

## UNDERSTANDING DISASTER PREVENTION LITERACY OF VILLAGERS IN MAGELANG REGENCY

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### ABSTRACT

*This research aims to understand the disaster prevention literacy of residents in Disaster-prone Area (DPA) III Mount Merapi and its support villages in Magelang Regency related to the Sister Village-based disaster mitigation. The disaster prevention literacy concepts help researchers have a better understanding of the outcomes of disaster education which has been done by BPBD Magelang Regency. This qualitative research uses a constructivist paradigm. The data was collected through in depth-interview with research informants, namely village officials and the OPRB member in Ngargosoko, Nglumut, and Kapuhan villages (located in DPA III) as well as Sucen, Gulon and Mangunsari villages (support villages). Disaster prevention literacy can be known from the knowledge and skills of informants about natural signs before an eruption, what to do, when to do it, and how to evacuate during the eruption of Merapi. Information management was also carried out carefully by the informants by choosing a form of formal communication to convey their knowledge and skills to others about the Sister Village program. This study also found that informants viewed BPBD Magelang Regency as a credible organization so that they were willing to follow directions, trust information, and socialization activities organized by the organization.*

**Keywords:** disaster communication, disaster literacy, disaster mitigation, Sister Village, Magelang

### ABSTRAK

Penelitian ini bertujuan untuk memahami literasi pencegahan bencana warga di KRB III Gunung Merapi dan desa penyangganya di Kabupaten Magelang terkait mitigasi bencana berbasis Sister Village. Konsep literasi pencegahan bencana membantu peneliti untuk lebih memahami hasil dari pendidikan kebencanaan yang telah dilakukan oleh BPBD Kabupaten Magelang. Penelitian kualitatif ini menggunakan paradigma konstruktivis. Teknik pengumpulan data yang dilakukan adalah wawancara mendalam kepada responden penelitian yaitu aparat desa dan tim OPRB pada desa Ngargosoko, Nglumut, dan Kapuhan (desa di KRB III) serta desa Sucen, Gulon dan Mangunsari (desa penyangga). Literasi pencegahan bencana dapat diketahui dari pengetahuan dan keterampilan informan tentang tanda-tanda alam sebelum letusan, tentang apa yang harus dilakukan, kapan harus melakukannya, dan cara mengungsi saat terjadi letusan Merapi. Pengelolaan informasi juga dilakukan secara hati-hati oleh informan dengan memilih bentuk komunikasi formal untuk menyampaikan pengetahuan dan keterampilannya kepada orang lain tentang program Sister Village. Penelitian ini juga menemukan bahwa informan memandang BPBD Kabupaten Magelang sebagai lembaga yang kredibel sehingga bersedia mengikuti arahan, mempercayai informasi, dan sosialisasi kegiatan yang diselenggarakan oleh organisasi tersebut.

**Kata Kunci:** komunikasi bencana, literasi bencana, mitigasi bencana, Sister Village, Magelang

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## INTRODUCTION

The eruption of Mount Merapi in 2010 resulted in many injuries and deaths as well as property losses in four districts around the slopes of mount Merapi. The death toll from the eruption was recorded as many as 347 people and the displaced population reached 410,388 people (bpd.magelangkab.go.id). According to Gunawan Iman Suroso, Head of Prevention and Preparedness of Magelang Regency Disaster Management Agency (BPBD Kabupaten Magelang) in his interview mentioned that when Mount Merapi

erupted in 2010, people in Disaster-prone areas (DPA) III experienced panic and chaos in the evacuation process, unclear refugees camp as well as the challenges to manage refugees and logistics. DPA III is an area that is located close to the source of danger often hit by hot clouds, lava flows, rock debris, rock bursts and heavy ash rain. In the event of increased activity of Mount Merapi that leads to eruption, people living in DPA III are prioritized to be evacuated first. DPA III is a collection of villages located 0-10 km from the top of Mount Merapi and consists of 19 villages, as follows:

**Figure 1.1.** Villages in DPA III

Sub-district	No	DPA III Villages
Sawangan	1	Wonolelo
	2	Kapuhan
	3	Ketep
Dukun	4	Sengi
	5	Sewukan
	6	Paten
	7	Krinjing
	8	Kalibening
	9	Sumber
	10	Ngargomulyo
	11	Keningar
Srumbung	12	Kaliurang
	13	Kemiren
	14	Ngablak
	15	Nglumut
	16	Tegalrandu
	17	Mranggen
	18	Ngargosoko
	19	Srumbung

(Source: BPBD Kabupaten Magelang, n.d.)

Figure 1.2. Disaster-prone villages and their Sister Villages.

Sub-district	No	DPA III Villages	Evacuation Destination Village (Sister Village)
Sawangan	1	Wonolelo	Banyuroto Village, Sawangan Sub-district and Pogalan Village, Pakis Sub-district
	2	Kapuhan	Mangunsari Village, Sawangan Sub-district
	3	Ketep	Podosuko Village, Wulunggunung Village, Sawangan Sub-district and Ketundan Village, Pakis Sub-district
Dukun	4	Sengi	Need Village, Tirtosari Village, and Jati Village, Sawangan Sub-district, Ireko Village, and Senden Village, Mungkid Sub-district
	5	Sewukan	Ambartawang Village, Mungkid Village and Rambeanak Village, Mungkid Sub-district
	6	Paten	Gondang Village, Bumirejo Village, and Paremono Village, Mungkid Sub-district Banyurejo Village, and Mertoyudan Village, Mertoyudan Sub-district
	7	Krinjing	Deyangan Village, Mertoyudan Sub-district
	8	Kalibening	Adikarto Village, and Tanjung Village, Muntilan Sub-district
	9	Sumber	Pucungrejo Village, Muntilan Sub-district
	10	Ngargomulyo	Tamanagung Village, Muntilan Sub-district
	11	Keningar	Ngrajak Village, Mungkid Sub-district
	Srubung	12	Kaliurang
13		Kemiren	Salam Village, Salam Sub-district
14		Ngablak	Kradenan Village, Kadiluwih Village, Somoketro Village, and Tirta Village, Salam Sub-district
15		Nglumut	Sucen Hamlet, Salam Sub-district
16		Tegalrandu	Bringin Village, Pabelan Village, Mungkid Sub-district and Wanurejo Village, Borobudur Sub-district
17		Mranggen	Gunungprong Village and Sokorini Village, Muntilan Sub-district
18		Ngargosoko	Gulon Village, Salam Sub-district
19		Srubung	Baturono Village and Tersangede Village, Salam Sub-district

(Source: BPBD Kabupaten Magelang, n.d.)

Gunawan explained that Sister Village disaster mitigation system was created to reduce the risk of Merapi eruption in the future. The basic concept of Sister Village is the cooperation between eruption prone villages with safe villages outside the disaster-prone areas which are not affected by eruptions (support villages) as the destination for evacuation. Sister Village-based or brotherhood/sisterhood refugee management program is the handling of refugees by facilitating between villages in Mount Merapi DPA III and support villages (safe from the threat of Mount Merapi eruption). This way, when Mount Merapi erupts, the people of DPA III will already have permanent places to seek refuge that is their Sister Villages. Sister Village does not only provide a refugee camp, but it is an overall evacuation method in the event of a disaster that allows people affected by the eruption to get to their Sister Villages safely. The following are the villages in DPA III and their Sister Villages (Mei et al., 2018)

BPBD Kabupaten Magelang introduced Sister Village program to residents in DPA III through socialization and training (simulation). Supranowo as the Head of

Emergency and Logistics of BPBD Kabupaten Magelang stated that the simulation was carried out in two ways, namely table-top exercise, and field exercise by inviting the Disaster Risk Mitigation Organisation consisting of various professions such as midwives, community defense personnel, teachers, village heads and family welfare empowerment members. According to (Kaharjono, 2018), table-top exercise is an indoor training activity involving one or more parties to test the capacity and function of the institutions involved based on the training scenario. In the table-top exercise, each village is required to make a fixed procedure to deal with the eruption. While the field rehearsal is a simulation conducted outdoors aimed at perfecting their skills and knowledge in dealing with the eruption of Mount Merapi. In the implementation of table-top exercise and field exercise, BPBD Kabupaten Magelang invited disaster-prone villages in DPA III as well as the support villages. It was expected that there will be a synchronization in evacuating residents when the eruption of Mount Merapi occurs.

From the interview with Didik Suswanto Eko Putro as the Head of

Emergency Section of Magelang Regency Disaster Management Agency, table-top exercise and field exercise are only conducted once a year. Whereas according to Didik, there are three sub-districts and 19 villages in DPA III which are approximately 10 km away from the top of Mount Merapi that must receive awareness training regarding the Sister Village program. Simulation activities have been carried out since 2013-2019 and only covers eight villages in DPA III and 10 support villages. Didik was worried that the simulation that is conducted only once a year was not effective enough for residents to understand Sister Village-based disaster mitigation system.

Socialization activity is information dissemination activity that aim to make changes to individual knowledge, skills, and attitudes. Socialization is a bridge between sources of knowledge and society (Manurung, 2018). In this context, the source of knowledge is the BPBD of Magelang Regency which disseminates information in the form of the Sister Village program for disaster education to village communities who are members of the program.

This research aims to understanding knowledge, skills, and attitude of the residents in DPA III and its support villages after participating in table-top exercise and field exercise related to the Sister Village-based disaster mitigation system.

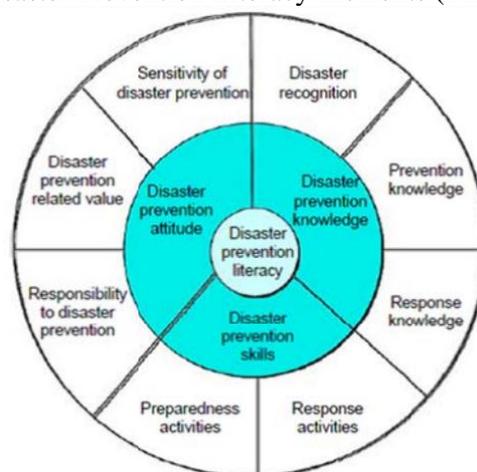
The disaster prevention literacy concepts help researchers have a better understanding of the outcomes of disaster education which has been done by BPBD Kabupaten Magelang. The core assessment of

disaster prevention literacy encompasses 3 broad categories: knowledge, attitude, and skills. The first category, knowledge assesses individual ability to understand and identify characteristic of disaster and learn the key values of disaster prevention. The second category, skill assesses individual to know-how to respond correctly when the disaster strikes. Different from the process of learning knowledge, skill must be put through drills. The third category is attitude. It refers to the possession of strong values in residents such as their “sensitivity to the disaster”, their “willingness to learn more about the disaster” and their “willingness to upgrade their skills” so they can be respond better in the future for the well being of themselves and their community (Binte et al., 2015).

Previous research has shown that disaster literacy research is still a new and rare program in Indonesia. This is stated in Zein Mufarrih Muktaf’s writing entitled Disaster Literacy in Communication Perspective (Muktaf, 2017). Disaster literacy is heavily influenced by media literacy and health literacy.

Several researches on disaster communication have been carried out by communication researchers. For example research on communication disaster in online media with quantitative approach been conducted by Lestari et al. (2020). This research aims to analyze the tendency of online media coverage detik.com August-September 2017 period about the eruption of Mount Sinabung disaster communication.

**Figure 1.3** Disaster Prevention Literacy Elements (Binte et al., 2015)



Meanwhile, E.Luik (2013) conducted research on disaster literacy with quantitative approach to identify the level of knowledge of community disasters and the creation and application of new media as a means of disaster mitigation literacy activities. In the research, disaster literacy was discussed using information literacy model, the level of knowledge in understanding the message and application of new media as a means of disaster mitigation literacy activities.

Previous research focused on the conceptual realm of disaster literacy and the use of literacy model to discuss the level of disaster literacy with quantitative approach. While this research focuses on measuring disaster prevention literacy with qualitative approach. It is used to see knowledge, skills, and attitude of the DPA III's resident and its support villages in understanding the information provided regarding Sister Village-based disaster mitigation after attending table-top exercise and field exercise.

Muktaf (2017) also added that research in disaster literacy is still very open to a variety of research approaches both qualitative and quantitative. Therefore, carrying out this research using qualitative approach becomes important to improve the level of communication research in the field of disaster literacy. This research is a preliminary research which will then be continued to evaluate the communication material made by the BPBD of Magelang Regency regarding the Sister Village Program. With this, it is hoped that it can create effective non-structural disaster mitigation activities by BPBD of Magelang Regency or other interested parties.

The result of the study can also be a strong argument as a recommendation material to the relevant agencies to launch a sustainable, continuous, and repeated disaster mitigation socialization program so that it is deeply ingrained in the community.

## **RESEARCH METHODOLOGY**

The paradigm used in this research is the constructivist paradigm. Creswell (2002) explained that researchers who use this assumption are expected to try to interpret the meaning that others have about the world.

According to Patton (2002), research with this strategy suggests that whichever point of view an individual takes in looking at the world is valid, and researchers need to appreciate any view that the individual has.

Researchers use constructivist paradigm because researchers want to see how community such as Disaster Risk Mitigation Organization or Organisasi Resiko Penanggulangan Bencana (OPRB) in DPA III and its support villages evaluate information and messages about Merapi eruption. Also, how they modify the message for their needs in disaster mitigation related to Sister Village. This information and messages already provided by BPBD Kabupaten Magelang through table-top exercise and field exercise.

In accordance with the paradigms and problems identified in this research, the purpose of this research is to describe the ability of informants to respond, analyze, communicate, or interact and criticize matters related to mitigation, preparedness, and recovery in the Sister Village program. Therefore, this research uses a qualitative approach with descriptive research format, where the data was collected through in-depth interviews of informants, namely residents living in the DPA III area as well as the residents of support villages who had participated in table-top exercise and field exercise organized by Magelang Regency Disaster Management Agency. The in-depth interviews were conducted with the members of the Disaster Risk Mitigation Organization or Organisasi Resiko Penanggulangan Bencana (OPRB) in the villages of DPA III (Nglumut, Kapuhan and Ngargosoko) as well as their support villages (Sucen, Mangunsari and Gulon). They were chosen because two reasons:

- a. Their position and knowledge are considered to be representative and they play an active role in understanding Sister Village disaster mitigation system. The implementation of the held by BPBDA Magelang Regency always invites this organisation and representatives of other residents
- b. The research team also considered that Disaster Risk Mitigation Organization or Organisasi Resiko Penanggulangan Bencana (OPRB) members were opinion leaders in their respective

villages. Hanneman and Ridle (in Wahjudi, 2018) state that individuals who act as opinion leaders will occupy a favorable position, because they have many relationships with other people, have alternative ways to meet their needs and are less dependent on others. From the same research, it was also stated that individuals who act as opinion leaders are shown to have high connectivity or the most connected with other individuals. OPRB members have direct information access to the BPBD of Magelang Regency. They were the first to receive information and to be trusted to coordinate and assist the evacuation of villagers when Mount Merapi erupted. In addition, the Disaster Risk Mitigation Organization or Organisasi Resiko Penanggulangan Bencana (OPRB) itself also involves officials such as the village head and village secretary.

The literature study was also conducted by looking at the documents owned by BPBD Kabupaten Magelang related to the Sister Village program.

Hennink et al., (2011) explained that the analysis of research data can be done through several stages, namely perform verbatim transcription, conceptualization of data found in the field, building a framework to explain disaster literacy the informants have and drawing conclusions and verification.

## RESULT AND ANALYSIS

Indonesia is listed in the 35 countries with the highest risk of disaster. This makes Indonesia considered as a disaster-prone country because Indonesia experiences a high incidence of disasters every year. One of them is volcanic disaster or volcanic eruption. Indonesia has 500 volcanoes and 127 of them are still active. The geographical location of Indonesia which is above the "Ring of Fire" or Pacific Ring of Fire put Indonesia on the path of the most active mountain range in the world. Not only is it a disaster-prone country, but Indonesia also has the highest number of fatalities in the world due to natural disasters. Based on the results of disaster risk studies Amri et al. (2018), it appears that the number

of people exposed to the risk of volcanic eruptions is widely spread in Java, Bali, and Nusa Tenggara with a total of more than three million people throughout Indonesia. In 2018, Indonesia was even ranked first in the world as the country with the highest number of fatalities due to natural disasters.

The government cannot work alone to reduce the death toll from natural disasters. There needs to be cooperation and active role of the community. It is stated in Government Regulation No. 64 of 2010. In article 1 paragraph 4 it is stated that mitigation is an effort to reduce the risk of disaster, either structurally or physically through natural and/or artificial physical development or non-structural or non-physical measures by increasing the ability to deal with disaster threats in coastal areas and small islands. Then in article 14 it is also clearly stated that disaster mitigation activities are not only oriented to physical activities but also non-physical activities. Therefore, based on the mandate of Article 16, non-structural/non-physical disaster mitigation activities cover 7 (seven) aspects, namely a) preparation of legislation; b) preparation of disaster-prone maps; c) preparation of disaster risk map; d) preparation of environmental impact analysis; e) spatial arrangement; f) zoning arrangement; and g) education, counseling, and awareness of the community.

In other words, good disaster mitigation involves two parties, the role of the government and the active role of the community. One of the roles of the government in disaster mitigation is to build good evacuation facilities and physical infrastructure. The government through BPBD Kabupaten Magelang has prepared a better disaster management program after the eruption of Mount Merapi in 2010. The program in question is Sister Village which was initiated 2011. Sister Village program is the manifestation of living in harmony with disaster which is derived from local solidarity and then standardized in a government program. The process of forming and implementing this program involves the community in DPA III region (village chiefs, support villages and their officials, Disaster Risk Mitigation Team, volunteers and related parties) as the subjects as well as the ones who implement the programs (Mei et al., 2018).

In relation to the issue of communication in disaster management, BPBD Kabupaten Magelang continues to provide assistance related to the Sister Village program to residents in DPA III villages and their support villages. Mei et al (2018) explained that more mentoring programs are conducted in the form of socio-engineering activities such as convincing the village chiefs, their officials, Disaster Risk Mitigation team and community leaders about the importance of Sister Village programs in handling refugees from the threat of Mount Merapi eruption. This is an effort by the government to foster collective awareness and disaster literacy in the context of non-disaster and before disaster communication.

Researcher of Population Research Center of Indonesian Institute of Sciences (LIPI) Deny Hidayati (Ramadhan, 2018) explained that socialization and disaster mitigation education must be given regularly, continuously, repeatedly, and accompanied by simulations so that it is deeply ingrained in the community. Socialization that is done only once does not work in the community and tends to be forgotten immediately. Socialization and education are lost when there is no disaster. Deny added that nonstructural mitigation (awareness and preparedness) in Indonesia must be improved.

Labudasari and Rochmah (2020) explained that one effort in disaster mitigation is to apply disaster literacy. Disaster literacy is one of the efforts made to reduce the risk of disaster. According to Sung-Chin Chung & Cherng-Jyh Yen (2016), disaster literacy is defined as a combination of various abilities, skills and emotions that drive a person to respond, analyze and reflect in the face of disaster for the sake of his well-being. In general, disaster mitigation literacy consists of a correct understanding of life-threatening disasters, a proactive attitude towards disaster information and disaster prevention as well as adequate capabilities and skills for disaster prevention. Disaster literacy is the ability to identify, understand, interpret, communicate or interact and criticize matters related to disaster (mitigation, preparedness, and recovery) (Labudasari & Rochmah, 2020; Muktaf, 2017)

Referring to the concept used by Coppola and Maloney (K & Uman, 2019), disaster literacy is a component of mitigation

and preparedness. Disaster literacy can change and strengthen the adjustment ability of individuals living in DPA III in the face of environmental changes due to the eruption of Mount Merapi. That way DPA III residents are also able to survive, help the evacuation process and minimize the risk when the volcanology disaster occurs. How the villagers of DPA III and its support village understand, interpret, and communicate information related to the Eruption of Mount Merapi and Sister Village Program is reflected through knowledge, skills, and attitude in disaster prevention literacy.

### **Disaster Prevention Knowledge**

Disaster prevention knowledge can be seen from three outcomes. First, respondent's knowledge regarding the different status changes of Mount Merapi activity; secondly, knowledge about the function of the Sister Village program; and thirdly, knowledge about the function and role of village officials and disaster risk mitigation teams in the Sister Village program.

### **Knowledge about early warning of Mount Merapi (Catur Gatra Merapi)**

It is expected that individuals have basic skills in disaster literacy such as being aware of the importance of community assistance to increase collective awareness in the community to minimize disaster risk and have basic knowledge about the importance of disaster mitigation and preparedness. The Sister Village program was delivered by BPBD Kabupaten Magelang in the form of table-top exercise and field exercise held annually by inviting one DPA III village and its support village.

Before delivering information about the Sister Village disaster mitigation system, BPBD Kabupaten Magelang will remind members of the Disaster Risk Mitigation Organization about "Catur Gatra" Mount Merapi. In it contains things that must be done by residents in every active status of Merapi. Divided into four levels, namely Normal, Alert, Standby, and Watch Out Level.

- Normal Level
  - Do daily activities.
  - Follow the socialization and training of Mount Merapi disaster management.

- Follow the official information on Mount Merapi activities.
- Secure property, important and valuable papers in a safe place.
- Record the assets.
- Alert Level
  - Carry out daily activities for residents who are outside a 3 km radius from the summit.
  - Follow the official information on the development of Mount Merapi activities.
  - Collect important papers and prepare them in one place.
  - Follow the socialization and training of disaster management
- Standby Level
  - Don't do activities in dangerous places
  - Prioritize evacuation in Disaster Prone Areas (KRB) III
  - Secure important and valuable papers
  - Secure moving property.
- Follow the latest information about Mount Merapi activities
- Prepare a standby bag in a place that easy to reach. The contents of the bag are clothes, flashlight, medicines, radio, cellphone, snacks and drinks. Immediately evacuate if you start to see falling lava or small hot clouds or continuous rumbling sounds.
- Watch Out Level
  - Obligated to evacuate for DPA II residents whose areas are estimated to have been hit by hot clouds.
  - Bring the standby bag.
  - Follow the directions of the village evacuation coordinator
  - Follow procedures of living in refuge.
  - Don't go back home before Mount Merapi is declared safe by the government.
  - Follow all recommendations from the government.

Figure 3.2 Catur Gatra Merapi Poster From BPBD Kabupaten Magelang



(Source: *Catur Gatra Ngadepi Bebaya*, n.d.)

“Catur Gatra Mount Merapi” delivered during table-top exercise. It is with the hope that members of Disaster Risk Mitigation Organization will have the basic knowledge about changes in the status of volcanoes and what must be done to help other residents and themselves.

DPA III villagers who were informants of this research claimed to be able to read the increasing activity of Mount Merapi through signs from their surroundings and local beliefs. For example, informants from Nglumut and Kapuhan villages who said that there are signs of nature such as hotter air at night, wild animals descending from the mountain, small earthquakes, and rumbling sounds are signs of increased volcanic activity in Mount Merapi. Even informants from Ngargosoko village specifically mentioned that a walnut tree can show a sign of Mount Merapi turbulence.

*“So, there is this walnut tree here that is centuries old. If only the leaves fall off, then Mount Merapi status can still be considered safe. But if there is a broken branch, well, then we need to take a further look. If the fallen branch is on the south side of the tree, that means the direction of the eruption will be to the south. That is what local people believe”.*

On the other hand, informants from Mangunsari and Sucen villages could only monitor the signs of mount Merapi activity according to the information provided by the Disaster Management Agency team. This is due to their geographical location which is approximately 50 km from the top of Mount Merapi. There are also informants from Gulon Village who monitor Mount Merapi's activities by observing cold lava in the White River passing through their village. If it feels that the cold lava is thick enough and sands started to pile up in the river that it becomes shallow, then it is certain that Mount Merapi will soon elevate to a more dangerous status. Because according to the head of Gulon Village Disaster Risk Mitigation Team, Mount Merapi's eruption is always accompanied by heavy rain and lightning that occurs in Merapi crater.

Although they can read the signs of nature, but the informants do not understand the exact criteria to detect the increasing the status of Mount Merapi. Therefore, the

determination of normal, alert, medium alert, and high alert statuses of Mount Merapi refer to the information provided by the authorities such as the Geological Disaster Technology Research and Development Center and Disaster Management Agency. Therefore, they do not merely see the signs of nature but also monitor the information provided periodically by Geological Disaster Technology Research and Development Center and Disaster Management Agency through WhatsApp messages. This is done to monitor the emergency level of Mount Merapi, so that the informants can determine the next steps both as refugees and the ones who will accept refugees.

### **Knowledge about Sister Village Program**

This is demonstrated through how informants know and understand the procedures for evacuation and welcoming refugees, the appointment of transportation equipment used during eruptions, the implementation of communal kitchens, health insurance, security guarantees and the availability of animal shelters. For example, a respondent from Kapuhan village in DPA III referred to Sister Village fixed procedure when discussing evacuation procedures.

*“According to the fixed procedure, vulnerable residents such as the elderly, pregnant women, sick citizens and children are prioritized. From the fixed procedure we also have the data of people who have two-wheeled and four-wheeled vehicles. Later the vulnerable population is taken to a refugee shelter/support village. Therefore, we do not need to wait to be picked up by disaster management agency or other agencies, instead we can directly move. The people work together and once the eruption occurs; we can straightforwardly make vulnerable residents our priority. The first steps are gather everyone at the assembly point of each hamlet, directly transported by other cars/vehicles and taken to the support village. Usually there are also vehicles owned by residents that can be used for evacuation, such as pick-up cars, trucks, etc.”*

There was also a different case with respondent from Sucen village as a support

village who knew and understood that the village already had livestock shelter in Nglagahombo hamlet and Klogeran hamlet as the destinations to evacuate livestock from Nglumut village. This respondent also mentioned that Sucen village also has a village hall yard that can be used to park vehicles used during the evacuation and health centers, midwives, as well as primary clinics for refugees are also available there.

Informants felt that the Sister Village program can provide a sense of comfort, safety, and peace for both the villages in DPA III and its support villages because of the following reasons:

- a. The command system, communication, and coordination from the central level to the village level became clearer due to the involvement of Disaster Risk Mitigation teams and village officials in the Sister Village Program. That way it is expected that the evacuation will be faster and more efficient.
- b. The construction and addition of better evacuation facilities and physical infrastructure are expected to help residents not to panic, as well as be more directed and organized when carrying out the evacuation process. As stated by the informants from Ngargosoko Village below:

*"In the past, when Mount Merapi erupted, before there were vehicles like now, people would run on their feet to find refuge. So those who could run fast, could quickly get there. While for the vulnerable group like the elderly, all they could do was walk slowly, and wherever they stopped, then it is where they seek refuge. But with this program, everything has been arranged. Transportation has been provided in every hamlet. Evacuation routes are already available and refurbished. So, the trucks will be used to transport the villagers first, after which the team from the village will conduct a thorough inspection to make sure that all the residents have been evacuated. If there is anyone*

*left, then that is the role of the village rescue team to evacuate that person".*

- c. The origin and history of refugees from DPA III villages will be recorded in the data with details to ensure its validity. This of course also makes it easier for the support villages. This was supported by the statement from a Sucen Village respondent who said that in 2006, before the Sister Village program existed, there was chaos when preparing the needs of refugees. Because refugees suddenly flocked to their village without any prior communication. Similarly, a respondent from Mangunsari Village also revealed that the data collection is useful to provide humanitarian assistance properly and appropriate to fulfil the needs of refugees.

*"We have always been ready to accommodate refugees, however, refugees are not well taken care of, we accept them, but we do not know the data. The Sister Village program helps us understand their origin and history. Before there is Sister Village program, we have also received many refugees, accommodated them in schools and provided food, but aid was less personal. We accommodated refugees from various villages and placed them in the village buildings, schools and houses of residents who volunteered. It went like this, first we covered their needs for 1-3 days through community volunteers. We did not record any data; it was all up to the volunteers to give whatever help they can provide. After 3 days, aid from various places started coming in, so we could coordinate."*

- d. There is MoU between DPA III villages and support villages so that their communication, cooperation,

and coordination are stronger and more legally valid. Moreover, there are also villages such as Ngargosoko and Gulon; as well as Nglumut and Sucen that had been Sister Villages long before the Sister Village program was formed. The cooperation will be stronger with this MoU because it means that there will be funding from the government to build disaster management infrastructure in both villages. For

example, the construction of a more representative Final Evacuation Site (FES), Public Toilets and a more adequate communal kitchen. As stated in the 2018 budget plan of BPBD Kabupaten Magelang which contains a budget for the procurement of facilities and pre-existing disaster management in several villages included in the Sister Village program.

**Figure 3.2** Regional Task Force Work Plan for Year 2018  
 BPBD Kabupaten Magelang

No	Program/Kegiatan	Lokasi	Indikator Kinerja	Besaran/ Volume	Catatan
1	2	3	4	5	6
1	Pembangunan gedung TPA/TEA	desa Pogalan kec. Pakis	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 Paket	Rp. 190.000.000
2	Pembangunan gedung TPA	desa Gondangsari kec. Pakis	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 Paket	Rp. 500.000.000
3	Pembangunan gedung TEA	desa Banyuroto kec. Sawangan	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 Paket	Rp. 1.500.000.000
4	Pembangunan 1 Paket TEA	Desa Wulunggunung, kec. Sawangan	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 Paket	Rp. 1.500.000.000
1	2	3	4	5	6
5	Pembangunan 1 Paket TEA	desa Jati kec. Sawangan	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana		Rp. 750.000.000
6	Pembangunan 1 Paket TEA	desa Mangunsari , kec. Sawangan	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 Paket	Rp. 800.000.000
7	Pengadaan peralatan penanggulangan bencana	desa Kapuhan, kec. Sawangan	Cakupan masyarakat yang mendapat pengetahuan kebencanaan	1 Paket	Rp. 75.000.000
8	Pengadaan peralatan penanggulangan bencana	desa Wonolelo, kec. Sawangan	Cakupan masyarakat yang mendapat pengetahuan kebencanaan	1 paket	Rp. 100.000.000
9	Pembangunan TEA	desa Ngablak, kec. Srumbung	Cakupan masyarakat yang sudah mendapatkan pelayanan rehabilitasi dan rekonstruksi pasca bencana	1 paket	Rp. 400.000.000

(Source: Perhubungan, 2018)

### Knowledge about role of village officials and disaster risk mitigation teams or OPRB in the Sister Village program.

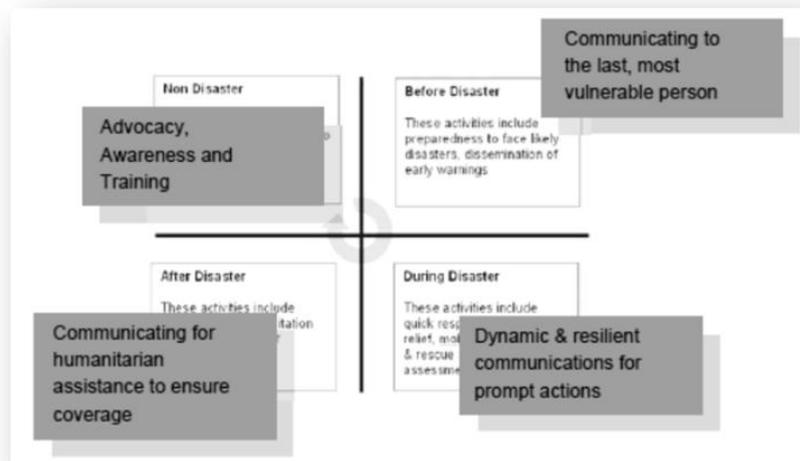
Sister Village program implementation cannot be separated from the active role of the officials and Disaster Risk Mitigation Team in each village. The interview revealed that the officials and Disaster Risk Mitigation Team as part of the success of the Sister Village program are expected not to easily provide information that is not yet clear to the residents, volunteers, or other officials. Because it seems that a lot of information is circulating in the community when Mount Merapi Erupted. To avoid this, village officials and Disaster Risk Mitigation Team can take several measures such as complying with direct orders from the authorities namely the Regent, Head of Sub-District and Disaster Management Agency; carry out their respective duties so that no tasks are overlapping; actively seek information and monitor updates related to Mount Merapi from credible sources of information to make sure that the condition during evacuation process remains manageable.

Village officials and Disaster Risk Mitigation teams must be able to convince

and forward the messages delivered by the Disaster Management Agency (BPBD) so that the evacuation process can run smoothly. In this Sister Village every villager plays an active role to help each other, from toddlers to the elderly, they all have their own roles. Citizens have their own initiative to participate in the success of this government's movement.

The three forms of knowledge are described above are also needed in the success of disaster mitigation. It can be achieved through communication, coordination and cooperation between the government and the community. Shaw and Gupta (in Budi HH, 2012) explained that in the stage before a disaster (non and before-disaster), the communication aspect will include accurate information, coordination and aspects of cooperation, especially for people who are vulnerable to disaster events. All communication potentials are important to ensure prevention and risk reduction. Especially in terms of mitigation, with the right approach, communication, information, coordination and cooperation between institutions and existing components can be integrated properly.

Figure 3.1 Communication Issues in Disaster Management (Budi HH, 2012)



## DISASTER PREVENTION SKILLS

### Population data collection skill that are integrated with a system called Sistem Informasi Desa (SID)

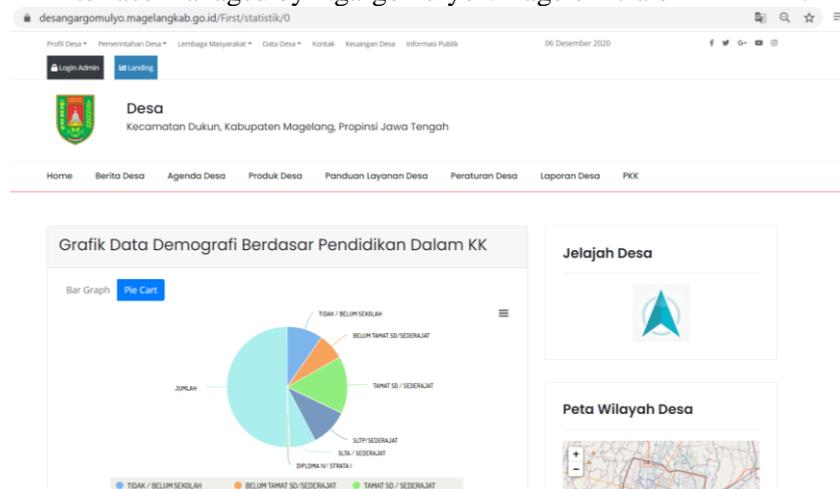
Individuals are expected to have advanced abilities after having basic awareness and knowledge of disaster mitigation and preparedness. The advanced capability is to follow the instructions of the message of preparedness, response, and disaster recovery. In other words, there is individual behavior that can be observed when disaster occurs and post-disaster. Unfortunately, the ability of individuals to follow instructions in the event of disaster and post-disaster recovery cannot be observed and seen in the results of this research. This is because at the time of the research, the respective community was not facing an eruption disaster, given that the last Merapi eruption occurred in 2010 and the Sister Village program was only initiated a year later.

The ability of individuals to follow the instructions of preparedness messages based on the Sister Village program can be observed through population data collection activities that are routinely carried out by Ngargosoko, Nglumut, Kapuhan, Mangunsari, Sucen and Gulon villages. One of the important activities in Sister Village-based disaster preparedness is updating the population data regularly and it is periodically carried out by village officials and Disaster Risk Mitigation Team. According to BPBD

Kabupaten Pacitan, (2014), population data can be used to assist in the preparation of plans and more precise analysis in determining the number of populations, including vulnerable groups and public infrastructure, affected by the dangers.

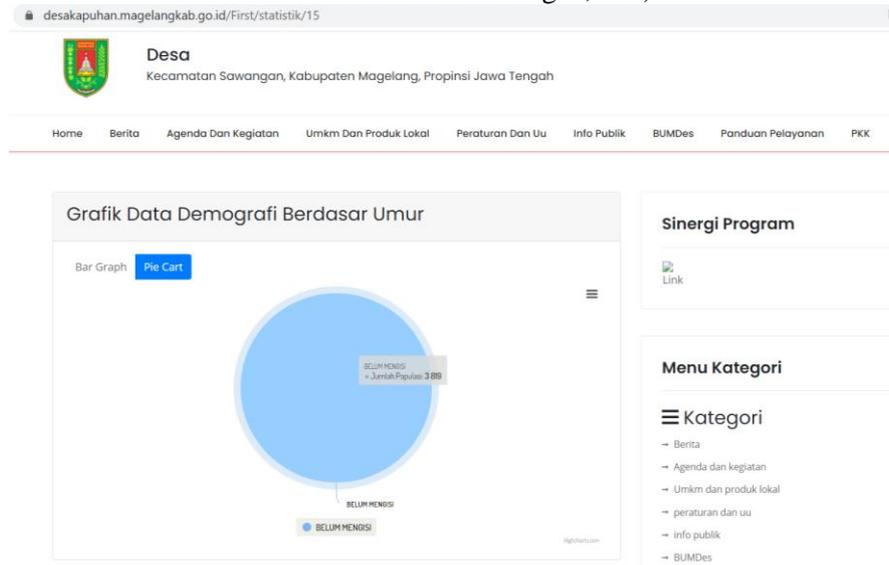
Therefore, BPBD Kabupaten Magelang initiated the village information system called "Sistem Informasi Desa" (SID), an online service to support the Sister Village program. Sari et al. (2018) explained that in SID there are information regarding population data, public services, and village assets that are inputted and updated periodically. Anyone connected to the SID network will be able to find the data easily. So that in the event of Merapi eruption, the data of DPA III community will not be lost and the documents are well identified. By using SID that is constantly updated periodically, it will be very helpful especially for support villages because the data contains the prospective refugees who will come to them. So that the needs of facilities and infrastructure can be prepared and adjusted to their ability and needs. According to BPBD Kabupaten Magelang (2016) data since October 2016 there are only eight villages in the Sister Village program that can be accessed online, namely Ngargomulyo village, Sumber Village, Dukun Village, Jumoyo Village, Sirahan Village, Tamanagung Village, Pucungrejo Village, and Kaliurang Village.

**Figure 3.3** One of the Village Information System called Sistem Informasi Desa (SID) website interface managed by Ngargomulyo village officials in DPA III.



(Source: Desa Ngargomulyo, n.d.)

**Figure 3.4** Unupdated view of Kapuhan Village SID website interface (Source: Desa Kecamatan Sawangan, n.d.)



From interviews with Kapuhan village officials, it was found that the process of uploading population data in SID did not run smoothly in Kapuhan Village. Population data and other data are stored offline. The inactivity of SID website in Kapuhan village was caused by the lack of human resources. The results also showed that Ngargosoko village, Nglumut village, Sucen village, Gulon village, and Mangunsari village also did not update their websites. After further confirmation, they actually had updated the data regarding population, facilities and infrastructure periodically every year, but the data is stored offline and submitted manually to Magelang Regency Disaster Management Agency. Meanwhile, what is expected by BPBD Kabupaten Magelang(2016) is for the disaster-prone villages to be more motivated to update their VIS so that it can be accessed by anyone quickly when needed.

**Ability to distinguish between social and environmental aspects that are at risk in an eruption state**

Individuals can understand information, especially being able to distinguish social and environmental aspects that are at risk in the event of a disaster and have the resources necessary to stay safe and recover. The most visible measure taken by all villages that become informants is to prioritize the evacuation of toddlers, pregnant women, and the elderly. This is because they

are the most vulnerable groups who need to get the most decent shelter with the full help of the medical team.

The evacuation consists of residents as well as non-residents. In addition to residents with the above categories that are prioritized, the evacuation of non-residents in the form of livestock is also one of the priorities in the evacuation. Considering that most of the displaced people have livestock and it is impossible for the farm animals to be left in the original village, then the evacuation place should be able to accommodate livestock from DPA villages. All support villages must have a field to accommodate these farm animals.

If the available field cannot accommodate all farm animals, then the male cattle are left behind and only female cattle are evacuated. For the farm animals left in the original village, DPA residents formed a special team to guard their shelter in the village. This team is tasked with monitoring abandoned farm animals and the farms.

This arrangement worked in Ngargosoko village, although all the villagers had evacuated to the support village, the village chief gave specific instruction to stay on guard at the village hall. People can take care of their farms as long as they did not leave Ngargosoko village. According to the disaster risk mitigation team, this was done so that residents did not become confused and stressed out thinking about their farms.

Because many of the refugees were anxious not because of the atmosphere in the refugee camp, but rather due to the thought of abandoning their possessions.

In addition to its correlation to refugees, this ability is also reflected from the readiness of the evacuation teams/refugee camps. Security is the priority of the refugee camps. This aims to minimize friction - unnecessary friction between citizens, and any unexpected incidents that may harm the peaceful atmosphere in the camps.

Lestari (2018) in her book states that in a disaster emergency, communication is very much needed as a function of management and coordination between the government, survivors, the community, volunteers, and the mass media. Good crisis communication management will make government coordination and decision-making functions run stable. On the survivors' side, suffering can be reduced because assistance can be provided more quickly and easily with adequate information capital, can be accessed openly, by anyone, and quickly.

Communication media such as SID actually has the potential to play an important role in disaster mitigation activities both in conditions before a disaster occurs and during a post-disaster period. If informants as OPRB members and village officials can manage SID optimally, then SID can be used as:

1. Communication media that provide information to the community about the preparedness needed and what preparations should be made when a disaster occurs.
2. Communication media that provide information to the mass media, volunteers, and the government regarding access to locations in areas affected by the eruption of Merapi. So that the delivery of assistance will be more effective.
3. Communication media that provide information to the mass media, volunteers, and the government regarding medical efforts that have been made and can be done to recover physically and mentally the victims affected by the eruption of Merapi.

All of this is intended to reduce to a minimum the number of survivors and property losses. Through communication media, we can obtain information needed

during pre-disaster, during a disaster, and after a disaster.

## DISASTER PREVENTION ATTITUDE

### **Willingness to follow instructions during the 2010 eruption of Merapi (before the Sister Village Program was formed)**

The willingness of village officials and disaster risk mitigation teams to follow the instructions in the event of disaster and post-disaster recovery can be seen before the formation of the Sister Village program. When mount Merapi erupted in 2010, village officials and disaster risk mitigation teams in each village were still waiting for one command from the authorities such as the Regent, Regional Secretary and BPBD Kabupaten Magelang to determine when was the right time to evacuate and accept refugees. For example, the experience of a respondent from Nglumut village when mount Merapi status was on "high alert" in 2010 was not too panicked because he followed the direction of the authorities.

*"So, we only monitored the information from the Geological Disaster Technology Research and Development Center, if it says that the situation is normal, normal active, or level 1- level 2 alert, we are still relaxed. Only when we are advised to be ready to move, then we take action. We always follow the direction of Geological Disaster Technology Research and Development Center and the disaster management task force team which are coordinated by the Regent and represented by the Regency's Secretariat Officer. So, when the volcanic activity status is on high alert, only officials are left in the village, both the security officials and guard officials"*

Meanwhile, the willingness to follow instructions from the competent authorities after the Sister Village program cannot be measured yet. This is because the Sister Village program has never been officially tested when this research was completed.

### **Willingness to join table-top exercise and field exercise held by the authority**

The villagers from three villages in DPA III (Nglumut, Kapuhan and

Ngargosoko) and three support villages (Sucen, Mangunsari and Gulon) have mostly participated in table-top exercise and field exercise held by BPBD Kabupaten Magelang related to the Sister Village program. The residents from those six villages have attended at least one table-top exercise and field rehearsal. Mangunsari villagers even participated in three table-top exercise and field exercise held by BPBD Kabupaten Magelang and almost every year the village allocates a budget for Sister Village-based mitigation training. But there are also Gulon villagers who claim to have only participated in one table-top exercise in 2017 without simulation. The informants considered the table-top and field exercises as a form of education for the community, especially villages which become the members of Sister Village to be ready to face Mount Merapi eruption. Informants who live in Kapuhan Village saw table-top and field exercises as a means of education because all village officials were included to be pioneers in disaster mitigation.

#### **Willingness to comply with their role as part of the Disaster Risk Mitigation Team**

The informants in this study were considered as opinion leaders, so by the Disaster Management Agency they were included in the table-top and field exercises of the Sister Village program. According to Shofiyah (2011), opinion leaders are those who have high authority and who determine the attitudes and behaviors of their followers. They are followed because they usually have formal education, higher socio-economic status, more innovative in adopting new ideas, have broad insights and knowledge. Opinion leader is expected to influence his followers to change the attitude and behavior of his followers to be as desired by the opinion leader.

As the opinion leaders, informants are also expected to influence their fellow citizens to have the awareness related to preparedness, response, and post-disaster recovery. In addition, informants which consist of village officials and disaster mitigation teams have a responsibility to constantly advise the citizens to be ready and always alert when Merapi begins showing signs. It is very important to note that in carrying out their responsibilities, they refer

to their respective job description. This is to avoid misinformation at the time of Merapi eruption disaster. As stated by the respondent from Nglumut Village, that he did not carry out any awareness program to other residents because in every community there are already volunteers from the Sister Village program. He did not do it to avoid information overlaps.

If there is an update related to the entire Sister Village Program, then the one who provides information to the village representatives is the village chief or village secretary. The information is conveyed through a variety of communication channels both face-to-face and through technology. The following are communication channels commonly used to distribute information:

- a. Local residents Selapanan forum like the one conducted in Gulon village. This forum is held once a month by inviting village officials, Disaster Risk Mitigation teams, volunteers, and community leaders from each hamlet.
- b. All villages have Whatsapp groups to communicate, distribute information and coordinate regarding the current situation of Mount Merapi.
- c. Radio communication is also used in Nglumut village. Communication radio named Rajawali BK (Regional Radio Line of Kali Bebeng Krasak area) with the frequency at 150,080 Mhz.

Formal communication tools can avoid hoaxes and disinformation. As stated by Liu (in Nahar, 2020), the crisis information, the public tends to be more receptive to crisis information conveyed through traditional media rather than through social media or word of mouth. Therefore, the dissemination of more traditional crisis information such as using traditional media (television, radio, and newspapers) and word of mouth can still significantly influence how people respond to crisis information.

The three forms of willingness created in the informants cannot be separated from the views of the informants who view the BPBD Magelang Regency as a credible organization in disaster management. Informants argue that the information presented and the socialization (table-top exercise and field exercise) are considered to further clarify and calm themselves that the

current evacuation system will not be as chaotic as during the 2010 eruption of Merapi. Nahar (2020) said the government message that is conveyed well and clearly through the media is needed by the public to reduce panic and stress, and the public can know clearly and exactly what they should do to help and participate in accelerating the response to the crisis that occurs.

According to Budi HH (2012), the community's willingness to take part in disaster mitigation can also be created if the authorities do the following:

1. Understanding the characteristics of the audience to ensure that messages and media on disaster issues can encourage disaster mitigation actions and behavior.
2. The aspect of leadership commitment is also needed to avoid overlapping, chaos in coordination and reluctance to cooperate.
3. Education about disasters - areas and risks is also needed so that the public knows and understands the current situation and in the future.

According to the informants, having an Disaster Risk Mitigation Organization or OPRB in each village was very useful and made it easier for them to understand and be accountable for their role in the Sister Village disaster mitigation system.

## CONCLUSION

On November 5, 2010, Mount Merapi erupted. Based on data from the BNPB Disaster Management and Operations Center (Pusdalops), the eruption of Mount Merapi in 2010 resulted in 277 deaths in the Yogyakarta Special Region and 109 people in the Central Java region. Tens of thousands of people were displaced and thousands of livestock died. The disaster caused major damage and losses, including in the Magelang Regency (Linawati, 2019). The number of refugees who were victims of the eruption of Mount Merapi in Magelang Regency in 2010 reached 98,597 people and was spread in 226 refugee barracks (Tempo.co, 2010).

The evacuation process of residents on the slopes of Mount Merapi during the 2010 eruption caused chaos and panic. Among them, there is a lack of clarity about the destination of the occupation. Confusion also occurs in the management of the evacuation,

including the management of its logistics. In addition, many refugees experienced disasters not only from hot clouds but from chaos during the evacuation process (Siedoo, 2019).

In 2011 the Sister Village program was initiated which is expected to minimize chaotic situation in the future when the evacuation process occurs. Sister Village is a disaster mitigation system that pairs villages in DPA III with villages that have a safe radius to the summit of Mount Merapi. The villages within this safe radius will later become places of refugee for residents from DPA III.

BPBD Magelang Regency then held exercise in the form of table-top exercise and field exercise by bringing together the villages in Sister Village Program. Unfortunately, this effort from BPBD Magelang district can only be done once a year with more than 19 villages in the Sister Village program to be achieved. On the other hand, disaster prevention literacy must be carried out repeatedly in order to create a disaster-resilient society. Therefore, this research wanted to comprehensively understand knowledges, skills and attitudes possessed by the residents in DPA III and their village siblings who participated in the exercise.

Disaster prevention literacy can be seen from three categories, namely knowledge skills, and attitude. The categories of knowledge and skills are reflected through the understanding and skills of the informants in understanding nature signs before an eruption, what to do, when to do it, and how to evacuate during the eruption of Merapi. The forms of knowledge and skills are described above are also needed in the success of disaster mitigation. It can be achieved through communication, coordination and cooperation between the government and the community. The skills of informants in using communication media (SID) are not optimal. Even though this communication media can be used to assist in disaster situations, during disasters, and after disasters. Information management was also carried out carefully by the informants by choosing a form of formal communication (cultural forum and community radio) to convey their knowledge and skills to others about the Sister Village program. This study also found that informants viewed BPBD

Magelang Regency as a credible organization so that they were willing to follow directions, trust information, and socialization activities organized by the organization.

The results of this study can be a recommendation for BPBD Kabupaten Magelang and Magelang Regency Government to improve the SID management of each village incorporated in the Sister Village Program. The research team saw that SID has the potential as a database that supports Sister Village programs as well as supporting tourism and economic development. The creation of interesting content (e.g., infographics and audio visuals) for each village's SID website also needs to be addressed. The content can be in the form of Sister Village program, tourism sector, economy and so on. In addition, increasing the frequency of socialization and increasing the number of communication forums related to the Sister Village program are also needed to maintain the collective awareness of the Merapi eruption disaster and create a disaster-resilient society.

The research team has not yet had the opportunity to examine the implementation of the Sister Village program in the context of disasters and post-disaster recovery. The policy regarding COVID-19 pandemic also does not allow the research team to conduct this research using large number of samples as in the quantitative approach. Therefore, those two topics can later be further investigated in other communication research related to disaster literacy.

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