The correlation of fire knowledge toward disasters response and preparedness practice among hospital nurses in Klaten Central Java, Indonesia

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Abstract. Increasing the earth's temperature is one of the impacts of climate change that happened in Indonesia, which can increase the risk of fire disasters that can be happened in the workplace. Hospitals have high fire risk from varied medical activities, the use of electrical equipment, kitchen parts, electricity tools, flammable, explosive, and oxidation chemicals. Nurses play an important role in the event of a disaster as an educator and responsible for the evacuation of victims, emergency relief providers to patients and visitors. This study aims to determine the correlation of fire knowledge with disaster response and preparedness practice among hospital nurses. This research is an observational analytic study with cross-sectional approaches. Respondents in this study were adult inpatient nurses in the X hospital located in Klaten, Central Java. The study used simple random sampling to select 71 respondents. This study uses questionnaires to measure nurses' knowledge and disaster response and preparedness practice. Sommers’ D correlation test showed a significant correlation between fire knowledge and disaster response and preparedness practice with p-value =0.037 and r=0.283.

1. Introduction
The development of industry and health services will always be followed by the application of technology and utilization, increasingly complex work equipment and materials. If this is not matched by the availability and skills of humans that can adequately hinder activities that can lead to accidents or disasters in the workplace [1]. Hospital is one of the workplaces that are at risk of fire disasters due to a variety of jobs it requires, such as the use of electrical equipment, activities that use rigorous sources of ignition, short-circuiting of electricity, and the presence of various kinds of chemicals that are flammable, easily explode, and are easily oxidized [2].

The old Central Java province especially in three city districts, Karanganyar, Solo, and Klaten, known for its cold temperatures, it is flanked by 2 mountains, Lawu and Merapi is now becoming a hot environment in the dry season, as a result of global climate change [3]. This condition can allow the combustible material to evaporate easily and trigger of fire triangle in the workplace especially in the uses of the flammable material hospital. Based on the previous study, there was a fire incident in the medicine warehouse of the hospital, which was suspected originated from a short circuit [4]. As a result of the incident, the patient should be evacuated. There are several fire prevention efforts, one of which is preparedness in the pre-disaster stage. Preparedness is one of the attempts to anticipate disasters in the form of a series of activities including organizational structures, as well as a thorough proper, and efficient step Knowledge
plays a vital role in emergency response and preparedness. The knowledge possessed can usually have an influence on attitudes and concerns to be prepared for disaster prevention [5]. In a hospital, an inpatient nurse has a major role in the event of a disaster, specifically as a fire preparedness educator who has responsibility for evacuating victims, as well as emergency relief providers to patients and the public at the hospital. Nurses must possess excellent knowledge about fire and have decent readiness [6]. Klaten X Hospital is a type B hospital located in the Klanten area that accommodates patients on a local scale. The adult inpatient installation building has been equipped with a fire extinguisher, evacuation plan fire, fire safety signs, heat detector, smoke detector, fire alarm, hydrant yard, assembly point, emergency stairs, and emergency numbers that can be contacted during a fire. Based on the things above, researchers are interested in conducting a relationship between fire knowledge and disaster response and preparedness practice especially in the face of fires in Klaten X Hospital.

2. Subject and methods
This research employed observational analysis with a cross-sectional approach. In this manner, data regarding knowledge and nurse's preparedness level were carried out at one time to see the correlation between the two variables. The study was conducted at the adult inpatient installation Klanten X Hospital, located in Klaten Regency. The population in this study were all adult inpatient nurses in the Hospital as many as 71 nurses. The sampling technique was conducted by the total sampling technique where the number of samples was equal to the population. Other than that, respondents in this study were nurses who had received regular training every 6 months, especially in evacuation and firefighting techniques.

Several categories are used to describe the characteristics of the respondents. Age using 2 categories, adult (18-40 years) and old (41-65 years). Length of working using 3 categories, new (less than 6 years), moderate (6-10 years), and senior (more than 10 years). The independent variable in this study was 'knowledge', while the dependent variable was preparedness in dealing with fire. We collected the questionnaire consisted of three parts, specifically the respondent's identity, the knowledge questionnaire about fire, and the preparedness. It came in the form of multiple-choice where the correct answer was worth 1, and the wrong answer is worth 0. The assessment of the fire knowledge questionnaire is measured from the percentage of respondents' answers where the measurement results are categorized into two categories, particularly "Well" and "Not good". At the same time, the disaster response and preparedness practice questionnaire contained 15 questions with the Guttman Scale. The categorization of the measurement results was determined after finding the mean value as a measure of 2 categories,” Ready” and “Not ready”. Bivariate analysis in this study adopted Sommers' D correlation test technique, to determine whether there is a relationship or not and how strong is the relationship between fire knowledge and the disaster response and preparedness practice of adult nurses in the face of fires in Klaten X Hospital.

3. Results
This research was conducted in Klaten X Hospital, Central Java. Respondents in this study were adult inpatient nurses as many as 71 nurses. Table 1 shows the characteristics of respondents using a frequency distribution table, included gender, age, length of work, level of education, fire knowledge, disaster response, and preparedness practice. In table 2 showed bivariate analysis using Sommers’ D correlation test.

Based on the specific frequency distribution data, respondents in this study were dominated by women with 65 respondents (91.5%) compared to men with 6 respondents (8.5%). Most of the respondents are adults (18-40 years) as many as 37 respondents (52.1%), and the other 34 respondents (47.9%) are old category (41-65 years). While the length of work of respondents was mostly in senior enough (> 10 years) accounted for 39 respondents (54.9%). The education level of which dominated by Associate’s degree graduates as many as 58 respondents (81.7%). All research respondents have participated in training and fire simulations organized by the hospital. Based on statistical calculations, the majority of respondents' knowledge about fires is
in a good category as many as 55 respondents (77.5%). While the majority of research respondents had disaster response and preparedness practice in the "Ready" category, which was 52 respondents (73.2%).

The Sommers’ D correlation test results showed that the correlation between fire knowledge and disaster response and preparedness practice obtained p-value = 0.037. The number indicates that there is a correlation between fire knowledge and disaster response and preparedness practice of adult nurses, especially in facing the fire. The correlation coefficient (r) of 0.283 indicates that the correlation of knowledge with readiness is a weak strength and positive correlation.

**Table. 1** Respondents distribution of disasters response and preparedness practice in the hospital

| Characteristics             | Frequency (people) | Percentage (%) |
|-----------------------------|--------------------|----------------|
| Gender                      |                    |                |
| Male                        | 6                  | 8.5            |
| Female                      | 65                 | 91.5           |
| Total                       | 71                 | 100            |
| Age                         |                    |                |
| Adult (18-40 years)         | 37                 | 52.1           |
| Old (41-65 years)           | 34                 | 47.9           |
| Total                       | 71                 | 100            |
| Length of working           |                    |                |
| New (less than 6 years)     | 3                  | 4.2            |
| Moderate (6-10 years)       | 29                 | 40.8           |
| Senior (more than 10 years) | 39                 | 54.9           |
| Total                       | 71                 | 100            |
| Level of education          |                    |                |
| Associate’s degree          | 58                 | 81.7           |
| Bachelor of Applied Science | 9                  | 12.7           |
| Bachelor of Nursing         | 4                  | 5.6            |
| Total                       | 71                 | 100            |
| Fire Knowledge              |                    |                |
| Well                        | 55                 | 77.5           |
| Not good                    | 16                 | 22.5           |
| Total                       | 71                 | 100            |
| Disasters Response and Preparedness Practice | |                |
| Ready                       | 52                 | 73.2           |
| Not Ready                   | 19                 | 26.8           |
| Total                       | 71                 | 100            |

**Table. 2** Bivariate analysis of disasters response and preparedness practice using Sommers’ D correlation test

| Variables          | Disasters Response and Preparedness Practice (N%) | Category      | Ready | Not Ready | Total | P-value | r   |
|--------------------|--------------------------------------------------|---------------|-------|-----------|-------|---------|-----|
| Fire Knowledge     |                                                  |               |       |           |       |         |     |
| Well               |                                                  |               | 44(61.97%) | 11(15.49%) | 55(77.46%) | 0.037 | 0.283 |
| Not Good           |                                                  |               | 8(11.27%)  | 8(11.27%)  | 16(22.54%) |       |       |
4. Discussion

Respondents in this study were dominated by women. Nisak et al [7] studies showed gender differences of respondents had not yet brought a significant correlation to fire preparedness (p-value= 1,000), because both male and female respondents have the same opportunity to mitigate fire depending on each of them. Meanwhile, according to other studies, there is a significant correlation between gender and fire practices. Gender differences affect physical and mental preparedness in dealing with emergencies, where women tend to panic in the face of a disaster [8].

The age of respondents in the study consisted of two categories, where the proportions of the two groups were not much different. The adult category (18-40 years) included 37 respondents, and the older group (41-65 years) covered 34 respondents. The older someone is, the more experience and knowledge he or she gained as age affects one's memory. Early adulthood is a period of adjustment against new life patterns, early adulthood is known as the creative period where individuals have mental abilities to learn and adjust to new situations [9]. The age of workers should get attention because it will affect one's mental condition, physical condition, workability and responsibilities [10].

The length of work of respondents in the study was mostly dominated by the senior category (> 10 years). According to several studies about fire, the longer a person's work period, the more experience he obtained, hence the more productive there could be, including in its preparedness to anticipate disasters that will occur [11]. Information about the emergency response system must be provided continuously and frequently, to refresh one's memory in the event of an emergency that comes suddenly. For this reason, someone with a longer working period will directly receive more information about the emergency response system, which makes for a better implementation of emergency response [12].

The education level of many respondents is dominated by an Associate's degree. The education level can influence the level of knowledge in understanding something. The higher the level of one's education, the higher the maturity level of one's thinking in understanding and solving a problem, especially in these cases the level of nurse education dominated in Associate's degree. Understanding is the ability to correctly clarify a known object and be able to interpret the material correctly. Acceptance of new behavior or adoption of behavior that is based on knowledge of awareness and positive attitudes, then the behavior will be lasting. Conversely, if the behavior is not based on knowledge and awareness, it will not last long [13]. Education is a process of changing the attitude or way of behaving for a person or group that can mature humans through teaching and training efforts. Education influences the learning process, the higher a person's education, the easier that person will receive information and the more information received, the more knowledge is obtained [14].

All respondents in the study had participated in regular fire training every six months. Disaster preparedness training can increase preparedness because it can increase knowledge about appropriate attitudes and appropriate actions when dealing with disasters [15]. Based on the results of the analysis of the frequency distribution of respondents in fire knowledge, the majority have a good experience and the level of preparedness in the "Ready" category. The correlation of fire knowledge with disaster response and preparedness practice p-value = 0.037. This number indicates that there is a significant correlation between fire knowledge and nurse disaster response and preparedness practice. However, the correlation coefficient was 0.283, which suggests a weak coefficient and positive direction correlation. These indicating that the better the level of knowledge, the better the level of preparedness in dealing with fires, nevertheless with a weak effect on it. In this study, there were 44 respondents (61.97%) who possessed good knowledge and preparedness with the category "Ready", while eight respondents (11.27%) were still lack of readiness. The results of this study are in line with other studies, which show the relationship between knowledge and earthquake disaster preparedness by nurses RSIA Aceh Government in 2013 [16]. This study is also in line with research in Semarang City, whose research results designate that knowledge and attitudes influence the readiness of local citizens in Semarang to face floods [17].
According to the precede–proceed model, especially in the cognitive domain, the third level of knowledge that is the application relates to aspects of procedural knowledge which includes executing a procedure (running) and implementing it (implementing). Basically, the higher the level of expertise, the more ready to understand the problem and the more someone has the opportunity to take action [18]. When knowledge increases, a person will be more aware of his responsibilities in emergency preparedness. The more experience a person has about fire and safety, the more readiness one possesses increases [19].

5. Conclusion
There was a significant correlation between fire knowledge toward disaster response and preparedness practice in Klaten X Hospital, Central Java. Hospitals are means of public health referral that must continuously provide education, training in dealing with disasters and fire emergencies. Education and training can be carried out regularly at least two times a year by involving all medical personnel and hospital workers to improve preparedness in facing disasters. The selection of experienced fire trainers, both from firefighters and occupational safety practitioners can support the improvement of fire knowledge and practice both for nurses and health workers in hospitals.

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