Resident's Communication Behavior in Three Volcano Disaster Prone Areas with Different Disaster Exposure

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Abstract

Volcanic disaster gives various impacts on the environment depending on its exposure to the disaster. In addition to requiring different management, environmental changes due to volcanic disasters will form different behaviors. An effective communication between residents in disaster-prone areas with stakeholders is required to ease the risks as volcanic disasters. The objective of this research is to analyze resident's communication behavior in volcanic disaster prone areas to for disaster preparedness in areas with different disaster exposure types. This research applied quantitative method. The conclusions of this study are amongst others the residents in the area exposed to the cold lava flood have better skill level on media usage than those of resident's in other areas, and the residents have a good level of trust in media intervention, mainly for new programs.

Keywords: disasters, volcanoes, communication behavior, readiness, risk

Introduction

Indonesia, which is geographically located in the "Pacific Ring of Fire", has more than 83 active volcanoes, and therefore potentially has frequent earthquakes and volcanic eruptions. One of the volcanic eruptionswas of Mount Merapi in 2010 causing 242 death tolls in the Special Region of Yogyakarta and the other 97 fatalities in Central Java Province. The disaster impacts werenot only on the loss of lives but also the loss of assets and other productive resources of individuals and communities, causing economic vulnerability and poverty (Bappenas, BNPB 2011).

Although giving some signs, volcano disaster's incidence and its impactscannot be avoided. In addition to causing casualties, damage by volcanic eruptions affects the housing sector and other infrastructures such astelecommunications, electricity and energy, and clean water. BAPPENAS, BNPB (2011) stated that Mount Merapi eruption in 2010 has caused severe damages in the housing sector, and about 7,129 houses were damaged both in Yogyakarta and Central Java Province.

Based on the results of the assessment of damage and losses caused by the Mount Merapi eruption, dated December 31, 2010 compiled by the National Agency for Disaster Management ((BAPPENAS and BNPB, 2011), the impact of the eruption of Mount Merapi has caused damage and losses amounting to IDR3,557 trillion. Detailed estimated damage and losses occurred in the productive economic sectors were as the following IDR 1,692 trillion (46.64% of the total damage and losses value), followed by infrastructure sector ID.707,427 billion (19.50%),and IDR 626,651 billion (17.27%) in housing sector, across sectors were Rp.408,758 billion (13.22%), and social sector IDR122, 472 billion (3.38 percent). Therefore, to reduce the risk of a catastrophic impact of Mount Merapi, many people have made use of a communication medium, both to provide early warning and information, which are closely related in the response during the disaster and post-disaster time.

Volcano disaster has prompted residents in the disaster-prone areas to communicate with stakeholders. Communications are required both in the pre-disaster, emergency response, post- disaster and disaster risk reduction. The paradigm of the current disaster management system requires a more active role in community disaster management involving multiple actors, inter-discipline, and inter-institutional.

This is due to the problem complexity in disaster management that cannot be overcome by the government alone, but must be supported by the active role of the entire communities. Various issues that arise cannot be resolved from a particular field of science, but it takes the involvement of many science disciplines.

Based on the background, the general objective of the study is to analyze the resident's communication behavior in disaster-prone areas with different volcano types of disaster exposure in terms of volcano disaster preparedness. Detailed objectives of the study are as follows: (1) to analyze resident's skills of in disaster-prone areas of different volcano disaster exposure types in the use of communication media, (2) to identify perception of residents in disaster-prone areas of different volcano disaster exposure to information and (3) to find out level of citizen trust in the disaster-prone areas with different volcano disaster exposure to media intervention.

The usefulness of the study are (1) to provide an overview of the communication behavior of residents in disaster-prone areas with different volcano types disaster exposure, (2) to provide some recommendations in formulating disaster management policies to reduce the risk of volcanic catastrophies.

Communication Behaviour

Communication refers to the act of one person or more, send and receive messages that distorted by interference, occurs within a certain context, a certain influence, and there is a chance for feedback (DeVito, 2011). Risk communication is the process of sharing the meaning of the physical hazards (Rowan, 2009), is the integration of local media, community organizations, and interpersonal relationships (Kim and Kang, 2010), and inter-institutional network (Quero, 2012).

Behavior is a human activity that can be observed directly or indirectly (Notoatmojo, 2007). Behavior is formed of the obtaining process of information about the world, how information is stored and processed by the brain, how to solve problems, think, and compose language, and how the process is shown in observable behavior (Solso *et al*., 2007). The behavior of the offspring obtained in the form of biological instincts and results for life experience (Mustafa, 2011). Friend, family, and coworkers can affect a person's intention to perform an action (Springston *et al*., 2009). Trust is one of the main objectives in risk communication, and is a prerequisite for various other purposes (Renn and Levine 1991). Paren *in* Winkel (2007) stated that someone in their learning has the purpose, among others, to form the automatism.

To convince and complete the information, someone will use several communication channels, such as mass and interpersonal communication (Karus and Kiousis *in*Davis,1999). Media communication is the essence of civilization and history directed by prominent media in its time (Innis *in* Littlejohn and Foss, 2011).

There is a sharp distinction between oral, written, and electronic media. The oral media relies heavily on the sense of hearing in communication. The nature of the written media information is that there is not a change in the information, durable, lightweight and easily moved such as paper. The electronic media has made people like living in a global village (McLuhan *in* Littlejohn and Foss, 2011).

The development of technologies and methods to detect disasters caused trust in the performance of agencies responsible for disaster detection is the key for risk response (Earle and Cvetkovich *in* Renn, 2009). Motivations, skills, norms, attitudes, and values influence the coordination between stakeholders (Quero, 2012).

Disaster can occurs at any time, therefore residents in disaster-prone areas should be prepared for the changes that will occur during a disaster. According to Rafferti *et al*. (2013) certainty is the key principal underlying readiness to face the changes. The primary mechanism for creating readiness to change is a message to change (Armenakis *et al*. *in* French *et al*. 2005). Creation of readiness for change involves a change in a single individual cognition of people in a group. In general preparedness, message must include two issues that will be change, and individual and collective efficacy, that is sureness to use resources to achieve specific goals.

Based on the theoretical foundation, the observed variables include individual factors, the use of media skills, media mastery, perception of resources, and the level of trust in the media intervention.

Volcanic ash is volcanic fallout particles, which is ejected into the air during an eruption in a variety of sizes, and the smaller size can be blown up to hundreds of kilometers. Most impact of the volcanic ash is damage to crops and horticulture, and the destruction of some part of perennials. Cold lava flood is an overflow of material from volcanic eruptions due to water-borne precipitation in the lava flow. The amount of cold lava flow is caused by high rainfall in the upper reaches of the river.

As a secondary hazard of volcanic eruptions, cold lava flood damaging houses, infrastructure such as bridges, roads and irrigation, and hundreds of hectares of farmland damaged by natural disasters. The threat of cold lava lasts very long. According to the observations, cold lava floods still has been occurring in the field since the eruption of Mount Merapi in 2010 until 2014, although its intensity tends to decrease. To date, the cold lava flood threats mostly miners who take sand along the river.

Pyroclastic of volcanic eruptions is a gassy material with a temperature over 600°C flowing like rolling clouds. Pyroclastic damage infrastructures, such as roads, bridges, electricity and telecommunications networks, buildings, agricultural land, and also lives.

Methodology

This study was a cross sectional study using the method of survey on the population of residents in disaster-prone areas of Mount Merapi. This survey is conducted in Wukirsari Village, Cangkringan, Sleman District, Special Region of Yogyakarta, Jumoyo Village in Salem Sub-district, Magelang District, and Dukun Village, Dukun Sub-district, Magelang District, Central Java Province. The study site selection is done intentionally (purposively) with consideration that these disaster prone areas of Mount Merapi have different type of disaster exposure. Dukun Village is an area exposed to volcanic ash, Wukirsari Village is an area exposed to pyroclastic, and the Jumoyo Village is exposed area of cold lava flood.

Data were collected using a series of instruments and structured interviews with key informants and observations on communication activities of the residents in the study sites.

The number of samples in the study is a set of 200 respondents. Sampling was done randomly. The number of samples of each region is calculated pro rata based on the number of families (Table 1). Data collection was conducted from July to August 2013. To explain the communication behavior of residents in disaster-prone areas volcano, descriptive analysis is used.

Table 1. The number of head of the family and the proportion of the study sample 3 villages

Village (type of disaster)	Family	Proportion	Sample
Wukirsari (Pyroclastic)	3.600	2,7%	96
Jumoyo (Cold Lava Flood)	2.425	2,7%	66
Dukun (Volcanic ash)	1.421	2,7%	38
Total	7.446	2,7%	200

Result and Discussion

Individual characteristics

Results showed that respondent's educational level is good enough to support communication activities. Most respondents have high school education. However, there are still 5 percent of respondents who had never obtained formal education, 3 percent of respondents did not graduate elementary school, and 12.5 percent of respondents who only graduated elementary school.

The level of education need to be known in determining the methods and technologies in delivering the right message to improve disaster preparedness (Dufrene 2013). Similar research results presented by Blackwella *et al.*(2013), that to provide the knowledge resources, must use an appropriate technology in order to be easily understood by the people.

Unlike the results of such research, field observation showed the use of a medium of communication skills is not only determined by the level of education. Communication media uses many skills gained from the interaction between peers or between friends who have an interest in the same issues.

On average, respondents had been living in disaster-prone areas for more than 36 years. Even further, 19 percent of respondents had been living in disaster-prone areas for over 50 years. Having regard to the frequency of the eruption of Mount Merapi, one can say that the average respondent experienced enough volcano disaster. Experience is very important to establish cooperation in the face of disaster (Nivolanitou and Synodinou, 2010). Experience also makes a person have more attention in the area of disaster information (Rød, Botan, Holen 2011). Collaboration with various stakeholders is needed at the micro level of a community disaster exposure (Jocrin, Shaw, Takcuchi, Krishnamurthy 2012).

The skill of communication media usage

Almost all residents in disaster-prone areas volcanoes, both in areas exposed to pyroclastic, cold lava flood, and volcanic ash, has television (95.25), followed by radio (84.75) and MOBILE PHONE (76.50). Internet and radio call (HT) that have significant role during the emergency response owned mostly by people who are in areas exposed to volcanic ash, respectively 22.37 and 18.42.

Results were in accordance with the opinion of Biagi (2010) which states television moving rapidly past the radio. Expectations of residents to obtain information that is more real, encourage them to buy television sets that are able to present information in the form of voice, images, and text. Information in the form of sound-supported visualization in the form of image and sound systems have supported facilitate audience get better understanding on the information that is received and emotionally involved with the show being viewed. Rød, Botan, Holen (2011) describes a visualization state in the form of the image will be an impact on the audience than just the numbers.
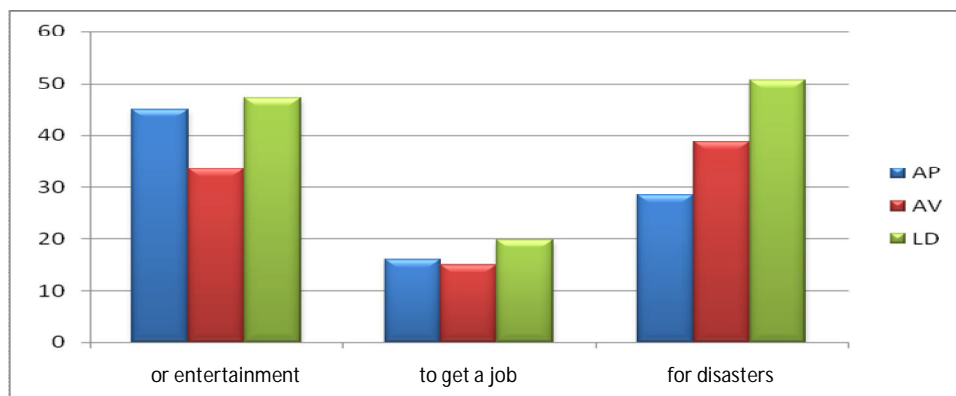
AP=Hot Could AV=Volcanic Ash LD-Cold Lava
Picture 1: Usage of Communication Media by citizen in the volcano disaster prone area with different disaster exposure graphic.

Media for Entertainment

Residents in areas prone to volcanic disasters, particularly those exposed to pyroclastic and cold lava flood require more entertainment than those of residents living in areas exposed to volcanic ash (Figure 1). It is seen from the level of use of communication media for entertainment, where residents in the area exposed to the cold lava flood and pyroclastic use of communications media, especially television reaching more than 90, while residents in areas exposed to volcanic ash only 60.53. In correlation with the needs of entertainment, according Hendarto cited by Rahmanadji, a human being lives with a strong instinct to seek excitement and entertainment.

Media to Get a Job

For the sake of jobs, more people are using the mobile phone as compared to other media. Observations in the field indicate that face to face communication that has the potential need to further communication will result in the exchange of mobile numbers. Flexibility of use of mobile phone and its personal nature allows one to communicate anywhere and with certain people desired. Vegetable merchant, itinerant food vendors, workshop workers, farmers, and other professions tend to use mobile phone for work. Average use of mobile phone to get a job in all three areas of the study is 44.78.

Media for Disaster

TV, radio, and mobile phone are media, which are widely used by residents for disaster-related communication (59.00). Residents in areas exposed to cold lava flood use communication media for disaster more than people in other regions, due to the long exposure to disaster (Figure 1).

The results of the field observations, information received through the mass media will be further communicated face-to-face with family, neighbors, whereas with others who are outside the area of residence, communication is done with both mobile phone and internet media. The use of social media by some of the residents are very helpful in disseminating disaster information, including straightening the news circulating in the community.

Social media is also used for long-distance coordination in disaster management. Social media (twitter) allows users to upload pictures, movies, and other sounds that allow users to get better understanding on the information received.

The information can be uploaded directly or forward the information to information received from various parties. The information can be passed from individuals, government agencies, and mass media. Uploading of information that can be done directly in social media, can also be done by stating the address of the site as a source of initial information. Inclusion of the site address was preceded by a brief description or items of information are uploaded.

Exchange of information among the volunteers or observers of a disaster very quickly, especially during disasters. Several governmental and non-governmental organizations utilize social media among others @pasagmerapi, @gemamerapi_fm, @JRKIndonesia, @RakomKFM, @Infest_Jogja,@ TRCBPBDDIY, @jalinbencana, @BNPB_Indonesia, @jmcangkringan, @CombineRI, @lintasmerapi, @jalinmerapi, @HaloPolisi, @palangmerah. The volunteers and disaster observers are generally actively communicating via social media.

Perception on Information Sources

Close relatives rated as the most reliable source of disaster information. The results showed the Chief of the Neighborhood (RT) is the most reliable source of information for residents in disaster-prone areas, in addition RW, community leaders, neighbors and friends. The Chief of the neighborhood is the resident coordinator and bridges communication with higher elements, such as RW, Ward, and local governments.

Several informants stated that information resources that present in activities that involving residents will foster their closeness to the residents. The informant's ability to communicate with residents is needed to find out the problems faced by residents.

Communication with some residents shows that they need the information to be simple, clear, and definite. The information obtained will be distributed among residents in the immediate neighborhood or confirmed by other parties. One party that is considered have more disaster information knowledge is volunteers and local residents that also active in the exchange of information with the public at large. Different views of the programs/activities undertaken as well as the disclosure of information in an area between the residents and local leaders are a factor inhibiting communication.

Level of Trust in the Media Interventions

Media intervention is information, which is disseminated through TV and radio in the form of news, dialogue, and appeal. The level of resident's trust for news, dialogue, and appeal on TV program is better than that of radio's. Of the three packaging programs, news is the most trusted, followed by appeals then dialogue.Florea (2013) stated that in the competition between channels, the media dramatize spectacularly to attract viewers and advertisement. Furthermore, the view that provokes emotion will quickly attract viewers. However, some people argue that the excessive information will trigger growing distrust for the media aired the show.

Conclusion

Residents in different areas of disaster exposure exhibit different communication behaviors. Residents, who are exposed more on cold lava floods are more active in holding communication as compared to other areas. In general, residents in disaster-prone areas still have good command on trust to TV and radio media intervention. The Chief of Neighborhood is the most advanced information source as compared to other information sources. The closest persons, who own connection to outside stakeholders, are the very important information bridges for residents in disaster-prone areas.

Recommendation

Based on this conclusion the effort to improve the communication skills of residents in disaster-prone areas to reduce the risk of volcanic disasters should be adapted to local conditions. In order for such efforts more effectively need to actively involve local residents in touch with the outside world. The local Chief of Village or other stakeholders should be more actively conduct communication with residents in disaster-prone areas through some activities held either by the local community or by the village apparatus, so that the community members will have a chance to deliver any faced issues and problems in lessening disaster risks.

Acknowledgements

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