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Determination of Priority Elements of Vigilance in the Use of Pesticides based on Difficulty and Usefulness (A Supporting Study for Law and Policy in Health)

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Abstract

The use of pesticides is still a problem for public health, therefore we need a regulation by the authorities, which can lead to the behavior of using pesticides correctly. This is part of the area of law and health policy. Pesticide poisoning can cause breathing difficulties, headaches, neurological or psychological effects, and skin irritation and mucous membranes. The purpose of this study is to provide an overview of some elements of vigilance in the use of chemical pesticides for farmers. The variables studied were difficulty and usefulness with eight elements, namely the use of personal protective equipment (PPE), pesticide storage, pesticide use procedures, use of pesticide doses, duration and frequency of pesticide spraying, maintaining equipment cleanliness, pesticide spraying according to wind direction and time of pesticide spraying. The sample size of this study was 100 respondents from the community who knew about the use of pesticides throughout Indonesia. The research instrument used was a Google form questionnaire sent to respondents via Whatsapp social media. The data that has been collected is analyzed descriptively to get an idea of which elements are the priorities for improvement. Referring data analysis result, the elements with high difficulty and usefulness together were use of pesticide doses and procedures for using pesticides. Thus, the two elements selected as priority elements will be fixed first. It is suggested that the pesticide control policy makers can develop regulations by prioritizing the two main elements, without ignoring the other six elements. In addition, it is also recommended that other control efforts be made that can be recommended to related parties in the area of law and health policy, related to the prevention of health problems caused by the use of pesticides.

Keywords: *health law and policy, pesticide; farmer; difficulty; usefulness*

Introduction

The use of pesticides is still a problem for public health, therefore we need a regulation by the authorities, which can lead to the behavior of using pesticides correctly. This is part of the area of law and health policy. With formal regulation, efforts to control the use of pesticides can be better regulated, so that the negative impacts that occur can be minimized.

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Pesticides have a major role in increasing agricultural production. Based on experience in Latin America, the use of pesticides can increase cocoa production by 40%. In Pakistan, pesticides help increase sugarcane production by 33%, and based on FAO records the use of pesticides can save cotton crops up to 50%.(1)

Many research results show a relationship between the use of pesticides with health problems in workers. According to WHO, intentional or unintentional pesticide poisoning is a serious problem in agricultural communities in poor and developing countries. It is estimated that around 250,000 deaths occur due to pesticide poisoning each year.(2)

Symptoms of poisoning arising from the use of pesticides include difficulty breathing, headaches, neurological or psychological effects, and skin irritation and mucous membranes. Manifestation of these effects depends on the type of pesticide and the level and duration of exposure.[3]

Advanced health problems arising from exposure to pesticides are mutagenic, carcinogenic, endocrine disruptors, reproductive and neurotoxic disorders.
[4] Pesticides can enter the body through digestion, inhalation and through the surface of the skin that is not protected.[5] The presence of pesticide exposure in the body can be determined by checking the activity of the cholinesterase enzyme. Organophosphate pesticides work by inhibiting the activity of the cholinesterase enzyme so that acetylchholin cannot be hydrolyzed, so that the amount becomes excessive, which in turn can result in continuous stimulation of the muscarinic and nicotitinic nerves.[6]

Horticultural crop farmers are one of the populations at risk for pesticide poisoning, with long-term negative impacts. The risk of this exposure is related to their involvement in activities in agriculture, such as spraying, preparing equipment for spraying, mixing pesticides, washing equipment and clothing used when spraying, removing weeds from plants, removing pests, watering plants and harvesting.

In Indonesia, the proportion of pesticide use or storage in the home is 20%. This shows the high risk of exposure to pesticides, not only in rice fields but also in the household environment.[7] Farmers who use chemical pesticides in Indonesia, most do not pay attention to pesticide use standards, although many have received counseling from the agriculture and health offices in pesticide prevention and control programs. So far, risky behavior carried out by farmers in the use of pesticides has not decreased, therefore, research needs to be carried out that aims to identify and provide an overview of the selection of elements of behavior of farmers who are very risky, to prioritize which elements need to be dealt with quickly quickly and right.

Method

This research was a descriptive study conducted in 2019, involving the general public who know about the use of chemical pesticides in Indonesia as research respondents, with a sample size of 100 respondents.

The research variables measured were difficulty and usefulness[8],[9] of 8 elements of risk behavior consisting of; 1) personal protective equipment (PPE), 2) storage of pesticides, 3) procedures for using pesticides, 4) use of pesticide doses, 5) duration and frequency of spraying pesticides, 6) maintain cleanliness of equipment, 7) spraying pesticides in the direction of the wind, 8) time spraying pesticides. The selection of these elements was based on references written by Djojosumarto, titled "Pesticides and Their Applications".[10] In this questionnaire, difficulty was scored with a negative symbol (0 to -10), so the higher the difficulty of an element, the score for that element increasingly negative. Usefulness was scored with positive symbols (0 to 10), so the higher the usefulness of an element, the more positive the score for that element was.

The research instrument used was a Google form questionnaire sent to respondents via Whatsapp social media. The categorical data that has been collected was analyzed descriptively in the form of frequency[11] to get an idea of which elements were the priorities for improvement.

Difficultness	**Elements**	**Usefulness**
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Personal protective equipment (PPE)	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Storage of pesticides	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Procedure for using pesticides	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Use of pesticide doses	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Duration and frequency of spraying pesticides	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Maintain cleanliness of equipment	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Spraying pesticides in the direction of the wind	Low 0 1 2 3 4 5 6 7 8 9 10 High
High -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 Low	Time spraying pesticides	Low 0 1 2 3 4 5 6 7 8 9 10 High

Figure 1. The research instrument

Findings

The results of descriptive data analysis are shown in Table 1.

Table 1. The distribution of difficulty

Variable name	Difficulty	
	Easy	Difficult
Personal protective equipment (PPE)	32	68
Storage of pesticides	37	63
Procedure for using pesticides	27	73
Use of pesticide doses	24	76
Duration and frequency of spraying pesticides	26	74
Maintain cleanliness of equipment	32	68
Spraying pesticides in the direction of the wind	36	64
Time spraying pesticides	33	67

Regarding difficulty, elements with a relatively high level of difficulty (score -6 to -10) were use of pesticide doses, duration and frequency of spraying pesticides, and procedures for using pesticides.

Table 2. The distribution of usefulness

Variable name	Usefulness	
	Useful	No Useful
Personal protective equipment (PPE)	22	78
Storage of pesticides	26	74
Procedure for using pesticides	38	62
Use of pesticide doses	29	71
Duration and frequency of spraying pesticides	15	85
Maintain cleanliness of equipment	26	74
Spraying pesticides in the direction of the wind	28	72
Time spraying pesticides	34	66

Regarding usefulness, elements with a relatively high level of usefulness (score 6 to 10) were procedures for using pesticides, time spraying pesticides, and use of pesticide doses.

Referring to Table 1 and Table 2, it can be seen that the elements with high difficulty and usefulness together were use of pesticide doses and procedures for using pesticides. Thus, the two elements selected as priority elements will be fixed first.

Discussion

Based on the results of the study, it is known that there are 2 elements that are prioritized for improvement, referring to the difficulty and usefulnes according to public perception. The two elements are:

1) Use of pesticide doses

2) Procedures for using pesticides

The two elements above were chosen as elements to be addressed first, but that does not mean ignoring the other six elements. Selection as an element of priority is limited to the issue of time urgency. Because these two elements have the highest level of difficulty to be changed for the better and have the highest level of benefit for the community, both of them are chosen to be addressed first.

The use of difficulty and usefulness as a priority determination refers to the findings pioneered by Nugroho et al.[8],[9] which was originally applied to research on the elements of e-learning in the health field, which has been realized in two studies namely the use of difficulty and usefulness without weighting and weighting. In both studies it is recommended that this priority setting method can be applied to various fields of science. Thus, in this study also applied the use of difficulty and usefulness as a method of selecting elements that are prioritized to be addressed first in the framework of the program of vigilance against the behavior of the use of wrong pesticides, which could adversely affect health.

However, in this study, only the main elements were selected with high difficulty and usefulness values together, based on descriptive data analysis in the form of frequency. Meanwhile, Nugroho et al.[8],[9] in both researches, applying in different ways using numerical data analysis in the form of mean scores for each element, and presented in the form of Difficulty-Usefulness Pyramid (DUP).

Conclusion

Based on the results of data analysis, it can be concluded that based on difficulty and usefulness, there are two main elements that are prioritized to be addressed first, namely use of pesticide doses and procedures for using pesticides.

Based on the conclusions above, it is suggested that the pesticide control policy makers can develop regulations by prioritizing the two main elements, without ignoring the other six elements. In addition, it is also recommended that other control efforts be made that can be recommended to related parties in the area of law and health policy, related to the prevention of health problems caused by the use of pesticides.

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