Community-Based Disaster Management: Assessing Local Preparedness Groups (LPGs) to build a Resilient Community in Semarang City, Indonesia

Handayani Wiwandari[1]*, Surya Putri Intan Hapsari[2], Anggraeni Mega[3] and Setyono Jawoto Sih[1]
1. Department of Urban and Regional Planning, Diponegoro University, INDONESIA
2. Institute for Regional Development and Environmental Management, INDONESIA
3. Initiative for Urban Climate Change and Environment, INDONESIA
*wiwandari.handayani@pwk.undip.ac.id

Abstract

Semarang is prone to flooding due to tidal flood from the sea and flash flood from the upper inland area. Several studies have noted that a community is an important element in the reduction of disaster (flood) risk. The purpose of this study is to examine the capacity of community formed as Local Preparedness Groups (LPGs) in Semarang.

The analysis was designed by comparing perceptual- and evidence-based questions to assess the capacity of the LPGs to contribute to better comprehension of the strengths and emerging challenges in engaging the community/local people in Disaster Management (DM). The questions were derived from six main variables including knowledge, skill/capability, communication and collaboration, financial resources, leadership and organizational system. A mini FGD was conducted in each LPG and the participants were asked to form a consensus to answer the questions. The scoring system was applied to calculate the capacity value ranging from 0 to 1. We found an average capacity value of 0.64.

Keywords: Disaster management, local preparedness group, resilient community, perceptual and evidence-based, Semarang.

Introduction

Hydrometeorology disasters are one of growing number of disastrous events across the globe, with flooding regarded as the most frequently occurring of these. Urbanization is indicated by an increased urban population and a higher rate of land conversion and together these play a role in straining environmental/ecological capacity[15,16]. In addition, the climate change phenomena shown by a higher level of rainfall and rises in sea level have led to multifaceted vulnerability of most urban areas located in a low elevated zone. The generally high pace of urbanization, combined with the climate change impact, can be clearly seen in Semarang. Similar to other coastal cities in Indonesia, or even in Asia, Semarang city is prone to flooding due to tidal flood from the sea and the threat of flash flooding from the upper inland area. Landslides are also regarded as a most frequent disaster, particularly in the hilly area of the city.[12]

The Hyogo Framework for Action 2005–2015 followed by the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030. have forced a global commitment to reduce the increasing vulnerability and promote resilience in many developing regions by giving more attention to Disaster Risk Management (DRM). This includes Disaster Risk Reduction (DRR) and Disaster Management (DM) components, to mitigate disasters with infrastructural work, appropriate knowledge and incessant innovation. Accordingly, there are now many concerns in DRM across the country which are preparing the related stakeholders including local communities, to be sufficiently equipped to participate optimally in the disaster risk management process[1,17].

DRR is more concerned with mitigation planning and strategy setting while DM is likely to be a reactive approach consisting of preparedness, response and recovery phases. DM includes a social process that is applied to the design of the DM mechanism based on community needs and condition.[19]

There is general agreement that a community is central to DM.[14,19,20,25] Accordingly, community resilience has become a term frequently used to connect DM and disaster resilience. Norris et al[20] similar to Rapaport et al[29], define community as an entity in a defined area which has a communal identity and fate. In regard to community resilience in the DM, the community refers to a group of individuals with similar characteristics living in a particular disaster-prone area. There are at least two important notions on community resilience in DM. First, it is very much related to the process of adaptation and, therefore, a resilient community may have a good adaptive capacity to address disaster. Second, a community is understood as a social learning process where people absorb the disturbance together, resulting in collective actions.

The resilient community is essentially not the ultimate goal in DM, but rather a strategy to enhance disaster readiness. Hence, a resilient community is one with the capacity to "bounce back" after a disaster, as indicated by the level of preparedness based on knowledge and awareness, methods of responding and speed of recovery[26,29].

Several studies have noted that a community is an important element in the reduction of disaster risk. Learning from California in the USA, Pearce[23] states that there is more public participation when disaster management is planned

simultaneously with community planning and that public participation is very important to raising awareness and minimalizing loss and damage. Madan[7], based on the case of Delhi, India, stated that the local community is the frontline in the response to a disaster and, therefore, local capacity is very important not only to minimize loss and damage but also to reduce the impact of future potential disasters.

Misra et al[18] showed the important role of social networks in helping a community in West Bengal, India, deal with disaster. Singkran[34] also exposed how there was greater loss and damage in Thailand in 2011 because of flooding due to the lack of capacity and awareness of the local community affected. A similar case was also elaborated by Allen[1] concerning the Philippines in 2006 and his results showed that despite some limitations and a potentially more complex process, local people should be engaged in DM to create a sustained effort to reducing vulnerability and improving adaptive capacity.

In line with several studies revealing the important role of the local community in DM, there has been more concrete action on engaging the local community in Indonesia, mostly as a follow up to the Indonesian government's commitment to the Hyogo Framework. There have been at least three important and very influential milestones in promoting the DM mechanism in the country. The first was the establishment of the Indonesian National Board for Disaster Management (INBDM) in 2008, which is responsible for implementing the Hyogo Framework for Action in Indonesia. Following this formation in the national setting, the second milestone was the establishment of a Disaster Management Board (DMB) at the provincial and district/city level, under the supervision of the INBDM. The DMB in Semarang was established in 2011 under government regulation no. 13, 2010 and it was expected that there would be a more comprehensive DM at the city level after its initiation.

The third milestone was the launch of the Local Preparedness Group (LPGs) in certain prone local areas (at *Kelurahan*[1] level), to promote community-based disaster preparedness action. Under the Semarang DMB, the first LPG in Semarang was introduced in 2012. As part of the Asian Cities Climate Change Resilience Network (ACCCRN) between 2009–2016 and continuing with engagement in the 100 Resilient Cities network, other significant contributions have also been made by international donors to support Semarang's DM, including facilitation to empower the LPGs. The number of LPGs reached 35 in 2018, indicating that locally based community groups play a significant role in safeguarding front line DM in Semarang city.

Other studies have also focused on the importance of the local people/ community in DM.[1,15,18,23,34] However, the performance or capacity of the community itself has so been far understudied. Accordingly, in line with the growing awareness of the importance of community participation in DM, this study aims to examine the capacity of the LPGs in Semarang. The analysis was designed by comparing perceptual- and evidence-based questions to assess the LPGs' capacity to contribute to better comprehension of the strengths and emerging challenges in engaging the community/ local people in DM to achieve a more resilient community in the future. Accordingly, by comparing the two types of questions, a fuller comprehension emerges about the effectiveness of the interventions of different stakeholders including government, donors and NGOs, to improve the capacity of the LPGs in particular and the community living in the disaster-prone area in general.

Description of Study Area
Disaster in Semarang City is triggered mostly by hydrometeorological factors which are very much influenced by climate change and urbanization. In the last ten years, disaster events in the city have included floods, droughts, landslides, cyclones and land fires[13]. Floods and landslides were the most frequent disaster in Semarang City between 2010–2017[8]. According to the Indonesian Constitution No. 24 / 2007, disaster causes property loss, environmental damage, human casualties and psychological distress. One of the disasters with the greatest losses in Semarang City was caused by flash floods in the Garang Watershed in 1990. Water overflowed to a height of 2-3m, causing a loss of Rp 8.5 billion, with 782 damaged houses and 47 fatalities.

In 1993, flash floods in the Garang Watershed caused 23 fatalities[28]. Flash flooding also occurred in the Beringin Watershed and the East Flood Canal of Semarang City. In 2010. flash flooding in the Beringin Watershed caused eight deaths[21]. In addition to flash flooding, Semarang City, as a coastal city with low elevation, is also prone to tidal flooding.

Landslides are also regarded as a most frequent disaster in Semarang City during the rainy season, especially in hilly areas such as in the Gajahmungkur, Gunungpati, Candisari, Ngaliyan, Tugu, Tembalang, South Semarang, West Semarang and Banyumanik Sub-Districts. In the dry season, several areas in Semarang City such as in Candisari and Tembalang, are prone to drought and fires. Based on the risk of disaster, a map was developed by the DMB showing that approximately 20% of *kelurahan* in Semarang City is also prone to cyclone including Gunungpati, Gajahmungkur, Genuk, Ngaliyan and Tembalang. Figure 1 depicts the disaster-prone areas in Semarang City.

Realizing that the number of disaster events is increasing every year and appreciating community involvement as an essential element in DM, the DMB of Semarang City, in collaboration with BINTARI (a local NGO) and Mercy Corps Indonesia, seven LPGs were formed to improve community capacity to address flood under the ACCCRN Programme. The LPG is a locally-based organization at the

Kelurahan level and consists of community representatives from particular disaster-prone areas. LPG membership is voluntary and there are average 25 members in each *Kelurahan*. The LPG acts as the first layer for evacuation and first aid activities during a disaster, as an extension of the DMB. When a disaster occurs, the LPG is the first team that has the capability and responsibility to evacuate and provide first aid in order to minimize the disaster impact before assistance from related stakeholders arrives.

In general, the organizational structure of an LPG consists of a chairperson and secretary, supported by evacuation, communication, public kitchens and health teams. In Semarang City, some LPGs are legalized by *Kelurahan* or sub-district decree. The number of LPGs in Semarang City continued to increase after 2012 and reached 35 by 2018. Up until 2018, as many as 18 LPGs had been initiated by the DMB of Semarang City; 14 LPGs were initiated in collaboration with different NGOs and three were initiated by community empowerment at the *Kelurahan* level and are known as CEI (Community Empowerment Institution).

Table 1 explains the establishment of LPGs in Semarang City between 2012–2017 and figure 2 further illustrates the locations of LPGs and types of disaster experienced.

Material and Methods
Data Needs: The measurement of the capacity of the LPGs in Semarang city was developed based on a questionnaire distributed to LPG members in the city. Of the 35 LPGs established between 2012–2017, 31 were willing to participate as respondents through the FGD mechanism. A mini FGD was conducted in each LPG and the participants were ask to form a consensus when answering the questions. Two types of questions, categorized as perceptual- and fact/evidence-based (Table 2), were developed based on the literature and related regulations on DM and community participation. The questions were derived from six main elements indicating the capacity level of the LPGs in DM including knowledge, skill/capability, communication and collaboration, financial resources, leadership and organizational system.
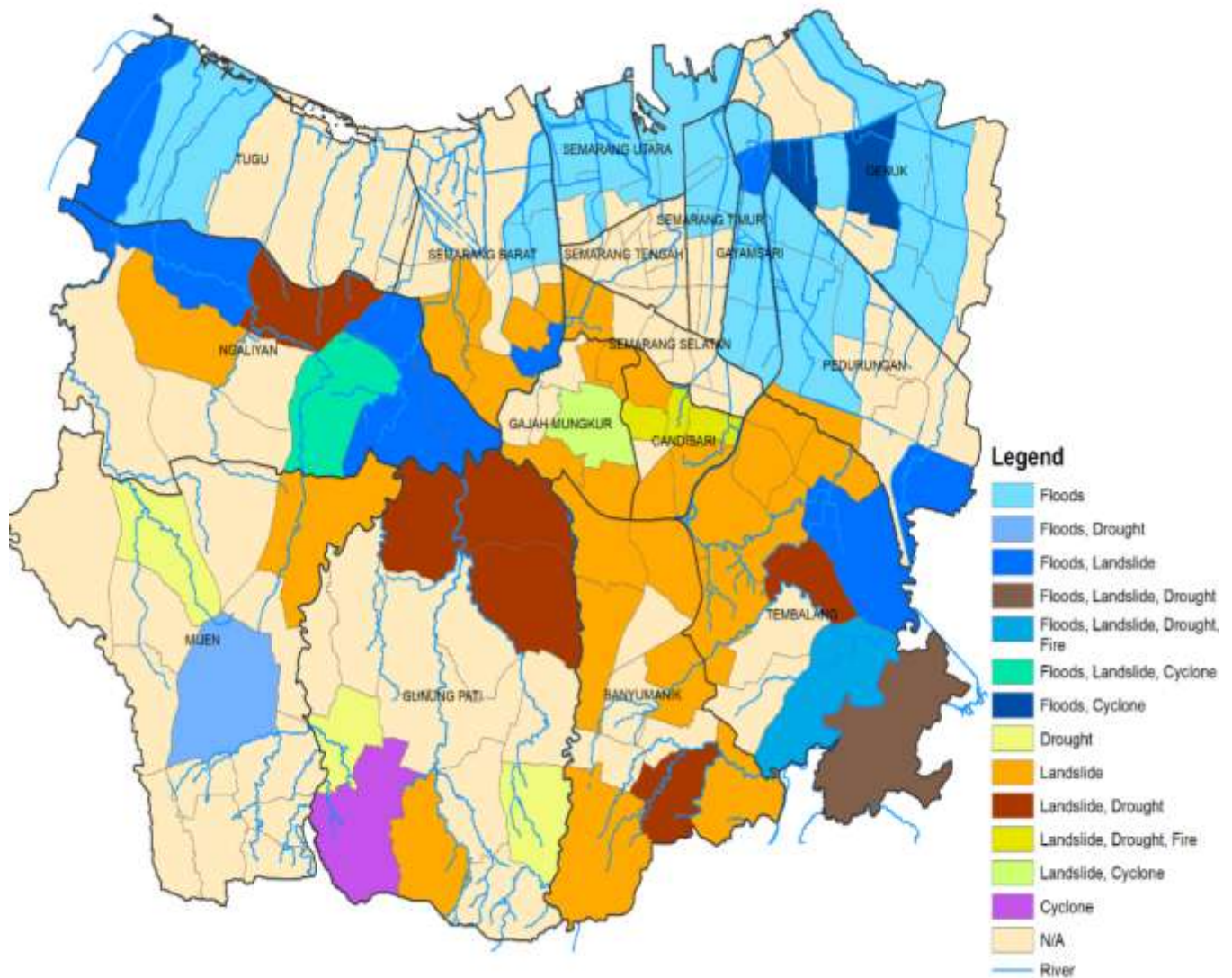
Figure 1: Disaster Prone Areas in Semarang City, based on *Kelurahan*

Table 1
Establishment of LPGs in Semarang City

LPGs	Initiator
2012	
Randusari	DMB
Wates	BINTARI and MCI
Wonosari	BINTARI and MCI
Beringin	BINTARI and MCI
Tambakaji	BINTARI and MCI
Mangunharjo	BINTARI and MCI
Mangkang Wetan	BINTARI and MCI
Muktiharjo Lor	CEI
2013	
Jagalan	DMB
Kedungpane	DMB
Kaligawe	DMB
Jomblang	DMB
Sukorejo	DMB
Genuksari	DMB
Rowosari	DMB
Tinjomoyo	DMB
2014	
Kemijen	CEI
Kembangarum	DMB
Gondoriyo	BINTARI and MCI
Muktiharjo Kidul	DMB
2015	
Bandarharjo	DMB
Tanjung Mas	CEI
Lempongsari	DMB
2016	
Mangkang Kulon	DMB
Meteseh	DMB
Kalipancur	DMB
Krobokan	IUCCE and MCI
Cabean	IUCCE and MCI
Panggung Lor	IUCCE and MCI
2017	
Petompon	IUCCE and MCI
Ngemplak Simongan	DMB
Bulustalan	IUCCE and MCI
Candi	DMB
Bulu Lor	IUCCE and MCI
Manyaran	IUCCE and MCI

Note:
2012–2016 : supported by the ACCCRN Programme
2016–2017 : supported by the Zurich Flood Resilience Programme
Government : DMB
Local NGO : BINTARI, MCI, IUCCE
Community : LPMK

Table 2
Selected Variables and Questions for LPGs Capacity Assessment

Variables	Explanation	References	Questions	
			Perceptual-based	**Fact/Evidence-based**
Knowledge	Knowledge is important for the sustainability of community participation. Accordingly, local knowledge is an important element in reducing disaster risk.	Shah *et al.*, 2017; Gibson & Wisner, 2016; UNDP, 2012; Lopez-Marrero, 2011	LPGs/community knowledge on: • the causes of disaster • natural signs prior to disaster • disaster information dissemination system • required actions during disaster • impacts of disaster • access to recovery programmes	Availability of: • CBDRM (Community Based Disaster Risk Management) document • disaster risk map
Skills/Capability	Skills/capability is the community capacity for preparedness, response and recovery, including the ability to utilize available resources	Atreya *et al.*, 2017; Onuma *et al.*, 2017; UNDP, 2012; Husna, 2012	LPGs/community ability on: • managing or mobilizing the current resources (ex. handy talky, first aid, etc.)	• Availability of scheduled disaster preparedness training initiated by the LPGs • Availability of regular rehearsal initiated by different institutions (govt agency, NGO, etc) for disaster preparedness, evacuation and emergency response • Women's involvement in disaster preparedness activities • Availability of an early warning system • LPGs/community actions/ initiatives to reduce loss and damage a during disaster • LPGs/community actions/ initiatives to speed up recovery process
Communication and Collaboration	Communication is a substantial element. Effective communication takes place based on trust among community members, in addition to the importance of expanding networks and collaborating with different partners.	Tzionas, 2017; Gultom, 2016; Rogers, Lawry, Dragisic, & Mills, 2016; Lopez-Marrero, 2011	• Quality of networking between communities and other stakeholders on disaster-related issues • Trust among LPGs mostly on disaster information delivery and related disaster management activities • Trust between LPGs and government (DMB) on disaster information delivery and related disaster management activities • Trust between LPGs member and local communities on disaster information delivery and	• Availability of formal institution or NGO to support disaster management activities • Collaborations among LPGs • Collective actions between member of LPGs and the local communities

|			related disaster management activities	
Financial Resource	Funding sustainability is very important to developing various activities and improving the community capacity.	PPN/Bappenas & BKNPB, 2006; Chaskin, 2001	• Financial capacity	• Availability of financial support from government (DMB) or other sources • Existence of self-funded activities • Effort to access different financial resources • Availability of budget control mechanisms
Leadership	Effective leadership has been proven to significantly reduce the disaster risk at community level.	Bankoff, 2015	• Commitment of local (LPGs) leader	• Existence of local (LPGs) leader • Role of local (LPGs) leader
Organizational System	Legal formal status is effective in the optimal engagement of the local community and reducing disaster risk.	INBDM, 2012; PPN/Bappenas & BKNPB, 2006	• LPGs management board commitment to run the organization	• Intensity of LPGs regular routine meeting • Implementation of LPG programme • Availability of volunteers coordinated by the LPG management board
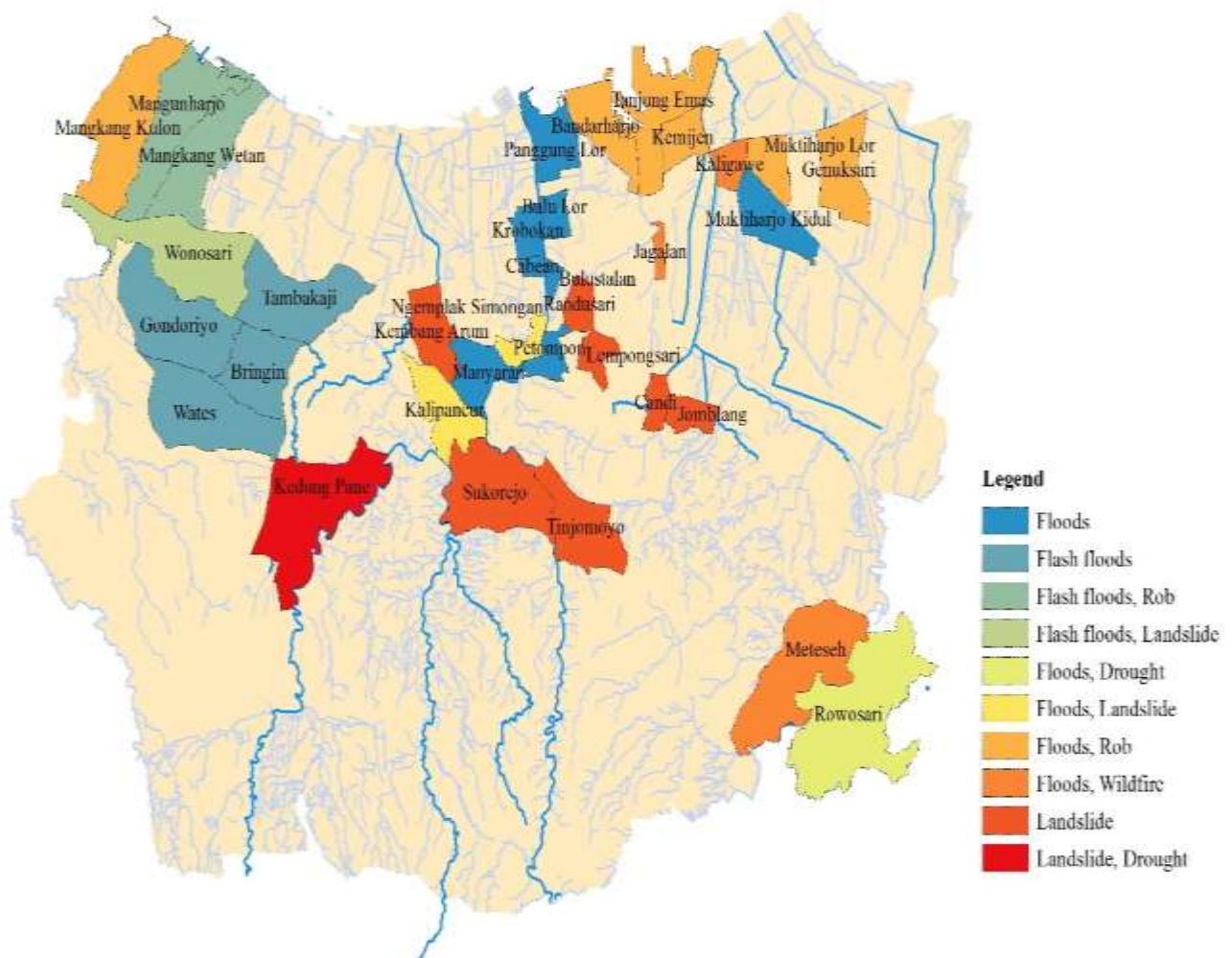
Figure 2: Distribution of LPGs and the Disaster Type of each *Kelurahan* in Semarang City

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Methods

Two further means of examining the capacity of the LPGs were employed. The first was an LPG capacity assessment using a scoring system to measure the capacity level in each *kelurahan*. The second was a comparison analysis to further comprehend the perceptual- and evidence-based types of question. There were in total 37 questions, consisting of 16 perceptual- and 21 evidence-based questions. The following shows the steps used to conduct these two main analyses:

1. The LPG capacity assessment:

a) Define variables to assess community capacity (Table 2), then break these down into questions (perceptual- and evidence-based);

b) Develop the scoring system. There was a different scoring method for each type of question. Data ranged from 0, 0.25, 0.5, 0.75 and 1 in scale for questions with five possible answer options, while for those with two answer options the data ranged between 0 and 1. For three answer questions, the data ranged between 0. 0.5 and 1. The scoring system is explained in more depth below (Table 3).

c) Calculate all the data in each variable of each sub-district. The purpose of this step was to derive the actual value of each data executed by the formula below:

$$N = \sum v1 \ldots v6$$

Note: N: LPG/Sub-district; V1: Knowledge; V2: Skills/Capability; V3: Communication and Collaboration; V4: Financial Resource; V5: Leadership; V6: Organizational System;

d) Standardize each calculation to normalize the actual values of each data to make it more comparable. The normalizing process was executed by the formula:

$$X = \frac{Xi}{Xmax}$$

Note: X: Normalized value; Xi: Actual value; Xmax: Maximum value;

e) Summarize the capacity variables and then identify the average value, minimum value and maximum value of each category.

2. Comparison of perceptual- and evidence-based questions:

a) Group the questions, i.e. as perceptual or evidence;

b) Calculate the data of each type of question in each variable;

c) Convert the data into a percentage executed by the formula:

$$X\% = \frac{X}{(\sum x1 \ldots xn)} \cdot 100$$

Note: X%: Percentage value; Xi: Actual value; $(\sum x1 \ldots xn)$: Result of summing up all the values in the set.

d) Present perceptual- and evidence-based data as a diagram, two for each variable.

Results

Local Preparedness Group Capacity in Semarang: Table 4 describes the assessment result of the LPG capacity calculation for each *kelurahan*. The values ranged from 0 to 1. with 0 indicating the lowest and 1 the highest capacity value.

Following the value for each *kelurahan*, figure 3 further summarizes the average, minimum and maximum value based on variables. Both the table and the figure illustrate, in general, that the capacity of LPGs in Semarang is good. The average capacity value was 0.64 (highlighted in grey in table 4).

The capacity value of 16 *kelurahans* out of 30 was above average and only 11 had a below average score. Regarding the six aspects (Figure 3), only financial resources scored a relatively low capacity value, mostly because some *kelurahan* gave a value of 0 for this variable and the other five variables had a relatively high value (0.68–0.79). Most flood-prone areas in Semarang are located in dense settlement with quite a significant number of poor and vulnerable people;[11] therefore, it is not very surprising that financial resources had the lowest score, meaning that the LPGs have a low capacity to ensure the quality and sustainability of the organization, mostly due to limited budget.

Gondoriyo had the highest score of 0.88. The LPG members in the *kelurahan* even agreed to give the highest score (i.e. 1) to the leadership and organization system, indicating that they were satisfied with its current institutional performance. Similar to other *kelurahan*, financial resources had the lowest score and this aspect should be regarded as the main challenge to further improve capacity in future. In contrast to Gondoriyo, Manyaran had the lowest score (0.35) and the aspect of leadership and organizational system had the lowest value of almost close to 0, demonstrating a serious internal management issue.

Nevertheless, the score for knowledge in Manyaran was above the average value, meaning that the LPG members had confidence in their comprehension of DM. Indeed, each *kelurahan* had a different combination of capacity value for each variable. This depended very much on the internal dynamic of the LPGs as influenced by the level of participation of the LPG members and the neighborhood characteristics.

Table 3
Scoring Method

Types of Questions	Answer	Score
Questions with 5 answering options (applied in perceptual-based questions)	a. Very perceptual-based on the best situation	1
	b. …	0.75
	c. …	0.5
	d. ….	0.25
	e. Very perceptual-based on the worst situation	0
Questions with 3 answering options (applied in evidence-based questions)	a. Available, high intensity	1
	b. Available, low intensity	0.5
	c. Not available	0
Questions with 2 answering options (applied in evidence-based questions)	a. Available	1
	b. Not available	0

Table 4
Assessment Result of LPGs Capacity in Semarang

LPG/ Sub District	Total Disaster Frequencies (2012–2017)	Knowledge	Skill	Communication and Collaboration	Financial Resource	Leadership	Organization System	Community Capacity
Gondoriyo	1	0.84	0.95	0.91	0.61	1.00	1.00	0.88
Panggung Lor	3	0.80	0.88	0.91	0.43	0.83	0.80	0.77
Bulu Lor	0	0.73	0.90	0.91	0.43	0.83	0.80	0.77
Tambakaji	18	0.70	0.95	0.91	0.32	0.83	0.85	0.76
Beringin	0	0.77	0.75	0.91	0.32	0.92	0.85	0.75
Mangkang Kulon	6	0.77	0.90	0.88	0.00	1.00	0.90	0.74
Mangkang Wetan	7	0.84	0.85	0.78	0.29	0.83	0.85	0.74
Kalipancur	13	0.75	0.73	0.91	0.18	0.92	0.95	0.74
Cabean	0	0.66	0.85	0.94	0.18	0.83	0.90	0.73
Candi	11	0.93	0.75	0.88	0.00	1.00	0.70	0.71
Wonosari	9	0.63	0.80	0.88	0.29	0.83	0.80	0.70
Lempongsari	12	0.71	0.95	0.88	0.32	0.67	0.65	0.70
Tinjomoyo	6	0.64	0.70	0.72	0.32	0.83	0.90	0.69
Randusari	11	0.70	0.80	0.88	0.04	1.00	0.65	0.68
Mangunharjo	6	0.88	0.45	0.88	0.00	0.83	1.00	0.67
Krobokan	2	0.68	0.73	0.75	0.14	0.83	0.80	0.65
Muktiharjo Lor	2	0.68	0.85	0.75	0.00	0.92	0.65	0.64
Kaligawe	20	0.66	0.80	0.66	0.29	0.83	0.60	0.64
Tanjung Mas	8	0.80	0.50	0.88	0.00	0.83	0.80	0.64
Petompon	5	0.63	0.85	0.84	0.04	0.83	0.60	0.63
Bulustalan	2	0.68	0.65	0.56	0.04	0.83	0.85	0.60
Jomblang	18	0.43	0.45	0.81	0.00	1.00	0.70	0.57
Muktiharjo Kidul	5	0.70	0.45	0.78	0.00	0.83	0.60	0.56
Rowosari	3	0.75	0.58	0.88	0.29	0.50	0.35	0.56
Sukorejo	17	0.66	0.23	0.78	0.00	1.00	0.60	0.54
Kemijen	14	0.59	0.73	0.81	0.14	0.08	0.45	0.47
Kembangarum	11	0.64	0.48	0.41	0.00	0.83	0.35	0.45
Genuksari	1	0.79	0.25	0.53	0.32	0.33	0.35	0.43
Ngemplak Simongan	5	0.63	0.50	0.47	0.00	0.58	0.30	0.41
Manyaran	6	0.73	0.28	0.38	0.14	0.33	0.25	0.35

Details			
Variables	**Average**	**Minimum**	**Maximum**
Knowledge	0.71	0.43	0.93
Skill/capability	0.68	0.23	0.95
Communication and Collaboration	0.78	0.38	0.94
Financial Resource	0.17	0.00	0.61
Leadership	0.79	0.08	1.00
Organizational system	0.70	0.25	1.00
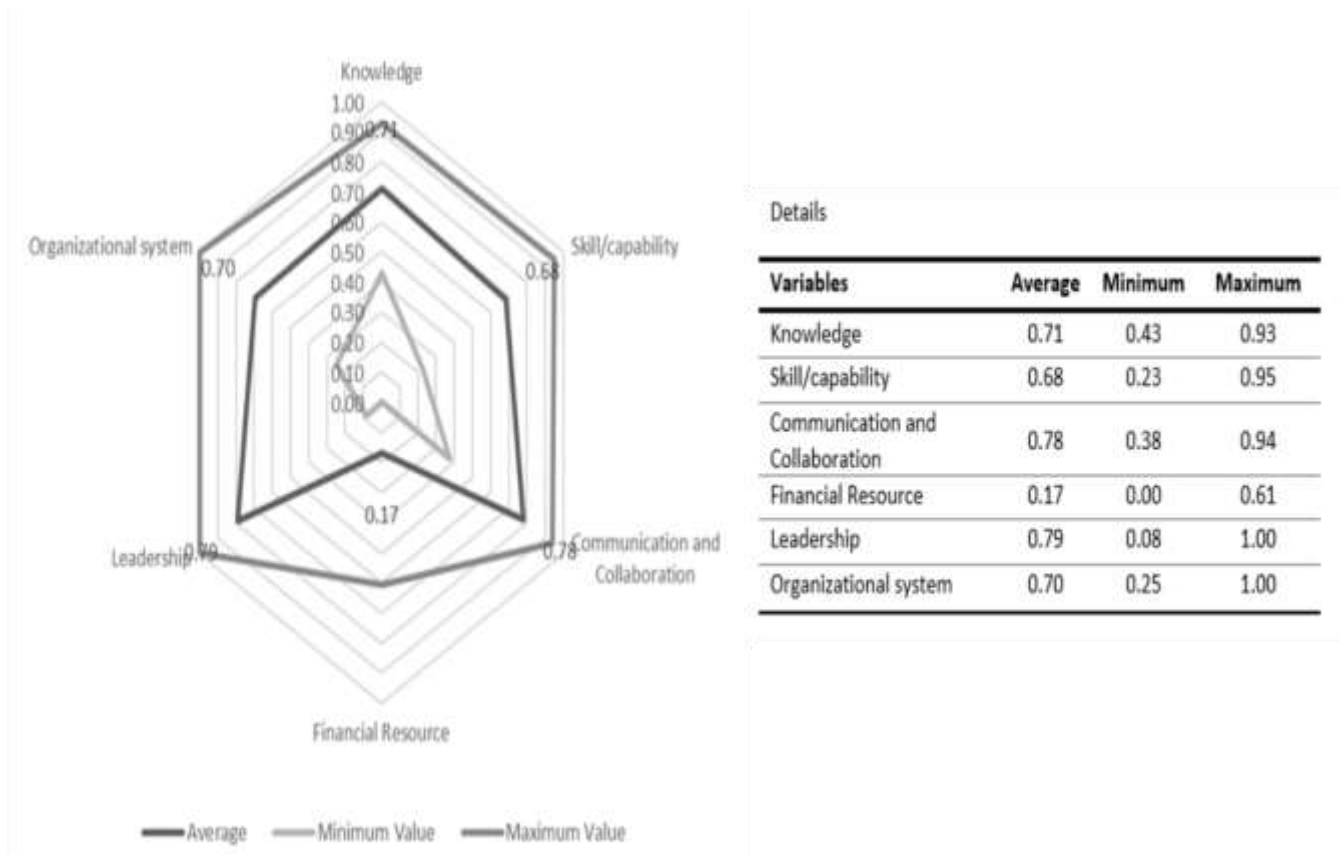
Figure 3: Assessment of Each Community Capacity Variables

Despite the positive findings at the city level, there was no correlation between the value of the LPG capacity and disaster experience. Gondoriyo, for example, the *kelurahan* with the highest LPF capacity value, had only experienced one reported disaster between 2012–2017, while other *kelurahan*(s) with more frequently reported disasters were distributed randomly in the thread as illustrated in table 4. This shows that community capacity was somehow not very much influenced by how frequently they had experienced disaster, or implicitly how important they thought the issue of disaster is in their neighborhood, but rather it was mostly influenced by the characteristics of the community itself. This deduction might be supported by exploring the values for each variable (Figure 3).

Regardless of the number of disasters experienced, the average values for the knowledge and skill/capability variable were quite high (0.71 and 0.69). Table 4 also shows that all *kelurahan* had relatively high values for knowledge and skill/capability.

Comparing the Perceptual- and the Evidence-based Questions: Table 5 shows the comparison value in percent between perceptual-based and evidence-based questions. The evidence-based value was calculated from the availability of supporting documents and/or proof of related activities, while the perceptual-based value was calculated from questions on how the LPG members acknowledged their own capacity for each variable. Five out of six variables had good evidence-based performance. The LPGs could

fulfil 60-80 percent of all required evidence of all variables. It was only financial resources which had relatively low evidence-based performance at lower than 20 percent. Unlike the evidence-based situation, the performance of perceptual-based answers differed across variables.

In general, there are three typologies of comparison with the perceptual- and evidence-based situation, explained as follows:

- **Typology 1: equality between perceptual and evidence based:** This occurred for the two variables of knowledge and leadership. Variable knowledge was a relatively balanced comparison between the perceptual- and evidence-based answers, as around 70 percent of the LPG members were confident to state that they were very knowledgeable and knowledgeable (score 1 and 0.75 out of 0-1 where 1 performs as the highest) of the related DM questions. Less than 10 percent stated that they were less or not knowledgeable in answering the knowledge variable questions. These percentages are also supported by 70 percent of available evidence (Table 5). A similar situation also applied to the leadership variable, whereas around 85 percent of LPG members were able to fulfill the evidence-based questions and 80 percent were confident to give a positive response to answering the perceptual-based questions.

Table 5
Comparison of the perceptual- and evidence-based questions

Variable		Explanation
Knowledge		
	A = Available NA = Not Available VK = Very Knowledgeable K = Knowledgeable	MK = Moderately Knowledgeable LK = Less Knowledgeable NK = Not Knowledgeable	• *Evidence-Based.* 69% of the LPGs had supporting documents, such as Community Based Disaster Risk Management (CBDRM) documents and a disaster risk map at the *Kelurahan* level. • *Perceptual-Based.* This consists of community knowledge of disaster. Approximately 52% of LPGs were knowledgeable and the other 21% of LPGs were moderately knowledgeable.
Skills		
	VP = Very Proficient P = Proficient MP = Moderately Proficient	LP = Less Proficient NP = Not Proficient	• *Evidence-Based.* Most LPGs (approximately 79%) had scheduled disaster preparedness training and an early warning system. • *Perceptual-Based.* This consists of the community ability in managing or mobilizing the current resources. Approximately 43% of LPGs were moderately proficient, while 33% of LPGs were proficient.
Communication and Collaboration		
	VT = Very High Level of Trust HLT = High Level of Trust MLT = Moderately Level of Trust	LL = Less Level of Trust NT = Low level of trust/no trust at all	• *Evidence-Based.* Mostly, the LPGs' (89%) activities were supported by government/NGOs. They also collaborated with other LPGs and took collective action with LPGs and other local communities. • *Perceptual-Based.* This consists of a networking system and trust level between LPGs and other related stakeholders. Around 41% of LPG members had a high level of trust in the LPGs, while only 5% of LPGs had a low level of trust.
Financial Resource		
		• *Evidence-Based.* Less than 20% of LPGs had financial resources (from gov't or others). Therefore, the existence of self-funded activities, access to financial resources and also a budget control mechanism were not available most LPGs (82%).

VAF = Very Adequate Financial MAF = Moderately Adequate Financial	AF = Adequate Financial LAF = Less Adequate Financial NAF = Not Adequate Financial	• *Perceptual-Based.* 63% of LPGs had inadequate financial capacity, while the other 33% of LPGs had less than adequate financial capacity.
Leadership		
		• *Evidence-Based.* More than 85% of LPGs stated that they had a local leader. • *Perceptual-Based.* Approximately 53% of LPGs stated that the commitment of the local (LPG) leader was moderately influential, while only 3% stated that it was less influential.
VI = Very Influential MI = Moderately Influential I = Influential	LI = Less Influential NI = Not Influential	
Organizational System		
		• *Evidence-Based.* Almost 80% of LPGs had a routine meeting and voluntarily activities coordinated by the LPG management board. • *Perceptual-Based.* 37% of LPG stated that the LPG management board's commitment to running the organization was moderately active, while 20% stated that it was very active.
VAC = Very Active MAC = Moderately Active AC = Active	LAC = Less Active NAC = Not Active	

- **Typology 2: higher evidence based compared to perceptual based:** Slightly different to the knowledgeable variable, skill/capability had an unbalanced performance between perceptual- and evidence-based, with 80 percent of the required evidence being fulfilled for the skill/capability variable, but only 40 percent being confident (score 1 and 0.75 out of 0-1 where 1 performs as the highest) in having proficiency in the related skill or capability on DM. Even though the difference is not very significant, a similar situation also occurred with two other variables, communication/collaboration and organizational system. There is a discrepancy up to around 20 percent between the perceptual-based and the evidence-based performance for both variables.

- **Typology 3 - lower evidence - compared to perceptual-based:** Financial resources can be regarded as the worst performing variable, as it only fulfilled 20 percent of the required evidence and 40 percent of the perceptual-based. The latter, however, had a higher percentage even though it was still very low compared to other variables. Consistent with the result of the first analysis, funding was regarded as the biggest challenge

in ensuring a sustained and improved capacity of the LPGs.

Discussion

Community resilience, within the context of DM, has been emphasized as the adaptive capacity that is leveraged through organizational work resulting from a collective learning process.[14,20] According to Chaskin[7], a community's adaptive capacity is very much dependent on human capital (regarded as a variable of knowledge and skill in table 5), social capital (regarded as a communication variable in table 5) and organizational capital (regarded as an organizational system and leadership in table 5).

From a different perspective, Norris et al[20] believe that "wellness" at both the individual level and community level will significantly influence the ability of the community to solve the emerging disturbance, either individually or collectively. Indeed, community resilience is very much closely related to population wellness which refers to the existence of good behaviour, proper functioning and sufficient quality of life in a particular community setting. Thus, what we are discussing for a resilient community in Semarang is to what extent the human, social and

organizational capital, as well as wellness have been invested in through the existence of the LPGs.

The findings show a very positive result mostly for knowledge and leadership, reflecting that there is in general sufficient human, social and organizational capital to acknowledge that the LPGs have a potential role as the agent of change to further promote community-based disaster management. It was found that the greatest challenge was funding resources which is not in fact surprising. Most of the people who live in disaster-prone areas are vulnerable, in addition to the fact that the government allocates only a very low budget for community empowerment[12].

LPGs provide the means for the community to have a stronger position to promote collective action. Generally, the vulnerable are likely to have limited capabilities in utilizing resources, but with a good leadership they can increase their capacity by generating a collective response. Septiarani and Handayani[11] investigated the dynamics of governance at the community level lead by the local leader in some disaster-prone areas in Semarang and found that the leadership provided a very positive influence on the management of the collective initiatives potentially taken at the community level. This is very substantial as most of the people living in a disaster-prone area in Semarang City are likely to stay rather then move to other places[5,11].

LPGs, thus, also function for social sustainability to encourage more people participation through committed leadership and this has resulted in improving their capacity to manage their limited resources. Good leadership at the local level and proficient ability to develop communication and collaboration, as shown in the analysis, results in a very substantial social capital that should be regarded as a worthy investment. Rapaport et al[29] differentiated urban and rural communities to illustrate the different value of relations at the community level. Urban people who live in kampong are still able to maintain social relationships. It should be regarded as a good indication that communication/ collaboration and organization systems have higher perceptual- compared to evidence-based values indicating good sensitivity to social ties and relationships, very much likely with rural communities.

Social learning is one key feature to magnifying adaptive capacity. Lopez-Marrero and Tschakert[14] define social learning as a process to recognizing existing local knowledge/skill and generating new knowledge/skill by means of the participation of the local people/stakeholders in the process. Therefore, there will be a common understanding and awareness of the basis for taking action. The process of social learning is very important to robust adaptive capacity. A higher level of evidence-based value for skill and capability in the analysis result may clearly indicate that the support from different sources to improve LPG capability has not been effective enough. As a matter of fact, the most suitable capability should appear from

within and be derived from local knowledge rather than dependent on support from external resources that may not be sustainable[14].

Conclusion
This study has provided a comparative assessment of perceptual and evidence-based questions to examine the capacity of LPGs. Based on the comparison result, we have further identified the effectiveness of the intervention executed by government, as well as other institutions, to leverage community participation through the role of LPGs. The institutionalization of community engagement in DM through the establishment of LPGs is expected to perform as the agent of change to achieve a resilient community to face various disaster events.

The fact that there is good self-confidence, as indicated by typology 1 and typology 3 in the comparative analyses, should be regarded as an optimistic sign and opportunity to improve the role of the LPGs in the future. Acknowledgment of existing knowledge and social cohesiveness among the LPG members, as well as between LPGs and the wider community, are important human, social and organizational capitals that need to be sustained and carefully maintained. However, there is still a challenge to have better strategy for improving LPG skills and capability (typology 2) as the current approach has not yet led to good confidence for LPG members. Nevertheless, a resilient community will only be achieved through a continuous social learning process.

Acknowledgement

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