

Knowledge, Attitude, and Experience about Industrial Disaster Mitigation and Preparedness

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Abstract: When a community is unprepared for industrial disaster, the anticipated results are many fatalities and economic loss. Preparedness indicators can be seen from knowledge, attitudes, and experience regarding disaster risk. The purpose of this research was to explain the relationship between knowledge, attitude, and experience of teenagers about industrial disaster mitigation and preparedness. The design of the research was descriptive correlation with a cross-sectional approach. The sample of the research was 109 teenagers in the age range 15-18 years who lived in high risk of industrial disaster. This research were undertaken by using simple random sampling by each cluster. The dependent variable were knowledge, attitude, and experience about industrial disaster mitigation, and the dependent variable was preparedness. Data was collected by using questionnaires and analyzed using Spearman's rho test and a chi square test with significant level $\alpha < 0.05$. The results show that knowledge about industrial disaster mitigation does not have significant correlation with preparedness ($p = 0.323$), attitude about industrial disaster mitigation has significant correlation with preparedness ($p = 0.037$), and experience about industrial disaster mitigation has significant correlation with preparedness ($p = 0.004$). It can be concluded that knowledge on mitigation has no effect on preparedness, whereas attitude and practice have an effect on preparedness. People practicing preparedness was not based on knowledge, but on training and experience.

1 BACKGROUND

In Gresik, industrial disasters still occur and cause loss of property, financial loss, environmental pollution, and even death. The high threat (hazard) of industrial disasters such as factory explosion and toxic gas leak is still felt by the people of Gresik, especially people in Randuagung Village. Randuagung is one of the villages in Gresik that has a high vulnerability to being affected in the event of a disaster. Randuagung Village has this status because of its location, within a radius of 1 mile of 93 surrounding factories. Threats and high vulnerability means that Randuagung Village has a high risk status regarding industrial disaster (FEMA, 2003). The high risk of industrial disaster itself can be reduced if the capacity of the community, especially adolescents, for disaster management is in both good and in the high category. In fact, to date, the level of awareness and responsiveness of the people, especially the adolescents, in Randuagung Village is still less than optimal because most of them have never received information about disaster management, so the relationship between

knowledge, attitude, and experience of adolescents about industrial disaster preparedness and mitigation cannot be explained.

Data from the National Fire Protection Association (NFPA) states that from 2009 to 2013 there were 37,000 cases of fires in industries with 18 deaths, 279 injured, and a total loss of 1 billion US dollars (Campbell, 2016). National Disaster Management Authority (BNPB) stated that Gresik City was ranked 2nd in all of Indonesia in 2011 for vulnerability to industrial disaster case after Sidoarjo city (BNPB, 2011). According to data from the BNPB in Baheramsyah (2013), the island of Java, especially in the regencies/cities along the north coast, has a high risk because it has developed industrial areas with dense populations. Based on the level of industrial disaster vulnerability, adjusted according to the degree of vulnerability due to technology fails, which refers to population density and vulnerable groups, East Java occupies the 3rd position, with high vulnerability.

The results of research by Firmansyah (2014) on 125 adolescent students aged 15-19 years found that 93 students (74%) have less knowledge on disaster

management, and 122 (99%) students have behavior preparedness that indicates they are not ready. Firmansyah (2014) explains that this is happening because most students never learn about disaster management. Based on a preliminary study by researchers on April 16, 2017, using a questionnaire with adolescents in Randuagung Village about the knowledge of industrial disaster mitigation, it was found that 2 people (20%) had good knowledge of mitigation, 3 people were aware enough (30%), and 5 people (50%) were less aware of industrial disaster mitigation. Among Randuagung Village youth, with regard to preparedness in industrial disaster management, there were only 2 people (20%) who were totally prepared, and 8 people (80%) who still had not taken any action. The lack of knowledge among young people in Randuagung Village is due to the fact that teenagers get less information and socialization about industrial disaster management.

National Disaster Management Authority or BNPB (2011) explains that industrial disaster is an accident caused by two factors, namely unsafe human acts and unsafe conditions. The damage mechanisms caused by industrial disasters can be explosions that result in death, injury, and damage to buildings and infrastructure that can release harmful pollutants (Coburn, 1994). The most effective way of dealing with industrial disasters is to reduce the possible causes of the disaster to minimize the losses that will arise (BNPB 2008). Important factors in industrial disaster management are comprehensive structural and non-structural mitigation, spatial planning, and law enforcement (Sari, 2016). Mitigation is an obligation of various parties, including experts, governments, and especially people affected by industrial disasters. The active participation of communities in pre-disaster management is essential to reduce the risks of plant fire disasters (BNPB, 2008). Such active participation includes actions to monitor pollution levels, to ensure inspection and enforcement of existing standards, and to improve security laws and prepare evacuation plans (Coburn et al., 1994).

The approach in this study uses behavioral theory based on the theory presented by Lawrence Green, which states that a person's behavior is influenced by three factors, namely predisposing factors (knowledge, attitude, experience, trust, values, beliefs), supporting factors (availability of health facilities, access to health facilities, government regulations and surrounding communities, health capabilities), and drivers (family support, attitudes and behavior of health workers, peer attitudes and behavior, motivation). These three factors influence one's behavior (Nursalam, 2016). Knowledge is a key factor and a key to preparedness. Knowledge possessed can

usually affect one's attitude and awareness to be ready for alert in anticipating the disaster (BNPB 2008). Knowledge about disasters should be given to the community, especially adolescents because they are part of the community with an important role to play in the effort to anticipate and handle the disaster (Maryani, 2010). Mitigation planning should aim to develop a disaster "security culture" in which people are fully aware of the dangers they face, protect themselves as far as they can, and fully support the efforts made for their protection. Anyone living in hazard-prone areas should understand the dangers as a fact of life.

The approach in this study uses behavioral theory based on the PRECEDE (Predisposing, Reinforcing, and Enabling Cause in Educational Diagnosis and Evaluation) is a guide in analyzing or diagnosing and evaluating behavior for intervention. PROCEED (Policy, Regulatory, Organizational Construct in Educational and Environmental Development) presented by Lawrence Green, which states that a person's behavior is influenced by three factors, namely predisposing factors (knowledge, attitude, experience, trust, values, beliefs), supporting factors (availability of health facilities, access to health facilities, government regulations and surrounding communities, health capabilities), and drivers (family support, attitudes and behavior of health workers, peer attitudes and behavior, motivation). These three factors influence one's behavior (Nursalam, 2016). Knowledge is a key factor and a key to preparedness. Knowledge owned possessed can usually affect the one's attitude and awareness to be ready for alert in anticipating the disaster (BNPB, 2008). The aim of this research was to explain the relationship between knowledge, attitude, and experience about industrial disaster mitigation and preparedness with teenagers.

2 METHODS

The research used a cross-sectional design to assess the relation between variables. The population was 15-18-year-old teenagers who lived in areas prone to industrial disaster, which were the hamlets of Manangkuli, Setinggi, and Randubowo in Randuagung Village, Kebomas, Gresik district. The population number was 1,183 people. By using simple random sampling of probability, the sampling selection was done and 109 respondents were found. The research instrument was a questionnaire extracted from books called "*Integrating Manmade Hazard Into Mitigation Planning* (2003)" and

“Awareness and Preparedness for Emergencies at Local Level (APELL) (2015)” that had been adjusted to the concept of disaster management. The validity and reliability tests were done, and the results were >0.05 and >0.6 respectively, from which it was concluded that the instrument was valid and reliable.

The data was collected by visiting respondents one by one (door-to-door data collection). The researcher visited the house and firstly explained the research problem, purpose, and benefit; secondly, the researcher gathered the data using the instrument.

The research was undertaken in Randuagung Village, Kebomas, Gresik district, on August 13, 2017. The data collected was analyzed using the correlational statistical test Spearman’s rho and chi square with the significance level of $\alpha = 0.05$.

The research had been passed with ethical approval number 484-KEPK by Faculty of Nursing Universitas Airlangga Health Research Ethics Committee on August 8, 2017.

3 RESULTS

Table 1 shows that most respondents have poor knowledge but show good preparedness. Based on the result of Spearman’s rho test $p = 0.323$, it means there is no correlation between knowledge of disaster mitigation industry with adolescent preparedness in the face of industrial disaster. The level of knowledge does not affect a person’s preparedness in disaster management.

Table 2 shows that most respondents have a positive attitude and show good preparedness. There are also respondents who have negative attitudes and show less preparedness. The result obtained by using Spearman’s rho correlation test was $p = 0.037$ ($\alpha < 0.05$), which means there is correlation between attitude to industrial disaster mitigation with adolescent preparedness in facing industrial disaster.

The correlation strength ($r = 0.201$) means the variable attitude to industrial disaster mitigation with preparedness in the face of industrial disaster has a low relation.

Table 3 shows that most respondents have conducted industrial disaster mitigation and showed good preparedness. The result of the statistical test using the chi square test was $p = 0.004$, which means there is a correlation between experience of industrial disaster mitigation and preparedness in face of industrial disaster.

4 DISCUSSION

The results of data analysis about the relationship between knowledge level of industrial disaster mitigation and preparedness in the face of industrial disaster shows that there is no correlation between knowledge level of industrial disaster mitigation and preparedness in facing industrial disaster. The results of this study are in line with the research by Pratama (2016), which states that there is no correlation between knowledge and community preparedness, because the respondents studied have different levels of different cognitive domains with each other, so the understanding of the concept of disaster varies. Each individual will differ in how to interpret the attitude in preparedness in the face of disaster. The results of this study indicate that most respondents have less knowledge of industrial disaster mitigation, but as many as 26 people (23.9%) show good preparedness.

This is in accordance with the PRECEDE and PROCEED theory presented by Lawrence Green, which states that one’s behavior is influenced by three main factors. The theory can be described in the following way: the behavior itself is determined or formed from three factors, namely predisposing factors, supporting factors, and driving factors. Predisposing factors include knowledge, attitude, experience, values, and beliefs (Nursalam, 2016). It

Table 1: Cross-tabulation of disaster mitigation knowledge and preparedness.

Knowledge	Preparedness						F	(%)
	Good		Average		Poor			
	(f)	(%)	(f)	(%)	(f)	(%)		
Good	17	15.6	4	3.7	1	0.9	22	20.2
Average	14	12.8	21	19.3	4	3.7	39	35.8
Poor	26	23.9	16	14.7	6	5.5	48	44.0
Total	57	52.3	41	37.6	11	10.1	109	100

Spearman’s rho test $p = 0.323$ $r = 0.096$

Table 2: Cross-tabulation of disaster mitigation attitude and preparedness.

Attitude	Preparedness						F	(%)
	Good		Average		Poor			
	(f)	(%)	(f)	(%)	(f)	(%)		
Positive	46	42.2	25	22.9	7	6.4	78	71.6
Negative	11	10.1	16	14.7	4	3.7	31	28.4
Total	57	52.3	41	37.6	11	10.1	109	100
<i>Spearman's rho test p = 0.037 r = 0.201</i>								

Table 3: Cross-tabulation of disaster mitigation experience and preparedness.

Experience	Preparedness						f	(%)
	Good		Average		Poor			
	(f)	(%)	(f)	(%)	(f)	(%)		
Ever	33	30.3	30	27.5	2	1.8	65	59.6
Never	24	22.0	11	10.1	9	8.3	44	40.4
Total	57	52.3	41	37.6	11	10.1	109	100
<i>Chi square test p = 0.004</i>								

shows that good adolescent preparedness is influenced not only by knowledge but also by other factors such as experience. Teenagers who live in hazard-prone areas of industry will indirectly become familiar with the situation, so they have experience in dealing with industrial disasters despite the lack of knowledge about industrial disaster mitigation.

The lower level of knowledge of respondents about the mitigation of industrial disasters is due to the lack of information obtained and the lack of socialization about industrial disaster management and mitigation-related training that can be done to reduce the impact of industrial disasters. This can be seen from the sources of information about disaster, which for the majority of respondents are informal sources such as internet, television, and newspapers so that the level of understanding of respondents about preparedness is in the poor category. The results showed that 66 respondents stated that they had never received any training or simulation in disaster management. The local teenagers stated that most had never been informed about disaster management, particularly mitigation and preparedness against industrial disasters, which had an impact on adolescent preparedness to deal with industrial disasters. Measures to reduce the impact of disasters on individuals and communities can be implemented with information and education, so that increasing disaster preparedness will be more effective through using both formal and informal education channels that will provide good knowledge.

The results of this study also show that respondents who have a good level of knowledge but less preparedness is 1 person (0.9%). Inadequate

preparedness may be due to the respondent only knowing about but not yet being at the stage of being alert in behavior towards industrial disasters. Preparedness in tackling industrial disasters is not only influenced by knowledge of industrial disaster mitigation; it could be influenced by the teenager's experience in dealing with previous industrial disasters and teenage perceptions of industrial disasters.

Setyawati (2014) argues that understanding and knowledge of disaster is the basic capital in the concept of disaster mitigation and preparedness. People may have awareness about responding to disasters but they do not try to avoid these disasters, so it is important to make a new attempt at increasing awareness of disaster. Efforts to provide education and training in disaster management through formal and non-formal education for adolescents should be coordinated with cross-sectoral links between local government and related organizations so that teenagers' awareness of industrial disasters can increase. Information obtained from the respondents is that the respondents have lived long enough in the area to be responsive to what must be done and prepared before a disaster so that the respondents have personal experience in disaster management, even though the knowledge is related to the minimal disaster response.

The results of data analysis on the relation of experience of industrial disaster mitigation with preparedness in the face of industrial disaster show that there is a relation between these. The relationship between the experience of disaster mitigation and economics has a positive direction that shows that the more respondents have

experience of industrial disaster mitigation, the better will be their preparedness.

This study is in line with Kapucu's research in Pratama (2016), which suggests that individuals who have experience in dealing with disasters will adapt during the disaster situation so that the threat of disaster will be responded to seriously and more effectively in the future. At the individual level, the experience of disasters generally has a positive impact on future disaster-related motivations. Becker (2017) in his research says that the process of forming a person's preparedness behavior is influenced by experience. Experiences are referred to in his research by several categories such as having experienced disaster, interaction with the surrounding community, having awareness and knowledge about disaster, and never giving knowledge to the surrounding community around disaster management.

The results of this study are in line with the opinion of Azwar (2003), which states that the factors that influence the formation of human behavior are personal experience, culture, others that are considered important, and emotional factors in the individual. One factor that can affect the preparedness of personal experience. What has been experienced by a person participates in the formation and influence of the appreciation of someone with the stimulus. Owned experience will provide stimulus in the form of responses related to psychological objects to form an action (Darmawan, 2013). Pangesti (2012) argues that experience is the best way to gain the truth of knowledge. Individual personal experience can be a learning process to solve problems faced in the future.

The results of this study indicate that adolescents who have had experience in disaster mitigation and also good preparedness amounted to 33 people. Experience is a predisposing factor that has important factors in the formation of adolescent preparedness behavior. Experience is the best lesson in human life because a bad experience in the past can be a lesson as well as a warning for the individual self so as to form a better individual self and try to improve so that a bad experience is not experienced by the individual self. The PRECEDE and PROCEED theory presented by Lawrence Green states that a person's behavior is influenced by three main factors.. One of the predisposing factors is knowledge (Nursalam, 2016).

The results also show that there are 2 respondents (1.8%) who have experienced industrial disaster mitigation but have less preparedness. The results of the research indicates that the lack of preparedness is because the last education that these 2 people had was elementary school and the

knowledge that both of them have is in the 'enough' and 'less' category'. Good preparedness is influenced by external factors that are in the disaster-prone industrial environment, so respondents are accustomed to and have personal experience of how to deal with industrial disaster; therefore in this research attitude about mitigation influenced preparedness.

5 CONCLUSIONS

There are two major findings in this research. The first is that knowledge does not have any correlation towards disaster preparedness. On the contrary, attitude and experience have a high correlation towards preparedness. The second is that experience of past events of disaster can be translated to education.

It can be concluded that teenagers tend to be more influenced by experience than knowledge in case of disaster preparedness. As shown above, teenagers are more likely to learn from active learning rather than theoretical or passive learning.

Nurses and health workers are supposed to cooperate with local government, village authorities, and related institutions such as BNPB to conduct disaster management related activities in the form of counseling and disaster simulation training for surrounding communities, especially teenagers.

Nurse specialists in disaster need to be added to locations prone to disaster. In line with this, health facilities have to be prepared and designed properly to handle industrial disaster.

People in disaster or hazard-prone locations, especially adolescents, are expected to play an active role in conducting disaster management efforts, particularly before an accident occurs. In accordance with this, the surrounding industries are expected to apply the principles of health and safety maximally to prevent disaster.

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