Empowering women for disaster risk reduction: a case study of geologically based disaster at Yan, Kedah, Malaysia

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Empowering women for disaster risk reduction: a case study of geologically based disaster at Yan, Kedah, Malaysia

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Abstract. The effects of disaster impact all levels of society equally. However, both men and women response to disaster differently. It is critical to acknowledge that both genders have different roles, responsibilities, access, and control over resources as well as how they are affected by crisis and disaster. This paper seeks to build an initial understanding on the importance of gender perspective through review of literature and single case study of Community Based Disaster Risk Management (CBDRM) program conducted at Yan, Kedah. Data was collected through survey questionnaires and focus group discussion with women that had experienced the geological disaster that occurred on the 18th of August 2021. The findings revealed that even though women and girls are more vulnerable to disasters and climate change, they also contribute vital information, skills, resources, and experiences to disaster risk reduction. These abilities are underutilised and are mostly missing from the creation of resilience strategies and decision-making processes for prevention, mitigation, preparedness, and recovery process of the disaster cycle. It is the responsibility of the national governments not only to identify these vulnerabilities but also to build the resilience of women and children to lessen disaster impact in the future.

1. Introduction

The unexpected disaster of debris flow and flash flood in Yan, Kedah was reported to have caused 20 people to be trapped at Jerai Hill Resort, three deaths, three injuries, and four victims missing on 18th of August 2021 [1] while as many as 800 homes around Yan and 200 homes in Tupah, Kuala Muda were affected from the event [2]. According to [3], women and children are among the most vulnerable communities affected after disasters in countries such as India, Bangladesh and Nepal with analysis showing a higher death rate than men [3].

The increasing debris flow and flash flood occurrence have triggered the need for Malaysia's national risk reduction agenda to conduct detailed studies and action plans. The effort was developed by mainstreaming the concept of disaster risk reduction, to be in lined with the international good practices as outlined in the Sendai Framework for Disaster Risk Reduction 2015-2030 by the United Nations Office for Disaster Risk Reduction (UNDRR) [4]. Thus, the study of women roles which represented half of the society is important to increase their awareness and reduce the risks or vulnerabilities of

disaster. It is also important to ensure that their voices and abilities are not neglected from the creation of resilience strategies and decision-making processes.

2. Women in Disaster Situation

The loss of individuals and properties could severely affect the victims and extend disillusionment after surviving disasters [5]. Thus, women empowerment on pre-disaster, during disaster and post disaster should be well educated by increasing awareness through training programmes [6]. According to [7], in few disaster cases, the roles of women have changed thus advancing women empowerment. Women usually are more concerned with environmental issues, sustainability education, and other basic services, hence their involvement in mitigation plan will contribute significant roles to the society specifically to their community. The involvement of women for socio-economic was explored in the after-post disaster, however the contribution in decision making was still low.

2.1. Disaster Risk Reduction (DRR)

Policies and practices for disaster risk management should be based on the understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics, and the environment. Such knowledge can be leveraged for the purpose of pre-disaster risk assessment, prevention and mitigation, and the development and implementation of appropriate preparedness and effective response to disasters [8]. The disaster risk reduction programmes require collaboration among public and private stakeholders. However DRR efforts was dominated by experts, thus limiting public insights and interests [9]. Therefore, disaster risk vulnerabilities to the community were not fully utilising the opportunities and chances for improvement.

2.2. Gender Role-Empowering Women

Empowerment is not limited to giving access to decision making, but also allowing people to perceive women as having the abilities and capacities in decision making. Recent research by [3] revealed that the lack of women as representatives in disaster risk reduction had exposed them to be highly vulnerable of disasters. This is due to their roles in decision making process is still at a lower level.

3. Geological based Disaster

Geological based disaster is caused by natural geological processes which triggers a single major event or a combination of two or more events at once. The examples of geological disaster are landslide, earthquake, tsunami, volcanic eruption, debris flow, avalanche, sinkhole, and subsidence. Landslide and subsidence are influenced by climate change while earthquake, tsunami and volcanic eruption are not influenced by climate change [10].

Although Malaysia is not a precipitous country (mountains and hills are less than 25% of the terrain) and generally free from disaster such as earthquake and volcanic eruption, the combination of heavy rainfall and slope failures causes landslide to happen frequently. The geology of the study area, Mount Jerai consists of Jerai formation and Machang formation. It comprises sedimentary rocks that have been metamorphosed by granite intrusion and is believed to be above the sedimentary rocks throughout the Mount Jerai area [11]. The general geological environment causes the area to be a high risk zone.

3.1 Types of disaster

Cascading disaster events occurred at Mount Jerai, Yan Kedah on 18th August 2021. It commenced with the triggering factor of extreme heavy rainfalls as reported by the Department of Irrigation and Drainage in which the rain station at Mount Jerai and Singkir Genting Village recorded 281mm and 172mm of rainfalls respectively during the incident. It was then continued with the slope failures and landslides which induced debris flow that brought along blocks of rocks, mud, trunk of tree debris, and ended up with mud flood at the downstream area. This incident has changed the geomorphology of the mountain and rivers. Few catchment areas were affected such as Titi Hayun, Batu Hampar, Seri Pergi, Tupah, Sungai Badak, and Teroi.

Debris flow is induced by steep terrain and sporadic rainfall. The most frequent mass movement process of debris flow is crucial in removing sediments from the mountainous terrains and transporting them into the river system. It is one of the most dangerous landslide types due to its high flow velocity, strong impact forces, and long runout, combined with poor temporal predictability [12].

The Mineral and Geoscience Department discovered 69 landslide locations and five debris flow source locations throughout Mount Jerai area, especially in Titi Hayun and Batu Hampar. The report published by the Ministry of Energy and Natural Resources has a guideline on different types of disaster, but it can be hard for the public to understand as there are various terminologies used on the types of disaster such as geological disaster, debris flow, mud flood, debris flood, erosion and siltation, landslides, and cascading geological disasters [13].

Geological hazard is a geological process or phenomenon that occurs naturally due to the triggering factors such as excessive rainfalls and natural or man-made causative factors. It would only be considered as geological disaster if the geological phenomenon occurred has brought the negative impacts such as harming and destructing the community, resulting in the loss of economy.

Debris flow is a type of mass movement that moves rapidly whilst carrying loose sand, silt, boulders, tree debris that mixed with water to form a liquid stream that flows downstream. The difference between mud flood and debris flood is mud flood occurs when flood water overflows the riverbank with a large amount of mud whilst debris flood occurs in the downstream areas when the water content is more than debris material. After all the boulders were stopped at the upstream, debris flood will bring wood debris, gravel, sand, and silt suspended in large amount of water. For some cases, cascading geological disasters are relatively rare but their impacts are enormous and had killed the most victims of natural hazard and disasters in this country [13].

3.2 Understanding the risk

Understanding the hazards and risks will lead to the preparedness and mitigation approaches of the local people, authorities, and agencies. The build-back-better agenda of United Nation Disaster Risk Reduction (UNDRR) for recovery, rehabilitation and reconstruction is vital to the people of Yan, Kedah.

This devastating disaster had caused 6 deaths, destructing many public infrastructures, residentials and industrial areas, in which more than RM75 million direct economic losses was reported. The incident had affected the Jerai Geopark, a popular tourism area which is one of the National Geoparks in Malaysia, covering a total area of 800 sq km. The overflow of the river resulted in flash flood, damaging the tourism infrastructures around the area.

4. Methodology- Single Case Study

Yan, which is a unique district in the state of Kedah and has been well known as the tourist attraction has been chosen as a case study. The site has been recently hit by landslide and debris flow incident in 2021 which has brought severe damages to the local community. The new and advanced technology of Early Warning System (EWS) from Japan was deployed at the area of Titi Hayun, Yan, Kedah is the pilot project in Malaysia towards facing geological disasters of landslide and debris flow. This project has focused on the involvement of various community levels by using the community-based disaster risk management (CDBRM) approach. This includes observing the roles of women in disaster preparedness and understanding their needs during disaster. This high impact programme is intended to enhance the resilience of the local community in early respond towards geological disaster through Early Warning System (EWS) deployment at Jerai Mountain and evacuation plans for debris flow and landslide disasters.

For this programme, in the context of women's empowerment, a brief study was made using two (2) methods; survey questionnaires and focus group discussion (FGD). The survey questionnaires conducted was to measure the respondents' understanding on disaster preparedness before the programme (on June 12th, 2022) and after the programme (on August 19th, 2022). Meanwhile, the focus group discussion (FGD) was conducted to get input from the participants regarding their understandings of geological-based disasters that occur in their area and how they can identify the relevant risks, and

then be able to give suggestions in dealing with those risks. These initial findings can help stakeholders to better understand the roles and needs of women in facing disaster situations.

5. Findings

5.1 Survey questionnaires result

On 12th June 2022, an informal meet up was coordinated with the local women community in Yan, Kedah. The intention of the meet up was to get to know more about the women community, sharing information on women empowerment in disaster management and how they would like to be involved in a women empowerment programme for disaster risk reduction. All 14 of the participants are the local champions that were involved with the Community-based Disaster Risk Management programme established to educate the locals about the early warning system. Thus, have some understanding on disaster awareness are crucial in developing the resilience of women in the study area.

The questionnaire which consists of 10 questions were distributed to the 14 participants to evaluate their level of understandings before the official program commenced on 19th August 2022. The questions were answered in Likert Scale in which the participants need to select the statement that best suits them ranging from Strongly Disagree (1) to Strongly Agree (5).

No.	Question
1	I have the awareness and understanding about risk, factor and impacts of disaster (e.g. flood, landslide etc.).
2	I am aware of the importance in disaster preparedness
3	I know about the type of help / support provided to the community before, during and after disaster (Public assistance, community assistance and self-help).
4	I can share and educate the concept, factor and impacts of disasters (e.g. flood, landslide etc.) to others.
5	I understand the importance and have the skill in making early planning and preparedness to face an emergency when disaster strikes.
6	I understand and can educate others about Early Warning System (EWS).
7	I understand and can educate others about the CBDRM concept.
8	I faced a lack of female and children supplies during disaster.
9	I am capable of identifying the location and evacuation route for myself and the community.
10	I am aware and understand the roles and responsibility of the community before, during and after a disaster occurred.

During the second program held on 19th August 2022, in addition to the original 14 participants another 10 new participants attended as well. The programme went through a series of disaster awareness education and sharing sessions by the local women community.

The result showed an overall higher positive rating post-event regarding disaster awareness and importance of disaster preparedness. The results correlated with higher ratings for participants who have attended both sessions as compared to participants that only attended once. Higher disagreements mainly focused on the statement related to their capability in educating and information sharing with other members of the community. This showed uncertainty among the participants and limited information absorption.

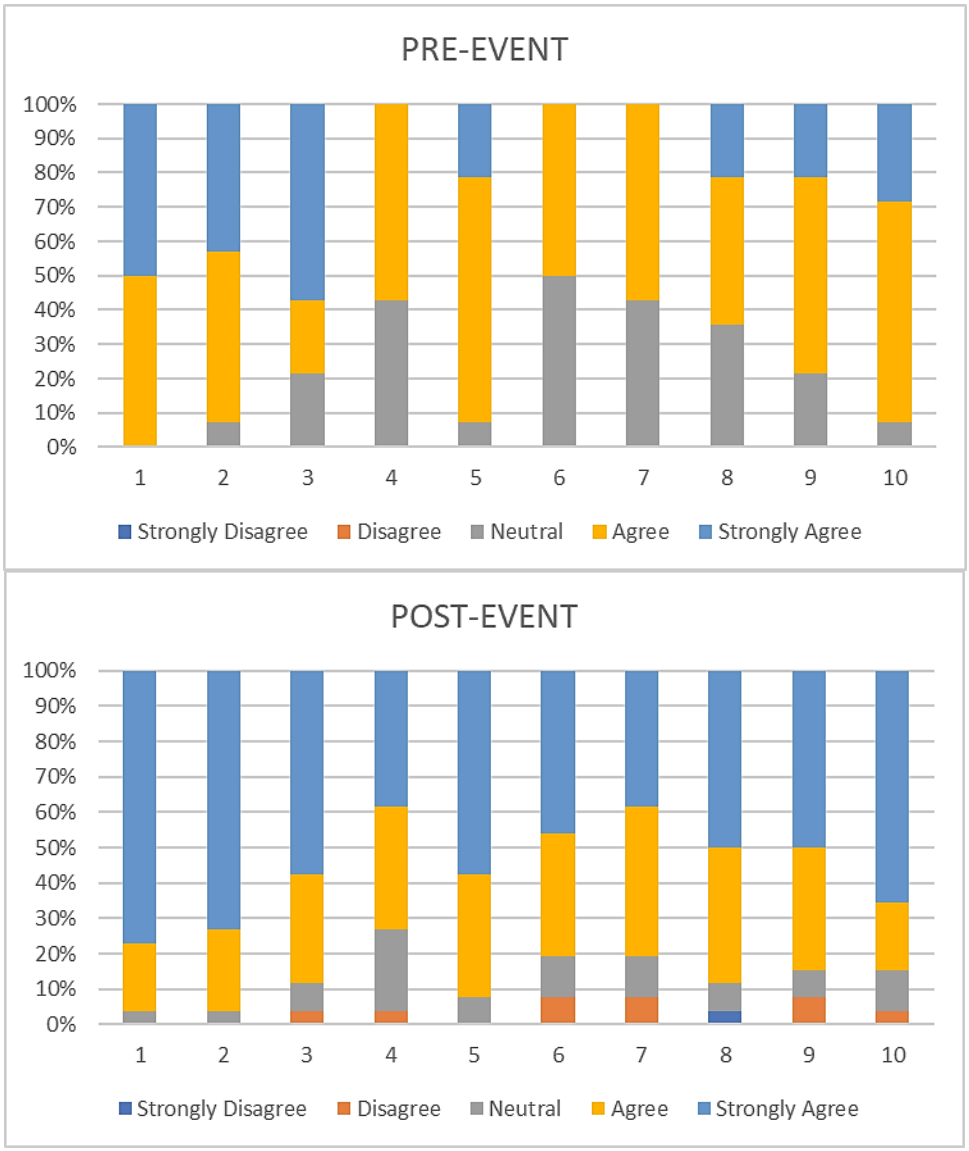

Figure 1 . Pre-event and post-event questionnaire results

5.2 FGD result

The Focus Group Discussion (FGD) was based on the three points that were discussed among the women community. The first discussion point seeks to understand the extend of disaster knowledge among the women. The second discussion point attempts to identify the types of risk that a woman and their family faces during a disaster. While the third discussion point is to provide disaster management and solutions. The result has been summarised in the table below.

Discussion 1: Understanding the type of disaster that had occurred	
Mud-slide	Occurred on 18 August 2021
Discussion 2: Identifying disaster risk and risk value	
Financial / Supplies Assistance	Over provided food
	Other help required: cleaning, financial, emotional support and spirit
Lack of communication and information	Panic / trauma
	Lack of experience

	Does not know who to contact
	Pregnant ladies and vulnerable groups (elderly, children, disabled) unable to evacuate by themselves – lack of energy / weak
Discussion 3: Risk management and solutions	
Emotional support	Establishing an emotional support group with regular meet up with the women community (face-to-face) to provide emotional support
	Positive thinking in oneself to be able to react with rationality
	Need help from counsellor to destress and reduce trauma in children
	Moral support from the nation
	Faith
Financial / Supplies Assistance	Provide different types of help after disaster occurred: Day 1-2: Ready-made food Day 2: Clothing Day 3: Cleaning assistance Day 3-4: Medicine (Panadol), cleaning equipment, hygiene products, children's needs (pampers, milk, etc.)
	Food should not just be on rice, but also include cooking oil and sugar
	Mattresses for children
	Slipper
	Providing financial assistance is much more practical
	Coordinate the assistance provided by re-evaluating the priority from time-to-time
Communication and information	WhatsApp Group for communication
	Important evacuation map, water levels and other information

6. Discussion

From the outcome of questionnaire, it can be concluded that the continuous disaster education awareness program for women shows positive result. The participants understanding, awareness, information sharing capability and confidence was reinforced and raised after participating the program.

Based on the Focus Group Discussion, emotional support and post-traumatic stress disorder are a common challenge faced by the women community. In addition to the usual physical aids, it is also important to focused on mental health and recovery among disaster victims particularly among women and children. The sense of support from the community and nation are also important for them to feel acknowledge and cared for after facing a disaster.

Additionally, the women community also understands their needs and wants in term of aid. They are also aware and willing to help their community by providing logistic and distribution work as they are familiar with the situation of each family in the area.

7. Conclusions

It can be concluded that even though women and girls are more vulnerable to disasters, they also contribute vital information, skills, resources, and experiences to disaster risk reduction and climate change adaptation. These abilities are underutilised in traditional resilience-building methods. Women are mostly missing from the creation of resilience strategies and decision-making processes for prevention, mitigation, preparedness, and recovery. It is the responsibility of the national governments not only to identify these vulnerabilities but also to build the resilience of women and children to lessen disaster impact in the future.

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