a very small percentage of respondents were inclined to call the media if landslide occurred in the future. The respondents would prefer to inform the authority, family member or neighbour but not the media. It is important therefore to make the public understand the importance of media during hazard or disaster events like landslide. Without media, the information about landslide incidents will be hard to spread out. The most important is that communities should not be passive of information (Servaes, 2004) and must make an effort to utilise the existence of new media to spread information about landslide happenings. It is not only about informing other people about landslide incidents but it can also help reduce risks and tragedies.

7. Conclusion

Overall, this study indicates that education on landslide hazard is important in order to improve public knowledge and the understanding of related issues on landslide incidences. The Malaysian government should consider improving the official curriculum in school and implementing the disaster education to students exactly like Japan did. In the meantime, more research about the hazards of landslide should be conducted in the future and this research should also be shared with the public. The most important agenda is that the media should work closely with the public. Likewise, the public should not feel alienated from the media. The public should understand the power of the media especially during landslide incidences. In sum, the researcher would like to suggest a further research on how the public view the local media towards environmental issues like landslide and why the public pay less trust towards the local media.

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