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Original Research Article

ANALYSIS OF FARMERS' INTERNAL FACTORS WITH THE ABILITY TO KNOW HAZARDOUS MATERIALS

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Abstract

Background: Work in agricultural areas is one of the occupations that are at risk with the accident and death rates. Hazardous and toxic material is one of the risks that can threaten the health of farmers, which is very important to be known by farmers.

Objectives: This study aimed to analyze the internal factors of farmers on the ability to recognize hazardous and toxic materials.

Methods: The design of this study used descriptive correlation design. Population in this study are farmers who are members of farmer groups in the working area of the Department of Agriculture in Lumajang Regency who are members of a joint group of farmers under the guidance of the Agriculture Office of Lumajang Regency. The sampling technique in this study used simple random sampling obtained samples were 45 farmers. Instrument of this study demographic data of the respondents and questionnaire that was adopted from PP No. 74, 2001 concerning the management of hazardous and toxic materials in agricultural areas. The questionnaire consists of 25 items with Cronbach Alpha .726. The data of this study were analyzed by one-way ANOVA.

Results: Based on the results of the study found that two internal factors of farmers related to the ability of farmers to recognize hazardous and toxic materials in agricultural areas, namely education and work tenure, with a significance level of 0,000 less than 0.05. Education and work tenure of farming affect the experience of farmers so that the level of knowledge of farmers increases. Farmers are more aware of the effects of hazardous and toxic substances on their health according to their level of knowledge.

Conclusion: Prevention of poisoning due to hazardous and toxic substances in agricultural areas can be developed by increasing health promotion and increasing farmers' knowledge to become more familiar with hazardous and toxic substances on label recognition, composition, mixing storage and their effects on health.

Keywords: Hazardous Materials, Toxic Materials, Farmers

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INTRODUCTION

Agricultural workers are among the most vulnerable working populations due to social and cultural risk factors that are often associated with their ethnicity, immigration status, social class, and rural location, as well as differences related to language barriers and lack of access to health services (Curl et al., 2020). Including health problems faced in agriculture, cannot be separated from the use of technology used to process agriculture. Namely, hoe technology that is replaced by tractors, eradication of pests with predators replaced by pesticides, will significantly affect health (Hidayah, 2019). Facilities that support agriculture include agricultural equipment, artificial fertilizers, additional chemicals, including pesticides that are defined as diseases that are self-made in the work process carried out by humans (Widianto et al., 2019). The use of tools, agricultural machinery, and pesticides can significantly increase the productivity capability of farming products, but behind it all, there are risks or threats in their use (Arista et al., 2019). Accidents and deaths in agriculture are persistent social problems because family members socialize with each other to accept danger as the norm(Pasaribu & Sudiyanto, 2016).

Potential risk factors can be aggravated by occupational hazards associated with farm work, including exposure to environmental hazards such as pesticides and synthetic fertilizers, diesel exhaust, ultraviolet radiation, dust biologically active, and viral and bacterial zoonoses, all of which can put the working population agriculture at increased risk of various adverse health effects (Curl et al., 2020). The increasing use of agricultural chemicals and motorized agricultural machinery by farmers in developing countries has resulted in increased rates of injury and poisoning among workers (ILO, 2015). There is a use of agrochemicals that widespread covering organophosphates (31.6%) without adequate protection in a scorching environment. Agricultural workers in the Ahero irrigation scheme are exposed to millions of occupational hazards that can be a barrier to food security and achieving the vision of the government in 2030 (Mburu et al., 2018).

Pesticides and agricultural chemicals to increase crop production and pest management, but they can simultaneously be harmful to non-targeted organisms, such as humans (Saw et al., 2011). The World Health Organization (WHO) estimates that 1-5 million cases of poisoning from pesticides occur in agriculture workers annually (80%) occur in developing countries (Mahmudah et al., 2012). The death rate reached 220,000 fatalities (Suparti et al., 2016). In Indonesia, the use of pesticides and chemical fertilizers has become a severe threat among farmers, especially in the health sector. As many as 12,000 deaths per year are reported as a result of the use of pesticides in Indonesia (Samosir et al., 2017). According to 1996 Ministry of Health, data on the results of monitoring of pesticide poisoning in 27 provinces of Indonesia showed 61.82% of farmers had regular cholinesterase activity, 1.3% severe poisoning, 9.98% moderate poisoning and 26.89% poisoning mild (Mayasari, 2017). Data on the 2015 National Poisoning Center in July-September, there was an incident of poisoning due to unintentional agricultural pesticides in East Java, where 29 victims were exposed to the inhaled route (Utami, 2016).

The cause of pesticide poisoning is improper use and management of pesticides, low level of knowledge about the dangers of pesticides, not paying attention to excellent and safe ways of use (Istianah & Yuniastuti, 2017). Besides there are also other factors, namely in-depth knowledge and motivation about PPE in farmers can cause workplace accidents such as farthest, stricken, poisoned, pinched by objects, radiation exposure, the influence of high temperatures, animal bites, direct contact with hazardous materials or other radiation (Maisyaroh, 2019). This is also in line with research conducted in Nepal on the use of pesticides, which highlights the lack of knowledge, attitudes, and practices of farmers regarding the handling and application of

pesticides. Human exposure to pesticides results in increased productivity, wages, and increased medical costs (Atreya et al., 2013).

The majority of farmers are aware of the negative impact of pesticides on their health and environment if not handled properly. Despite awareness, most farmers do not handle pesticides carefully and do not comply with the use of PPE, thereby increasing their risk of exposure to pesticides (Okoffo et al., 2016). The use of pesticides that are not by the recommendations harms health and the environment (Amsal et al., 2019). Food intake containing pesticide residues is documented to produce the highest exposure, around 103-105 times higher than that arising from drinking water or contaminated air (Tomer et al., 2015). Therefore we need a method of reducing the risk of poisoning due to pesticides with an internal factor approach to farmers so that farmers are more comfortable to receive information and willing to be more disciplined to comply with pesticide use procedures, so this research aims to analyze the internal factors of farmers that affect the ability of farmers to recognize hazardous and toxic materials in agricultural areas.

METHODS

Study Design

This study was used descriptive correlation design.

Setting

This research was conducted in the working areas of the Agriculture Office of Lumajang Regency from July until December 2019.

Research Subject

The population in this study are farmers who are members of farmer groups in the working area of the Lumajang Regency Agriculture Office, who are members of the combined farmer groups under the guidance of the Lumajang Regency Agriculture Office. The sampling technique in this study uses simple random sampling, which is the technique of determining data samples by randomly selecting respondents to be studied. The method that will be carried out by farmers from 8 sub-districts in Lumajang regency is chosen randomly as many as 208 farmers.

Instruments

The instruments of this study used demographic data of the respondents and also questionnaire that was adopted from PP No. 74, 2001 concerning the management of hazardous and toxic materials in agricultural areas. The questionnaire consists of 25 items using Likert scale with categories are 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. After knowing the total results of the questionnaire, it will be categorized again for the ability to recognize to be less, sufficient, and good. The reliability test of the questionnaire was Cronbach Alpha .726.

Data Analysis

Analysis of the data used consisted of two stages, namely univariate and bivariate. Univariate analysis techniques using descriptive are presented in the form of distribution tables, while bivariate analysis to measure the relationship between internal factors of farmers that can affect the ability to recognize hazardous and toxic substances in agricultural areas using one-way ANOVA with a significance level (α) < .05.

Ethical Consideration

This research submitted to the Research Ethics Commission of the Faculty of Dentistry, the University of Jember, under Number 342 / UN25.8 / KEPK / DL / 2019 on 8 February 2019. When the research was carried out, the researcher first communicated with the farmer groups that were targeted in this study. This communication is related to the purpose of this study and provides an overview of the implementation of this research. After obtaining approval from the farmers group, the researcher determines the farmers who will be respondents, then tells about the description of the implementation of this study and asks for

their approval to be used as respondents in this study.

RESULTS

Characteristics of Respondents by Demographic Data

Table 1. Distribution of Frequency of Respondents by Demographic Data in the 8 Sub-District of Lumajang Regency on July until December 2019.

Characteristics	Number (*n*)	Percentage (%)
Age		
< 30 years old	39	18.8
30-60 years old	110	52.9
> 60 years old	59	38.3
Gender		
Male	167	80.3
Female	41	19.7
Educational Level		
No school	23	11.0
Elementary school	126	60.6
Junior high school	20	9.6
Senior high school or university	39	18.8
Long Time Farming		
< 10 years	32	15.4
10-30 years	104	50.0
> 30 years	72	34.6

Sources: Primary Data of Questionnaire, 2019.

Based on the demographic data on table 1, it obtained that the characteristics of respondents, more than half (80.3%), are male, and more than half (52.9%) are age between 30-60 years. More than half (60.6%) had an elementary school education, and a half (50%) worked as farmers for 10-30 years.

Characteristics of Respondents by Abilities to Recognize Hazardous and Toxic Materials in Agricultural Areas

Table 2. Distribution of Frequency of Respondents by Abilities to Recognize Hazardous and Toxic Materials in Agricultural Areas in the 8 Sub-District of Lumajang Regency on July until December 2019.

Abilities to Recognize Hazardous and Toxic Materials in Agricultural Areas	Frequency (n)	Percentage (%)
Good	73	35.1
Sufficient	102	49.0
Less	33	15.9
Total	208	100.0

Sources: Primary Data of Questionnaire, 2019.

Based on the data above, it found that most respondents have sufficient ability to recognize hazardous and toxic material in agricultural areas, as many as 102 respondents (49.0%).

Table 3. Analysis of Relationships between Internal Factors and the Abilities of Farmers to Recognize Hazardous and Toxic Materials in Agricultural Areas using One-Way ANOVA in the 8 Sub-District of Lumajang Regency on July until December 2019.

	Internal Factors			
	Gender	**Age**	**Educational Level**	**Long Time Farming**
Abilities to Recognize Hazardous and Toxic Material in Agricultural Areas	.123	.412	.000	.000

Sources: Primary Data of Questionnaire, 2019.

Based on the data of this study in table 3 above, it was found that two internal factors of farmers related to the ability of farmers to recognize hazardous and toxic substances in agricultural areas, namely educational level (*p*-value = .000) and the long-time farming (*p*-value = .000). And the other two factors do not indicate a significant relationship with abilities of farmers to recognize hazardous and toxic materials in agricultural areas, namely gender (*p*-value = .123) and age (*p*-value = .412).

DISCUSSION

These differences are explained by looking at men and the roles and responsibilities of women in agriculture in specific cultural contexts, as well as gender differences in access to resources, including information. Gender roles along the pesticide pathway vary, but women usually lack knowledge of the harmful effects of pesticides and less access to training (Christie et al., 2015). Participants in research on the development of agricultural nursing-based education are the majority of men than women. Still, although men play a significant role, it turns out that women or wives also provide much support (Maisyaroh et al., 2019). Based on the results of Candra's research (2018) on the Occurrence and Characteristics of Injury in Farmers in Kalisat District, Jember Regency, most of the male genders had 85 people who had been injured (85%)(Sari, 2018). The sex of the farmer dramatically influences the activity of farming but less affects the ability of farmers to recognize hazardous and toxic materials.

Younger farmers are more likely to see the danger of these pesticides than older farmers (F.A.Jallow et al., 2017). Age factor has a role in the level of knowledge such as the theory of Juliana et al. in Hutapea (2012) about the relationship of age with the understanding that the younger the individual's age, the higher the ability to remember, including the ability to recall information received. Individuals who have experienced ageing will experience a physiological decline in the body, which will affect the ability to remember information (Fibriansari et al., 2019). Farmer's age influences the quality of life of farmers from the perspective of Agricultural Nursing. The quality of the physical health of elderly tobacco farmers is described by the participants in two themes, namely general health and rest-sleep. The quality of psychological health is represented by participants in two topics, namely the problems faced and ways of thinking about issues. The variety of activity levels was described by participants in two themes, namely tobacco farming activities and activities other than farming. The quality of social relations is characterized by participants in one topic, namely social links that include relationships with family and relationships with the community. Participants expressed the quality of the environment in one theme, namely the living environment, which included the ease of transportation, the affordability of

health facilities, the effects of tobacco storage, and safety. Spiritual / religious / belief qualities are described by participants in two themes, namely beliefs and worship activities (Widayati, 2014). Age is one of the factors that affect health, and also the ability to farm but not along with age also increases the strength of farmers to recognize dangerous and toxic materials.

Research findings show that the level of knowledge is sufficient among farmers, but this is not reflected in their practice. Educational factors have a relationship with the ability of farmers to recognize dangerous and toxic materials. There is a need for continuous pesticide safety education along with training for farmers on the use of personal protective equipment, personal hygiene, and sanitation practices during and after the application of pesticides. Besides, the promotion of alternative pest control strategies, such as the application of bio-pesticides, can be introduced. This will reduce the dependence of chemical pesticides and their adverse effects on human health and the environment (Satya Sai et al., 2019). Education about personal protective equipment, especially gloves, is used by around all farmers and workers (Wumbei et al., 2019). There is a need for the agricultural sector to expand the scope of injury prevention initiatives to fully include health, education, engineering, and public health regulation models (Hagel et al., 2008).

Following the results of data analysis, there is a relationship between the factors of farming time and the ability of farmers to recognize hazardous and toxic materials. The strength of farmers to identify dangerous and poisonous materials increases along with farming experience. The longer the farming, the more experienced farmers are in recognizing hazardous and toxic materials. The ability of farmers to identify hazardous materials, one of which is using Personal Protective Equipment (PPE) correctly (Widianto et al., 2019). Factors that influence farmers' decisions to use personal protective equipment include farming experience, farmer's age, access to extension services, availability of chemical stores, farm size, and education level (Okoffo et al., 2016). The chemicals found in pesticides, directly and indirectly, affect human health. The direct impact is through activities where pesticides pass through the skin or enter the eyes, mouth, and nose. The effect can cause long- or short-term effects. With knowledge of the impact of pesticides on human health, there is a need to evaluate the use of pesticides among farmers and the factors that influence the behavior of rice farmers using pesticides (Ali et al., 2018).

The use of pesticides in most areas of China has no standardization, especially in rural areas, and the limited knowledge and information about the use of pesticides among farmers in China tend to contribute to some overused pesticides (Deng et al., 2019). There is an influence of active learning models on the knowledge and attitude of using personal protective equipment. The community health center program is expected to activate existing occupational health units to carry out their role in providing health promotion and prevention of occupational accidents as occupational health units (Sahuleka et al., 2017). Farmer education and long farming factors illustrate the ability of farmers to socialize in farming communities. Farmers' activities to gather and socialize at health service centers influence the incidence of occupational diseases in agriculture (Widianto et al., n.d.). Farmers 'activities to socialize and exchange farming experiences are carried out at the farmers' group social gathering activities (Widianto et al., 2018).

Training and awareness programs addressing safe handling practices and safety measures as well as education about the long-term risk of exposure to pesticides on health and the environment, through radio, television, and posters, can improve the safety behavior of farmers and harassers, first in dealing with trauma due to hazardous materials on agriculture by providing essential living assistance. Necessary life support consists of environmental assessment, assessment of

victims, ability to stop bleeding, and the ability to decontaminate (Fibriansari et al., 2019). Farmers have a cultural aspect in providing preliminary management of the threat of hazardous materials on agriculture. Local wisdom of farmers can be seen from the experience of providing control of exposure to pesticides by immediately washing the exposed area with river water (Maisyaroh et al., 2019).

CONCLUSION

Internal factor farmers related to the ability of farmers to recognize hazardous and toxic materials in the agricultural area is factors education and factors long been a farmer, although two factors other less provide a connection to the ability of farmers, namely gender and age.

SUGGESTIONS

Prevention of poisoning due to hazardous and toxic materials in the area of agriculture can be developed by improving health promotion and raising awareness of farmers to learn more about hazardous materials and poisoning to introduction to labelling, composition, storage, mixing, and effects on health.

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DECLARATION OF CONFLICTING INTEREST

There is no potential conflict of interest in this research.

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AUTHOR CONTRIBUTION

Eko Prasetya Widianto: Prepare research proposals, Conducting, research permit, promote research plans at the Community, selecting samples based on inclusion and exclusion criteria, collecting research data, and compile research report, presentation of results report, and compile the article.

Suhari Suhari: Prepare research proposals, Conducting, research permit, promote research plans at the Community, selecting samples based on inclusion and exclusion criteria, collecting research data, and compile research report, presentation of results report, and compile the article.

Rizeki Dwi Fibriansari: Conduct preliminary studies, assist in preparing proposals, help make arrangements for a research permit, helps collect research data, perform data processing, help compile research results reports, and assist in the preparation of publications and manuscripts.

Arista Maisyaroh: Conduct preliminary studies, assist in preparing proposals, help make arrangements for a research permit, helps collect research data, perform data processing, help compile research results reports, and assist in the preparation of publications and manuscripts.

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