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RESPONDENTS' AREA OF PREFERENCE WHEN DISASTER STRIKES: A CASE STUDY OF CAMERON HIGHLAND

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Abstract

Disaster can be understood as the probability or threat of quantifiable damage, injury, liability, loss, or any other negative occurrence that is caused by external or internal vulnerabilities that required an immediate action. Therefore, this study intends to understand respondents' preferences of location when disaster strikes their settlements/ villages. Their responses are important to indicate their preparedness when facing disaster. Data collection was employed using the questionnaire survey method to the 11 villages. The selection of population was based on a cluster random sampling to ensure equal probability chances were given to every individual in every village. A total of 847 responses were able to be used for data analysis. The results show that the respondents' knowledge on safe location was influenced by their demographic background. In addition, their experience with disasters and residential area also influenced their area of preference to seek refuge in the event of a disaster. Thus, an active promotion of such information related to risk management and reduction should be varied to cater the unique characteristics of the population.

Keywords: Safe haven, route, disaster, dam, Cameron Highland

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INTRODUCTION

Cameron Highland, Lembah Bertam and further downstream villages are reported to have the highest occurrence of floods especially during monsoon season which makes the areas vulnerable. For that reasons, there are currently two dams that have been constructed in the study area, which include Sultan Abu Bakar (SAB) Dam in Lembah Bertam Hydroelectric Scheme and Susu Dam in Ulu Jelai Hydroelectric Scheme. The development of both dams is seen as one of the achievements in creating a better life for the local societies. Other than one of the entry point projects under the Economic Transformation Programme (ETP), dams provide flood control, supply water and irrigation, provide hydropower, offer recreation benefits and also provide navigation signs.

A disaster is a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses, which exceed the ability of the affected community or society to cope, using its own resources (UNISDR 2004). A disaster happens when the impact of a hazard affects a vulnerable population that causes damage, disruption and casualties. Hence, this paper discusses the responses of a community on their area of preference to seek refuge when disaster strikes. The findings of this study will help to identify the best approach to increase public preparedness and minimising loss of life and injuries in the event of disaster.

STUDY BACKGROUND

The preparation of a disaster preparedness plan within the community is important in relation to disaster management of the community as a whole. Public health and safety in the event of a disaster are strengthened as plans are devised and implemented since disaster often strikes without warning. The best way to prepare for disaster awareness is to create a specific plan of action that can be put as a notice to all community.

Community-based Disaster Risk Management (CBDRM) is a process in which at-risk communities are actively engaged in the identification, analysis, treatment, monitoring and evaluation of disaster risks in order to reduce their vulnerabilities and enhance their capacities (ADPC, 2003). This means that people are at the heart of decision-making and implementation of disaster risk management activities. The involvement of the most vulnerable social groups is considered as paramount in this process, while the support of the least vulnerable groups is necessary for successful implementation. One of the key aspects highlighted in disaster management is the provision of local shelter. Shelters are often located in public school buildings, community hall and others. The designated emergency shelters must be informed to the community in order to make sure they know where to head to when the early disaster warning is issued. Shelter as defined by various authors (Kolen & Helshoot, 2012; Isahak et al.,

2018) refers to a strong building that offers protection and to safeguard people from a helpless situation and is an integral part of disaster risk reduction (DRR).

Seag et al. (2013) identified that shelter provision can be divided into two. One is a temporary shelter for emergency evacuation; while the other is designated for a long-term relief operation. Other authors (Ashar, Amaratunga, & Haigh, 2014; Pannier, 2016) divided the shelter into vertical and horizontal evacuation. Vertical evacuation is the act of people movement within a flood prone area with the aim of reaching a relatively safe place above the water level for example reaching to upper building storey. Meanwhile horizontal evacuation is act of evacuation by going away from the affected area to a safe area using the recommended designated pathway.

A disaster can become uncontrollable once the event is underway. Therefore, preventive steps need to be taken before, during and after a disaster. If a community is not well prepared, control over the disaster event would be usually lost during its occurrence. If each individual in the community is familiar with ways of coping and precautionary measures, then the disruption by a disaster can be reduced (Sampath, 2001).

The implementation of the disaster management plan should be done at community level with support from local authorities, and technical and research institutions. The implementation process will include various structural and non-structural activities such as community training, disaster response drills, community early warning systems, disaster resilient construction of houses, forest plantations, mangrove plantation, diversification of crops, rainwater harvesting, construction of dykes, bridges and so on for vulnerability reduction and hazard mitigation. Hence, evacuation is a common strategy in emergency management. In many hazardous events, the best option is to relocate threatened populations to safer areas (Cova & Johnson, 2003). Evacuation refers to the temporary relocation from areas at risk to areas of greater safety (Cheng, Qian, & Zhang, 2011).

As reviewed by numerous authors, the location of a shelter could be anywhere, as long it is confirmed safe to the victims and declared as a 'green area' and easy to locate for the supply of foods and other items essential for survival. The temporary evacuation centre location needs to be setup at a higher ground level. However, it must be accessible at least by air or land. The shelter location must be on a field with a minimum area of 20 meters by 20 meters (Mat Rasul & Darus, 2016).

However, the success rate for evacuation is dependent on travel time and the available time for evacuation work. For instance, the available time for evacuation can be improved through flood forecasting and warning systems that provide a longer available time and decrease the possibility that residents cannot evacuate to flood shelters related to flood circumstances. Early warning is an

important precondition and allows implementation of more emergency measures (Jamrussri & Toda, 2018).

STUDY METHODOLOGY

A primary data collection on the target population in Cameron Highland was conducted using the closed-ended questionnaire survey method. A total of 847 samples participated in the survey involving 11 villages. This primary data collection was conducted after several meetings between the local authority and respective agencies related to disaster risk management and the population in the study area. A selection of samples from the total population was done by using the mixed method, which involved cluster sampling where samples were calculated to represent 30% of each cluster (11 villages). Cluster sampling is where the whole population is divided into clusters or groups. Subsequently, a random sample is taken from these clusters, all of which are used in the final sample (Wilson, 2010).

The selection of population was based on a cluster random sampling to ensure equal probability chances were given to every individual in every village. However, due to the low response from the respondents, a convenient sampling method was deployed to collect the targeted sample portion.

The survey was conducted on a face-to-face basis. The questionnaire survey form was bi-lingual; English-Malay. This is due to the fact that the Susu Dam area is largely populated by the Semai, Temiar and Malay ethnics, and only a few of them can understand English.

DATA ANALYSIS

This section discusses the results of the questionnaire survey in the study area. The discussion starts with the results on respondents' profiles as presented in Table 1 below.

Table 1 Respondents' profile

Characteristics	Categories	Frequency	%
Age	< 15 years old	37	4.4
	15 - 25 years old	236	27.9
	26 - 35 years old	205	24.2
	36 - 45 years old	152	17.9
	46 - 55 years old	101	11.9
	> 55 years old	116	13.7
Education level	Not attending school	150	17.7
	Elementary School	195	23.0
	Secondary School	435	51.4
	College/ Institute	27	3.2
	University	40	4.7

As shown in Table 1 above, 54% of the total respondents who participated in the survey were aged between 26 to 55 years old, 32.3% aged 25 years old and below while the remaining of 13.7% aged more than 55 years old. From the total of 847 respondents, 51.4% of have finished their secondary school, 23% have attended at least elementary school, while 17.7% claimed they never attended school. Only 7.9% have obtained tertiary education.

A question related to respondents' experience with disaster was also asked during the survey. 100% of respondents from Kg. Bako and Pos Telanok claimed they did not have any disaster experience (Table 2). In contrast, a majority of 66% from Lembah Bertam, followed by 47.8% from Kg. Mensun and 36.1% from the other villages claimed they have experienced with disaster. This shows that respondents who claimed they have experienced disaster came from various residential areas.

Table 2 Cross-tabulation between respondents' experience with disaster with their residential area

Residential area	**Response on experience with disaster**					
	No		**Yes**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**
Kg. Teji	44	93.6	3	6.4	47	100
Kg. Bako	9	100	0	0	9	100
Pos Telanok	3	100	0	0	3	100
Kg. Susu	62	87.3	9	12.7	71	100
Kg. Abu	42	89.4	5	10.6	47	100
Kg. Senangkar	29	96.7	1	3.3	30	100
Kg. Renglas	72	77.4	21	22.6	93	100
Lembah Bertam	88	34	171	66	259	100
Kg. Sg. Tiang	84	70	36	30	120	100
Kg. Mensun	36	52.2	33	47.8	69	100
Kg. Leryar	48	76.2	15	23.8	63	100
Others	23	63.9	13	36.1	36	100
Total	**540**	**63.8**	**307**	**36.2**	**847**	**100**

A question related to population preferences of location/ area to seek refuge when disaster strikes was asked during the data collection. The data was then analysed using Chi-square test against their experience with disaster and location of residential area. The results are shown in Table 3 and Table 4 below.

Table 3 Chi-square test between respondents' preference on area to go when disaster strike with their experience on disaster

Area of Preference	**Respondents' experience with disaster**			
	Value	**p-value**	**% count less than 5**	**Remarks**
Relative's/friend's house	11.128	0.001	0 cells (0)	**Valid, H_0 rejected**
Tok Batin's house	50.003	0.000	0 cells (0)	**Valid, H_0 rejected**
Assembly area/nominated area	22.131	0.000	0 cells (0)	**Valid, H_0 rejected**
Community Hall	49.057	0.000	0 cells (0)	**Valid, H_0 rejected**
Higher ground	28.553	0.000	0 cells (0)	**Valid, H_0 rejected**
Other area	7.503	0.006	0 cells (0)	**Valid, H_0 rejected**

Note: For result to be valid, the % of count less than 5 must be not more than 20%

Table 4 Chi-square test between respondents' preference on area to go when disaster strike with their residential area

Area of Preference	**Residential area**			
	Value	**p-value**	**% count less than 5**	**Remarks**
Relative's/friend's house	87.147	0.000	5 cells (20.8)	Invalid
Tok Batin's house	200.489	0.000	5 cells (20.8)	Invalid
Assembly area/nominated area	75.930	0.000	4 ells (16.7)	**Valid, H_0 rejected**
Community Hall	364.78	0.000	3 cells (12.5)	**Valid, H_0 rejected**
Higher ground	79.953	0.000	3 cells (12.5)	**Valid, H_0 rejected**
Other area	27.335	0.004	12 cells (50)	Invalid

Note: For result to be valid, the % of count less than 5 must be not more than 20%.

From the result in Tables 3 above, since all the p-values for respondents' preference on area to go when disaster strikes with their experience with disaster were less than 0.05, thus, H_0 can be rejected. Based on the result, it can be concluded that respondents' experience with disaster did influence their preference on area/place to go when disasters are expected to happen.

Meanwhile, result of Chi-square for respondents' preference on area to go when disaster strikes with their residential area shows that 3 tested p-values were less than the 0.05 that indicate H_0 can be rejected. This means that respondents' preference to go to designated assembly area (0.000), community hall (0.000) and higher ground (0.000) were influenced by their current location of residential area.

Another inferential test was conducted to explore further on respondents' characteristics based on their preferences of safe area to go when a disaster is expected to happen. The Chi-square test was conducted again between respondents' preference on area/place to go when disaster strikes with their

gender (Table 5). As shown in Table 5, respondents' gender influenced their preference to go to the community hall when a disaster is expected to happen.

Table 5 Chi-square test between respondents' preference on area to go when disaster strikes with their gender

Area of Preference	**Gender**			
	Value	**p-value**	**% count less than 5**	**Remarks**
Relative's/friend's house	0.137	0.712	0 cells (0)	**Valid, H_0 cannot be rejected**
Tok Batin's house	0.058	0.810	0 cells (0)	**Valid, H_0 cannot be rejected**
Assembly area/nominated area	0.489	0.485	0 cells (0)	**Valid, H_0 cannot be rejected**
Community Hall	11.243	0.001	0 cells (0)	**Valid, H_0 rejected**
Higher ground	2.826	0.093	0 cells (0)	**Valid, H_0 cannot be rejected**
Other area	0.045	0.831	0 cells (0)	**Valid, H_0 cannot be rejected**

Note: For result to be valid, the % of count less than 5 must be not more than 20%

Another test using the Spearman Rho was conducted between respondents' preference on area to go when disaster strikes with age, duration of stay and education level. The results are shown in Table 6 below.

Table 6 Spearman Rho test between respondents' preference on area to go when disaster strikes with age, duration of stay and education level

Area of Preference	**Age**		**Duration of stay**		**Education level**	
	CC	**p-value**	**CC**	**p-value**	**CC**	**p-value**
Relative's/friend's house	0.051	0.668	-0.034	0.319	**-0.073****	**0.034**
Tok Batin's house	**-0.109****	**0.002**	-0.025	0.461	**-0.111****	**0.001**
Assembly area/nominated area	**-0.137****	**0.000**	-0.043	0.214	-0.017	0.622
Community Hall	**-0.131****	**0.000**	-0.051	0.138	0.006	0.865
Higher ground	**0.165****	**0.000**	0.044	0.201	**-0.071***	**0.039**
Others	**0.077****	**0.024**	0.042	0.218	0.011	0.744

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

From Table 6 above, since all the p-values of respondents' preference on area to go when disaster strikes against their duration of stay were more than the critical value of 0.05, thus H_0 cannot be rejected. On the other hand, all tested p-values between respondents' age against preferred area except of relative/friend's

house are less than 0.05, thus H_0 can be rejected. In addition, p-values for respondents' preference area of relative/ friend's house (0.034), Tok Batin's house (0.001) and higher ground (0.039) against their education level are less than 0.05, thus H_0 also can be rejected. The result shows that there is a positive and low relationship between the variables which indicates the older the respondents' were, the more they preferred to go to higher ground (0.165**) and others (0.077**) as the option to choose when disaster strikes.

On the other hand, the negative relationship between respondents' age against preference to go to Tok Batin's house (-0.109**), identified assembly area (-0.137**), community hall (-0.131**) and respondents' education level against their preference to go relative/ friend's house (-0.073**), Tok Batin's house (-0.111**) and higher ground (-0.071*) points out that the more their age increased or the higher their education level, the more they disagreed over the preferred area chosen as a safe area when disaster strikes.

FINDINGS AND CONCLUSION

Overall, 66% respondents from Lembah Bertam, 47.8% from Kg. Mensun and 36.1% from the other villages claimed they have experienced with disaster. From the result of the Chi-square, respondents' experience with disaster did influence their preference on area/location to seek refuge during a disaster. In addition, other test reveals that respondents' preference to go to a designated assembly area, community hall and higher ground were influenced by their current location of residential/village area. Moreover, respondents' gender also influenced their preference to go to community hall in the event of a disaster. Another test using the Spearman Rho was conducted and revealed that there is a positive and low relationship showing respondents' who are older preferred to go to higher ground and other areas when disaster strikes. In contrast, the results showing the negative relationship show younger respondents' preferred to go to Tok Batin's house, identified assembly area, community hall. In addition, the lower their education level, the more they preferred to go a relative/friend's house, Tok Batin's house and higher ground.

Findings from the results show that the involvement of various government agencies and the non-governmental sector in executing disaster management is crucial. In order to increase the awareness of an affected community, preparedness programme aimed at minimising the risks caused by natural disasters should be facilitated through various programmes and medium. Awareness and preparedness campaign should also take into consideration of multi-characteristics of the population in ensuring the successfulness outcome of the disaster risk management program. In addition, the lack of information on hazard related risks, vulnerabilities and the preparedness actions to local communities could be the main hindrance to garnering community action. Thus,

the establishment and promotion of such information should be actively organised in disaster prone areas.

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REFERENCES

Asian Disaster Preparedness Center (ADPC). (2007). *Child-oriented participatory risk assessment and planning: A toolkit*. Thailand: Asian Disaster Preparedness Center.

Ashar, F., Amaratunga, D., & Haigh, R. (2014). The analysis of tsunami vertical shelter in Padang city. *Procedia Economics and Finance, 18*, 916-923.

Cheng, C., Qian, X., & Zhang, Y. (2011). Estimation of the evacuation clearance time based on dam-break simulation of the Huaxi dam in Southwestern China. *Natural Hazards*, *57*(2), 227-243.

Cova, T. J., & Johnson, J. P. (2003). A network flow model for lane-based evacuation routing. *Transportation Research Part A, 37*, 579-604.

Isahak, A., Reza, M. I. H., Siwar, C., Ismail, S. M., Sulaiman, N., Hanafi, Z., Zainuddin, M. S., & Taha, M. R. (2018). Delineating risk zones and evaluation of shelter centres for flood disaster management along the Pahang River Basin, Malaysia. *Jamba*, *10*(1), 501.

Jamrussri, S., & Toda, Y. (2018). Available flood evacuation time for high-risk areas in the middle reach of Chao Phraya River Basin. *Water*, *2*, 1-23.

Kolen, B., & Helshoot, I. (2012). Time needed to evacuate the Netherlands in the event of large-scale flooding: Strategies and consequences. *Disasters, 36*, 700-722.

Mat Rasul, R., & Darus, M. M. (2016). Temporary evacuation and relief centre design management in Malaysia: An Overview. In *3rd ISME International Colloquium*, December 27-28, 2016, Melaka, Malaysia.

Pannier, R. (2016). Ensuring safety of people in case of severe floods: Feasibility and relevance of vertical evacuation strategies in high population density. *E3S Web of Conferences, 7*, 19004.

Sampath, P. (2001). Vulnerability reduction at community level: The New Global Paradigm, In: Pradeep, S., Akka, D., & Uma, M. (eds), *Disaster Mitigation Experiences and Reflections*. New Delhi, India: Prentice Hall of India Pvt Ltd.

Seag, D., Hong, S. J., Park, H. S., Kim, D. S., Hong, S. J., & Park, H. S. (2013). Analysis of evacuation system on tsunami disaster prevention in Korea. *Journal of Coastal Research*, *65*, 974-979

UNISDR. (2004). *On-Line conference: Priority areas to implement disaster risk reduction*. Retrieved June 27, 2019, from https://www.unisdr.org/2004/wcdr-dialogue/terminology.htm

Wilson, J. (2010). Essentials of business research: A guide to doing your research project. Thousand Oaks: SAGE Publication

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