

# Middle School Preparedness in Dealing with Fire Disasters in Kampung Melayu Village

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This research aims to determine the level of middle school preparedness in the face of a fire disaster in Kampung Melayu village. The study used quantitative analysis by using data counting techniques from LIPI and distributing surveys to a sample population of 299 students, 48 teachers, and 2 education personnel from 2 junior high schools in Kampung Melayu village. The data analysis technique used involves structural preparedness, consisting of the preparedness of school facilities and infrastructure (following the guidelines of the Ministerial Regulation of Public Works No. 26, year 2008 on the technical requirements of protection systems for fire in buildings and the environment). It also involves non-structural preparedness, consisting of the preparedness of students, teachers, and educational professionals who follow the guidelines of LIPI and BNPB. The results showed that the acquisition of high school preparedness values in the face of fire disasters in Kampung Melayu village is high. The also showed that the acquisition of high scores influenced the availability of structural aspects that support the efforts of disaster preparedness at school, non-school structural understanding of disasters, and efforts to increase structural and non-structural capacity. The latter involves conducting disaster simulation activities through cooperation with related institutions such as BNPB, the East Jakarta Fire Department, and health institutions, such as puskesmas.

**Key words:** *Fire Disaster, Knowledge, and Disaster Preparedness.*

## Introduction

DKI Jakarta Province is the capital of the Republic of Indonesia. It has complex disaster problems. Fires in buildings and settlements are the second most prominent disasters that

occur (after flood disasters). Jatinegara district ranks fifth in terms of the threat of disastrous building and residential fires (BPBD DKI Jakarta Province). In the period from 2013 to 2018, there were 51 cases of residential fires in Jatinegara district in 7 villages. Compared with other Kelurahan in Jatinegara district, the most significant fire events occur in the Bidara Cina village and Kampung Melayu village. Most casualties occur in Kampung Melayu village due to the most fires occurring.

Education and training are an integral part of capacity building in disaster management disciplines. This is because each trained individual responds much better to catastrophic differences and will take proactive steps towards mitigation and prevention. School is regarded as the initial foundation and opportunity for people to practice independence from the elderly and have the responsibility of becoming a member of the community. As educational institutions second to families, schools are tasked with helping family environments educate, teach, improve and broaden the insight and behaviour of learners.

Preparedness is one part of the disaster management process. Increased preparedness is one of the key elements of disaster risk reduction that involves a pro-active approach to disasters. Providing sustainable knowledge for a professional building environment is more appropriate than providing on lesson for learners (Thayaparan et al, 2014). Educational institutions have the capacity to educate, research, and unify stakeholders to share experiences, improve knowledge bases and facilitate better decision-making to minimise the impact of disasters and loss of life (Mohammed, 2017).

School toughness is also considered important. There should be a place where children spend a lot of time and places that can provide safe conditions for students, teachers, parents and community members in normal situations. Schools should have security from any disaster risks. Many school buildings meet the requirements of resilience to one danger but fail to mitigate against other types of hazards. School resilience is unrelated to certain hazards and vulnerabilities but also takes into account many factors. These include insight into community risk and awareness with increased knowledge and shared attitudes and abilities to be exercised in emergencies (Bandecci, 2019).

## **Methods**

The research methods were implemented using quantitative analysis by using the data counting techniques from LIPI. This was done through surveys as objects of the study and data characteristics, as well as sampling of a population. The population in this research was two junior high schools (a state and private school) in Kampung Melayu village. The samples in this study were all non-structural components of the school: related educational personnel, teachers, and students of classes VI, VII and IX. The sampling technique used was the

stratified random sampling technique, which has a gradation of character for the overall nature of the population (Yunus, 2010).

### The Data Analysis Technique

To facilitate the processing of student preparedness data, teachers and educational professionals created a matrix of questions that are guided by LIPI and BNPB:

**Table 1:** Matrix of the Number of Students, Teachers and Education Personnel Responses

Series	Parameter				Total
	KD and SPP	DAP and ERP	DW	RM	
Teacher	38	10	9	13	70
Student	41	18	6	5	70
P. Education	10	11	6	10	37
Total Score					177

**Source:** LIPI (2013).

As for the processing of data facilities and infrastructure of the school against fire, a matrix of questions was created that were guided by the regulation of the Minister of Public Works No. 26, year 2008. It involves technical requirements of fire protection systems in buildings and the environment:

**Table 2:** Matrix of the Number of Questions Regarding Structural Preparedness (Facilities and Infrastructure)

Parameter								Total Score
SC	WS	RF	APS	BU	FP	SM	MC	
3	1	4	2	1	7	1	1	20

**Source:** Regulation of the Minister of Public Works No. 26, Year 2008 on Technical Requirements of Fire Protection Systems in Buildings and Environments.

To calculate the index per parameter of non-structural preparedness (students, teachers, and education professionals) and structures (facilities and infrastructure):

$$\text{Parameter Index} = \frac{\text{number of answers}}{\text{maximum number of questions}} \times 100$$

The index value is used for the achievement of indicators of the preparedness parameters of structures (facilities and infrastructure) and non-structures (students, teachers and education). The index in non-structural preparedness includes Knowledge of Disasters (KD) for students

and teachers; School Preparedness Policy (SPP) for education personnel; a Disaster Activities Plan (DAP) for students and teachers; Emergency Response Plan (ERP) for educational personnel; Disaster Warning (DW); and Resource Mobilisation (RM) for students, teachers and education personnel.

The index in the preparedness of structures include: School Conditions (SC), Water Supply for Fire Suppression (WS), Rescue Facilities (RF), Active Protection System (APS), Building Utilities (BU), Fire Prevention (FP), System Management (SM), and Monitoring and Controlling (MC). The higher the index number means the higher the level of achievement of the school in fulfilling the indicator of preparedness parameters.

The assessment of a junior high school's preparedness level is a combination of the value of the achievement index of structural preparedness and the value of the non-structural preparedness index. The equation to calculate the achievement index of Disaster Alert school monitoring is as follows:

Achievement Index:

$$= \left( \frac{\text{Number of values obtained}}{\text{Number of structural and non-structural scores}} \times \text{Structural Preparedness Index} \right) + \left( \frac{\text{Number of values obtained}}{\text{Number of structural and non-structural scores}} \times \text{Non-structural Preparedness Index} \right)$$

Once obtained, the value of the achievement index of Disaster Alert school monitoring is then put in the category listed in Table 3. The higher the value gained, the higher the level of school preparedness.

**Table 3:** School Community Preparedness Level

Index Value	Category
80-100	High Preparedness
60-79	Moderate Preparedness
< 60	Low Preparedness

**Source:** LIPI (2013).

## Result and Discussion

### 1. Preparedness of Secondary School Students in The Face of Fire Disasters in Kampung Melayu Village

The results of a questionnaire filled by students in two junior high schools were obtained as follows:

### *Santa Maria Fatima Junior High School*

Students already have a knowledge of fire disasters and know the location of the gathering points that have been socialised by the school. Students have also participated in the fire simulation activities held by the school, so students know of evacuation routes and disaster alerts at school. This is because the school has familiarised all the school residents with disaster simulation activities.

Education can be a motivator to the conduct of preparedness, especially for people who have never been affected by disasters in the past (Hoffmann et al., 2017). The implementation of the school is in line with the results of research that demonstrates the importance of adequate knowledge and skills in the face of disasters (Nakazawa et al, 2014).

Formal education is measured in school years, assuming the higher the number of years that a person spends in a formal education environment, the more he or she is educated (Hoffmann, 2017). Teachers have a very strategic role in the preparedness of the school community in the face of disasters because they can transfer knowledge to students in several periods. They are drivers and major actors in school preparedness (Sopaheluwakan, 2006).

The school has a special team in the face of disasters, consisting of school guards and teachers. The school also has evacuation sites, evacuation routes, and evacuation equipment. To convey a disaster alert, the school uses a kentongan of six pieces spread over several locations. The school also has a first aid box available and a ready-made stretcher that is still in good condition. The monitoring of fire conditions takes place throughout the classrooms and the entire staff room. It is performed by the East Jakarta Fire Department in a yearly inspection. Santa Maria Fatima has cooperated with BNPB in training and simulation of fire evacuation involving all components. This is so that all residents of Santa Maria Fatima have disaster related knowledge. Copies of important documents are also owned by the school in the form of soft files. The school already has adequate budget allocation for school preparedness given by the foundation. When researchers asked if anyone wanted to improve school's response to disaster preparedness, the school mentioned that even though there were no disabled school residents, the school wanted to make the school area safe and accessible for them.

In terms of the importance of educational functions in the beginning of post-learning, the maintenance of school records and the availability of basic resources in schools can involve psychological post-disaster support (Ilumin, 2018). This can promote knowledge of disaster risks as early as possible through disaster prevention, mitigation, preparedness, response, recovery and rehabilitation of formal and non-formal education and public education at all levels (UNISDR, 2005).

### *26 Junior High School Jakarta*

Students are able to take a stance in case of a fire in school and gain knowledge of fire disasters from friends, family and neighbours. Students also know the location of the gathering points and health posts in the school. However, students do not know of any posters about fires in schools and do not acquire books about disasters. This is because the school has never received assistance in preparedness, such as through books and equipment. The assistance has been obtained by the school in the form of disaster simulation training through school cooperation with the Wahana Visi Foundation.

Strengthening preparedness in improving risk management is one of the priority actions in the Sendai framework (UNISDR, 2015). Knowledge giving, especially the knowledge of disasters in young children (age 3 to 19 years) is very adequate because at that age, children have a sense of responsibility. This sense is not accompanied by a proportional awareness and preparation in the face of disasters (Bandecchi, 2019).

All teachers in SMP 26 Jakarta have discussed catastrophic events such as fires, floods and earthquakes in teaching and learning activities. The activities of evacuation simulation were followed by all teachers along with all the school residents (organised by the Wahana Visi Foundation, an NGO). Although only a few teachers have attended a disaster meeting, the majority of teachers can decide what to do if there is a fire disaster in the school.

This institution has the capacity to educate, provide knowledge and facilitate better decision making to minimise the impact of a disaster and loss of life (Mohammed, 2017). Building knowledge is provided early on in all walks of life. This is considered important, and is done by sharing experiences, learning with peers, training, and education to reduce disaster risks. (UNISDR, 2005).

26 Junior High School Jakarta has been getting assistance from non-governmental institutions in the form of disaster simulation activities with all the school residents and parents who are organised by the Wahana Visi Foundation. It has cooperated with the nearest health centre and the fire department in East Jakarta. The school has a special group in the face of disasters consisting of school guards, teachers, and extracurricular groups of students. Evacuation points and evacuation routes in the classrooms and in the school staircase are also available and are still in good condition. The school mentions having 2 extinguishers each weighing 1 kg, but does not know where the extinguishers are stored. The school also has no budget allocation for school preparedness. School staff already have knowledge of disasters from a seminar activity called "Child Friendly School" where one of the speakers was a BPBD representative DKI Jakarta. The school uses a siren from a megaphone as a tool to convey disaster warnings. When researchers asked if anyone wanted to improve the school in relation

to preparedness, the school mentioned wanting disaster simulation activities carried out routinely. This is because SMPN 26 Jakarta held disaster simulation activities once.

It is important to promote combined disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation of formal and non-formal education and public education at all levels (UNISDR, 2005). The presence of disaster-ready communities will surely reduce death and reduce catastrophic impacts (Rañeses, 2018).

**Table 4:** The results of observations of two SMPs in Kampung Melayu village:

No.	School Conditions	Santa Maria Fatima Junior High School	26 Junior High School Jakarta
1	The class doors and school gates are wide enough for evacuation.	●	●
2	The school already has an evacuation route.	●	●
3	The school already has a gathering place for disaster events.	●	●
<b>No.</b>	<b>Water Supply for Fire Suppression</b>		
1	In the school environment, there is a necessary water supply for fire protection.	●	●
<b>No.</b>	<b>Rescue Tools</b>		
1	The way to the outside is free from any obstacles for full use in fires or in other emergencies.	●	●
2	The door is capable of fully opening towards the road to the outside.	●	●
3	There is availability of electrical lighting operated by batteries as an emergency source.	●	●
4	There is a clear and easy-to-see evacuation route and gathering points.	●	●
<b>No.</b>	<b>Active Protection System</b>		
1	Extinguishers are in full condition, ready to operate and are always stored in their designated place if they are not in use.	●	●
2	The extinguishers' tubes are in good condition without dents, corrosion and fillings.	●	●

<b>No.</b>	<b>Building Utilities</b>		
1	A direct-pick contact is connected to a permanently installed contact box.	●	●
<b>No.</b>	<b>Fire Prevention in Buildings</b>	●	●
1	Available cabinets are made of non-flammable materials.	●	●
2	No Smoking signs are available.	●	●
3	Exits are not locked or have padlocks.	●	●
4	Stairs are not used as a resting/smoking place by the building occupants and are not used as a warehouse.	●	●
5	There is no damage to the floor, stair and stair grip.	●	●
6	There is availability of live lighting on stairs.	●	●
7	The maintenance of the extinguishers is carried out annually by manufacturing, APAR maintenance service companies, or by trained personnel.	●	●
<b>No.</b>	<b>General Provisions of Building Management</b>		
1	School buildings have an approved address, are placed in a bright position, and are visible and readable from the street or land they are facing.	●	●
<b>No.</b>	<b>Monitoring and Controlling</b>		
1	School organisers periodically present to the whole school about fire protection by providing knowledge that includes training and understanding of potential fire hazards and avoiding fires.	●	●
<b>TOTAL</b>		20	13,5

Descriptions ● = Appropriate ● = Sufficient ● = Inappropriate

The disclosure of facilities and infrastructures of two junior high school in Kampung Melayu village as follows:

a. School Conditions

1) Santa Maria Fatima Junior High School

The entire door of junior high school Santa Maria Fatima consists of two doors. The school gates are made of iron that can be fully slid open. Evacuation routes and the location of the gathering points are already available at school. The availability of evacuation routes, such as evacuation map sources, signposts, hydrants, extinguishers, points of interest and education and training are considered important in disaster relief efforts (Fattah et al., 2017). Optimal evacuation pathways can increase the efficiency of evacuation management (Zhu, 2018).

2) 26 Junior High School Jakarta

Based on observation, all the doors of SMPN 26 Jakarta class consist of two doors that can be fully opened to the outside and inside. The school gates are made of iron that can be fully slid open. Evacuation routes and the location of the gathering points are already available at school. The evacuation route is one of the factors affecting the optimisation of the rescue process, which includes emergency stairs, directions, and a means of exit (Seftyarizki et al, 2018). In establishing an evacuation pathway for fires, it is necessary to consider fire risk factors, the length of the route, the density of the building occupants, and the type of route to avoid build-up in the evacuation route (Zhu, 2018).

b. Water Supply for Fire Suppression

1) Santa Maria Fatima Junior High School

The school uses pumps and water taps as a fire fighting kit (located around the school area). They are capable of supplying water for fire protection. Basic facilities to fight against fire should be adjusted according to the amount of water supply needs through the addition of water supply pipelines (An, 2013). For fire suppression purposes, water supplies can be obtained from natural resources (water ponds, lakes, rivers, deep wells) and artificial sources (water tanks, swimming pools, water reservoirs, water tank cars and hydrants) (Regulation of The Minister of Public Works No. 20, Year 2009).

2) 26 Junior High School Jakarta

Similarly to the previous school, the school used pumps and water taps as a fire suppression kit capable of supplying water for fire protection. Water supply is a major factor in the fire suppression process, so there needs to be adequate water storage facilities for fire suppression (Ju, 2016). The position of a water supply is also important, because improper placement can inhibit fire suppression (Li, 2016).

c. Rescue Tools

1) Santa Maria Fatima Junior High School

The way out in the school is free from obstacles. The school hallway only works for mobility and there is no blocking objects. All the doors at school can be opened fully in the direction of the inside and outside. The school also has a flashlight that is still functioning properly and the exit marks are still in good condition and placed in an easily visible location. Safe schools show minimal disruption to school activities and ensure the safety of children both during and after the impact of natural hazards (Bandecchi, 2019). Maintaining the evacuation facilities regularly and maintaining access to exits can minimise the duration of the evacuation time (Li, 2016).

2) 26 Junior High School Jakarta

All doors at school can be fully opened in and out. The school also has a flashlight that is still functioning properly and the exit marks are still in good condition and placed in an easily visible location. However, in the hallway on the second floor, there is a table that prevents mobility. Besides having an evacuation route, and assessing the evacuation capacity, knowing the behaviour of the occupants of the building while evacuating themselves is also worth noting (Xie, 2014). The duration required for evacuation depends on the duration of self-evacuation, which is influenced by the width of stairs, building height and the number of building occupants (Wang, 2018).

d. Active Protection System

1) Santa Maria Fatima Junior High School

The school already has an extinguisher tube available in almost every room in good, ready to operate conditions without dents, corrosion and fillings. The condition of extinguishers are very influential in terms of the feasibility of fire control. When an extinguisher is in good condition, the risk of larger fires can be quickly addressed (Firdani et al., 2014). There needs to be a maximum standard distance in the layout of the extinguishers (Hu, 2014).

2) 26 Junior High School Jakarta

The school has two extinguisher tubes measuring 1 kg. When researchers inquired about the existence of extinguisher tubes, the school did not know where the extinguishers were stored. It is necessary to place fire extinguishers in locations reasonably easy to reach and carry (Gao, 2012). Training using ongoing fire handling equipment is also required (Angarita, 2015).

e. Building Utilities

1) Santa Maria Fatima Junior High School

All puncture contacts located in the school building are directly connected to the permanently installed contact box. Damage to the cable is due to decreased cable isolation performance (Fan, 2016). The important thing to be aware of is the electrical installations and the placement of points with capacities adequate for power consumption used (Lasuda, 2010).

2) 26 Junior High School Jakarta

Similar to the acquisition of two previous schools, all the puncture contacts in the school building are directly connected to the permanently installed contact box, with the puncture contact state still in good condition. Appropriate contact skewers are made of non-flammable materials. They are moisture resistant and mechanically strong enough (SNI 04-0225-2000). Less fitting contact with the power outlet is also a factor resulting from excessive heat (Setiyo, 2014).

f. Fire Prevention in Buildings

1) Santa Maria Fatima Junior High School

The school already has cabinets made of non-flammable materials. Smoking is prohibited and signs are installed in a clear and unobstructed school environment. The maintenance of APAR is done every year. The exit door of the school, other than the school fence, is a guardrail for the introduction of students who are outside the school building (not locked during teaching and learning activities). The school staircase is used only as a path for mobility. The stairs and are still in good condition with vivid lighting. Exit access and corridors are free from barriers and are only intended as mobility pathways. Evacuating people from danger areas to safe places in minimal time is the main goal in the face of a disaster (Qazi, 2017). Controlling and minimising danger from fires to the lowest level can be done with a perfect preventive plan in a well-trained organisation. If the two are merged together, then the fire safety system will be better (Zhang, 2012).

2) 26 Junior High School Jakarta

A No Smoking sign is installed in the school environment. An exit door other than a school fence is a door that is adjacent to a staircase that is not locked during teaching and learning activities. The school staircase is used only as a path for mobility. The stairs are still in good condition with vivid lighting. Access to the exits and the corridors are only intended as mobility tracks, but there is a table on the second floor that can inhibit mobility. The exit marks have been installed in the school environment. They are unobstructed and clearly visible. However, the school has no cabinets made of non-flammable materials, and the school's APAR has never been inspected. Factors affecting the evacuation process are the

emotions and age of building occupants and the speed of the flames. Other factors that are considered include disabilities, stress levels, gender, wind speed, etc. (Kasereka, 2018). In addition to considering the structure of the building, which also needs attention, there are behavioural, psychological, and physical factors involving the building occupants. It is necessary to consider the evacuation activities (Ahn, 2016).

#### g. General Provisions of Building Management

##### 1) Santa Maria Fatima Junior High School

The school address can be clearly read and seen from the street. New and existing buildings must have an approved address, be placed in a bright positions, and be visible and readable from the street (Regulation of The Minister of Public Works No. 26 Year 2008).

##### 2) 26 Junior High School Jakarta

The school address cannot be read clearly because the address signboard is too small, with a small font size with un-strategic address placement. This causes the address to be difficult to read from the school's street face. Location becomes important in fire control. The quicker the response of firefighters, the smaller the transmission of widespread flames so that the blackout effort can be minimised (Bagir, 2012).

#### h. Monitoring and Controlling

##### 1) Santa Maria Fatima Junior High School

Based on the information acquired, the school has provided disaster simulation activities periodically. Final simulation activities are carried out with BNPPB. The experience of evacuation exercises is important because every person must be successfully evacuated once a disaster occurs (Mitsuhara, 2019). A profound understanding of the basic awareness of disasters and the education of risk reduction for adults and children should be seen as the main point and applied scientifically and in a structured way (Bandeccchi, 2019).

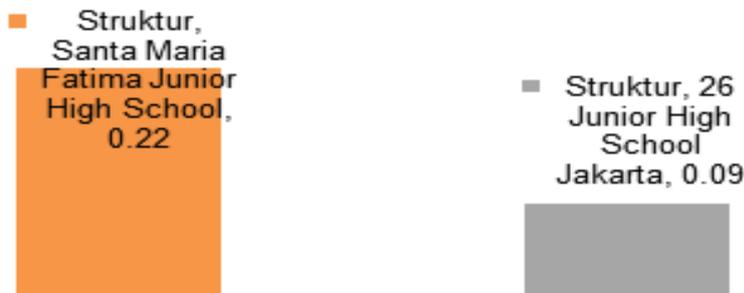
##### 2) 26 Junior High School Jakarta

Based on the information, the school has given knowledge about fire knowledge through the cooperation of the East Jakarta Fire Department and once held a disaster simulation with the cooperation of Wahana Visi Foundation with all the school residents Although it has not been implemented periodically. Fire prevention awareness can be improved by strengthening the extension and knowledge of fire protection to master the basic knowledge of fire suppression (An, 2013). Preparedness exercises are seen as important to foster a standby culture in schools, with early warning siren activation and training of independent evacuation at school. It is important that everyone can understand the risks, be able to manage threats and

contribute to encouraging the toughness of the community in the face of catastrophic hazards (BNPB, 2017).

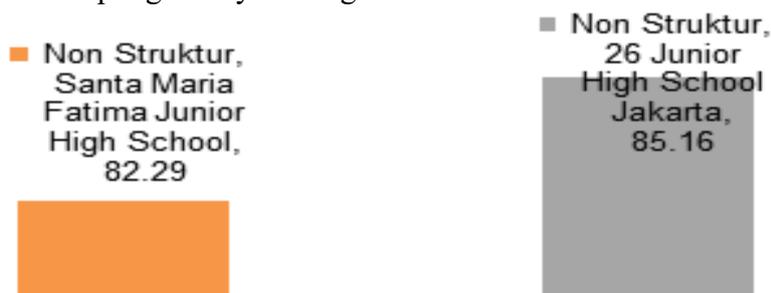
Based on the calculation of structural aspects (facilities and infrastructures), the following results are displayed in Figure 1. The occurrence of a difference in value is due to a difference in the number of respondents from the two schools affecting structural yield.

**Figure 1:** The Value of Junior Secondary School Structures in the Face of Fire Disasters in Kampung Melayu Village



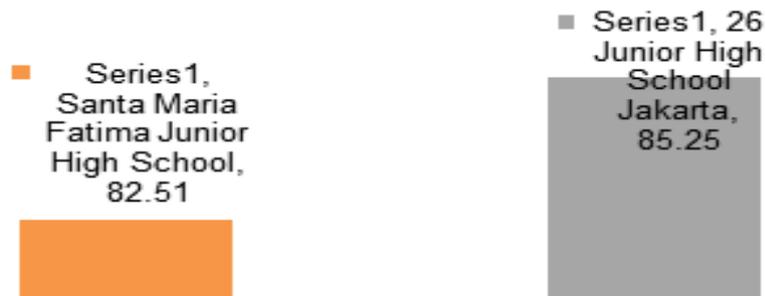
As for the acquisition of values of non-structural aspects (students, teachers, and education personnel), the following results are in Figure 2. The acquisition of different values due to differences in the number of respondents from two schools and the availability of infrastructure that supports preparedness in the face of fire disasters in schools affects the acquisition of non-structural values.

**Figure 2:** The Value of Junior Non-Secondary School Structures in the Face of Fire Disasters in Kampung Melayu Village



The acquisition of the combined values of structural and non-structural aspects are shown in Figure 3.

**Figure 3:** The Value of SMP Preparedness in the Face of Fire Disasters in Kampung Melayu Village



According to table 3, the preparedness of SMPN 26 Jakarta and Junior High School of Santa Maria Fatima for fire disasters is high and the acquisition of index value is between 80 and 100. The acquisition of preparedness regarding SMP level in facing disasters in Kampung Melayu village is based on the capacity of fire disaster preparedness. This involves equipment, understanding of non-school structures in disasters, and efforts to increase structural and non-structural capacity by conducting cooperation with related agencies.

A community that is very sensitive to disasters and has awareness, insight into disasters, and attitudes to be taken when dealing directly with disaster situations will certainly reduce the number of victims and damage caused by disasters (Rañeses, 2017). Awareness is a key factor in creating and maintaining a safe learning environment. Education about dangers, potentially damaging impacts of disasters, and most importantly, what can be done to deal with them is important (Bandecchi, 2019). Keeping buildings safe from fire should be based on planting awareness of fire and counselling through education. If teachers, students, and staff can work together to improve the physical condition of a school, then the level of building safety from fire can rise to a higher level (Yao, 2016).

## Conclusion

Based on the analysis and discussion of data on the results of the research that has been submitted in the previous chapter, researchers can determine the value of the preparedness of the first high school in the face of a fire disaster in Kampung Melayu village as being high. The acquisition value of the preparedness of 26 Junior High School Jakarta and Santa Maria Fatima Junior High School in the face of a fire disaster is between the grades 80 and 100.

This is influenced by the availability of structural aspects that support the efforts regarding disaster preparedness in the schools. It is also influenced by understanding of non-school structures in terms of disasters, and efforts to increase structural and non-structural capacity by holding disaster simulation activities through cooperation with related institutions such as BNPB, the East Jakarta Fire Department, and health institutes, such as Puskesmas.

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