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K3 RISK ANALYSIS IN PESTICIDE USE LOCAL AND TRANSMIGRATION VEGETABLE FARMERS IN PURWODADI VILLAGE, KUALA PESISIR DISTRICT, NAGAN RAYA REGENCY

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Abstract

Pesticides are chemical compounds used in controlling plant pests. The use of pesticides not in accordance with the threshold value can cause health risks for farmers. This study aims to analyze the phenomenon of pesticide use patterns, the risk of Occupational Diseases (PAK) due to pesticide exposure, and the pattern of use of Personal Protective Equipment (PPE) in local farmers and transmigration farmers in Purwodadi village. The approach used in this study is a qualitative method with a phenomology design, in-depth interview data collection techniques, participatory observation and documentation, with interview guidelines starting from the pattern of pesticide use that will explore the types of pesticides and how to use them, then explore the symptoms of diseases caused by pesticides in farmers and the use of PPE, by exploring experiences and reasons for using PPE. The results of this study indicate that local farmers are better at managing the dose and time of pesticide spraying than transmigration farmers, who often use excessive doses due to lack of knowledge. The risk of PAK in local and transmigration farmers is at risk of cardiovascular disease, COPD, cancer and dermatitis with symptoms felt by farmers, although local farmers tend to know the risks of pesticide exposure, and transmigration farmers consider only factors of work fatigue and age. The use of PPE among farmers is still low, especially among transmigration farmers due to economic factors and discomfort.

Keywords: ***Local and Transmigrants Farmers, Occupational Health and Safety, Occupational Diseases, Personal Protective, Equipment Pesticide***

1. INTRODUCTION

Pesticides are chemical compounds used to control plant pests (Mutia and Oktarlina, 2020). Basically, pesticides are the main pillar in supporting agricultural productivity in every agricultural area. Farmers' efforts to increase productivity for agriculture such as vegetables, farmers rely on pesticides to keep plants free from pests and not damaged. Pest control in agriculture, there are various types of pesticides used according to the target of pest organisms, including *insecticides, fungicides* , and *herbicides* (Purnama et al., 2021). *Insecticides* , such as *organophosphates* and *pyrethroids* , are often used to control insect pests that damage plants, while fungicides are used to treat diseases caused by fungi. *Herbicides* function to control the growth of weeds that compete with the main crops (Wahyuni et al., 2021). In Indonesia, the use of chemical pesticides still dominates, with as many as 85% of farmers using chemical pesticides to maintain agricultural yields, especially in areas with intensive agriculture (Purnama et al., 2021).

This is also evidenced by almost 85% of farmers using chemical pesticides and 15% using natural pesticides based on the results of an initial survey in Purwodadi Village, Kuala Pesisir District, Nagan Raya Regency. Although pesticides provide a quick solution in pest control, uncontrolled exposure can cause serious health risks for farmers (Wahyuni et al., 2021). Therefore, it is important to evaluate the use of pesticides and find safer and more sustainable *alternatives in the practice of pesticide use in the agricultural sector.* Efforts made to improve the quality of agricultural products, farmers are inseparable from the use of pesticides. The use of pesticides has *positive* and *negative risk impacts* , the *positive risk impact* obtained is the freedom from pests on plants, while the negative risks include short-term diseases such as poisoning, skin and eye irritation and allergies, and long-term diseases include chronic skin diseases, cancer, *cardiovascular disease* ,

reproductive disorders, and lung and respiratory tract diseases (COPD) which can be a risk to farmers from continuous exposure to pesticides through pesticide spraying activities (Ibrahim, M., & Sulaeman, A. 2022). The use of pesticides that do not meet standards can pose a health risk to farmers, the Ministry of Agriculture of the Republic of Indonesia (Kementan, 2011) sets a threshold value for pesticide use of 0.01 mg-10 mg/kg for all types of chemical pesticides. Farmers are one of the populations that have the highest risk of exposure to chemical pesticides in the agricultural sector (Ibrahim *et al* ., 2022).

Basically, farmers are not aware that the activities they do done at risk to safety And his health. Based on the results participatory observation, exposure Pesticides on vegetable farmers in Purwodadi village have health risks such as cardiovascular disease, COPD, cancer and skin irritation. The risk is felt by 65% of farmer groups in Purwodadi village, this is identified based on symptoms experienced by farmers such as coughing, shortness of breath, insomnia, dizziness and nausea. Pesticide exposure causes symptoms of disease and health risks to farmers, diseases caused by pesticide exposure are widely suffered by farmers in Indonesia and even in the world. WHO estimates 20,000 deaths each year due to pesticide use and pesticide exposure in farmers, based on data from the National Poisoning Information Center (SIKerNas) in 2017 there were around 2.5% poisoning caused by pesticides (SIKerNas, 2017). Exposure to pesticides that is often experienced by farmers can cause serious health problems, especially because pesticides enter the body through various channels, such as the skin, respiratory tract, and digestive tract. *Dermal contamination* occurs when pesticides come into direct contact with the skin, which can cause irritation or absorption of pesticides into the bloodstream, potentially causing poisoning or skin diseases (Riyadi et al., 2021). In addition, exposure through the respiratory tract (*inhalation*) is also very dangerous, this is because farmers who inhale pesticide vapor or dust can experience respiratory problems, irritation of the respiratory tract, or even chronic lung disease (Prasetyo et al., 2021).

Based on the results of participatory observations conducted by researchers, farmers in Purwodadi village have their own ways of working which affect the severity of pesticide exposure and different disease symptoms. This is because Farmers in Purwodadi village are divided into two, namely local farmers and transmigrant farmers who come from outside the Aceh region. Each group has a different way of working in agricultural activities, especially in pesticide use. This is supported by the differences in symptoms felt by farmers. Excessive use of pesticides can affect the occupational health of farmers. Based on the results of a literature study according to Setiawan and Bernik (2019), the impact of the risk of exposure to pesticides can cause diseases such as cancer, mutations, birth defects, CAIDS (*Chemically Acquired Deficiency Syndrome*) and so on. In general, the longer farmers spray, the greater the risk of poisoning and increased blood pressure. Short-term exposure to pesticides does not always have a visible impact on the human body, but the cumulative effects of long-term exposure can cause serious health problems. Pesticides used in agriculture, even at low doses, can accumulate in the human body over time. Accumulation of pesticides in body Can in progress during for months or even for years, cause poisoning chronic that is difficult to detect in the early stages. This is especially true for farmers who are routinely and long-term exposed to poorly managed pesticides (Rizal, 2020).

Various efforts in control use pesticide has performed on a number of area agriculture in Indonesia, *intensive* monitoring is carried out to identify excessive use of pesticides or not in accordance with the recommended dosage, which can lead to a decrease in the quality of human health, especially farmers (Sutanto, 2021). In addition to monitoring, risk analysis is also an important part of pesticide control efforts. This risk analysis is carried out to evaluate the potential hazards of pesticide exposure residues to farmers. This study also highlights the importance of educating farmers about the safe and appropriate use of pesticides. the standard that determined. In addition, regulations related to the use of pesticides are also tightened to support better control efforts. The Indonesian government has issued various policies that regulate the use of pesticides,

including acceptable residue standards in agricultural products. This is expected to reduce potential risks to farmers' health. Overall, efforts to control pesticide use through monitoring and risk analysis do not only focus on technical aspects, but also involve policies that support the sustainability of healthy agriculture.

Based on the phenomena that have been described regarding the risk of pesticide exposure in vegetable farmers, risk analysis is a scientific process used to estimate the potential negative risks of exposure to hazardous chemicals in pesticides. Based on the results of observations conducted by researchers in Purwodadi Village, Nagan Raya Regency. Researchers saw directly the differences in pesticide use carried out by local farmers and transmigrants at risk of health which were carried out continuously with different levels of severity in carrying out vegetable spraying activities. Based on this, this study aims to identify the phenomenon of pesticide use patterns carried out by farmers, the risk of Occupational Diseases (PAK) due to pesticide exposure, and the pattern of PPE use carried out by local farmers and transmigrant farmers in Purwodadi Village. In analyzing and identifying K3 risks in vegetable farmers.

2. IMPLEMENTATION METHOD

This study uses a qualitative approach with a phenomology research design. This study aims to explore subjective experiences and individual perceptions related to certain phenomena, in this study the phenomenon to be studied is the risk of occupational safety and health (K3) in the use of pesticides on vegetable farmers in Purwodadi village which was carried out for 2-3 months starting on June 20, 2024. Through this method, researchers will explore the phenomenon of pesticide use patterns on the experiences of local and transmigrant farmers, the risk of Occupational Diseases (PAK) to pesticide exposure, and patterns of use of Personal Protective Equipment (PPE). The data collection techniques used in this study were in-depth interviews, participatory observation and documentation involving 8 informants consisting of 3 main informants (local farmers), 3 main informants (transmigrant farmers), one supporting informant (farmer group leader) and one key informant (health center officer) who will be interviewed focused on the pattern of pesticide or chemical use in farmers, the risk of Occupational Diseases (PAK) caused by pesticide exposure in farmers in Purwodadi village, and the pattern of use of PPE used by farmers. Data obtained through interviews and observations will be analyzed using a constant comparison method with several steps (open coding, axial coding, selective coding, and memos) to compare one datum with another datum permanently and to deeply understand knowledge and perception in building a more comprehensive and accurate theory.

3. RESULTS AND DISCUSSION

3.1 Results

Characteristics of Informants

Table **1**

Distribution of Informant Characteristics in Purwodadi Village, Kuala Pesisir District, Nagan Raya Regency

Characteristics	Amount	
	n	%
Age		
40-50 Years	3	62.5%
51-60 Years	5	37.5%
Gender		
Woman	7	87.5%
Man	1	12.5%
Education		
JUNIOR HIGH SCHOOL	2	25.0%
SENIOR HIGH SCHOOL	5	62.5%
S1 (Medicine)	1	12.5%
Length of work		

5-9 Years	2	25.0%
10-20 Years	3	37.5%
21-30 Years	3	37.5%

Source: Primary Data from Piurwodadi Village Informants, 2024

Informant Profile

This study involved eight informants consisting of three local farmers and three transmigrant farmers as the main informants, male, aged 40-60 years with junior high and high school education levels with a length of service ranging from 5-30 years, one farmer group leader as a supporting informant with a high school education level, 10 years of service and one health center officer (Doctor) as a key informant with a bachelor's degree and 9 years of service. The main informants were selected based on their work experience in using pesticides and the risks they experienced to occupational health and symptoms of diseases suffered while working as farmers. The profile of each main informant varied greatly in terms of age, length of service as a farmer, and work experience in using pesticides. Local farmers generally had more than 15 years of work experience, while transmigrant farmers had 5 to 10 years of work experience. The health center officers who participated had more than 7 years of work experience in handling work-related health complaints, especially those related to pesticide exposure.

Pesticide Use Patterns

The pattern of pesticide use has significant differences between local farmers and transmigrant farmers. Local farmers with 15-30 years of experience as farmers tend to have more experience in regulating the dosage and timing of pesticide spraying and the various types of pesticides used such as glyphosate, paraquat, propiconazole, carbendazim and deltamethrin. Based on the results of the interviews conducted, local farmers usually use a pesticide dose of 25-50mg for one 5 liter spray tank, the dosage used by local farmers is in accordance with the threshold value for the use of chemical pesticides determined by the Ministry of Agriculture, local farmers carry out spraying activities in the morning at 10.00 WIB or in the afternoon at 16.00 WIB. They admit that in the long term, the use of pesticides must be controlled so as not to damage plants and soil quickly (plants do not want to grow) or cause health problems. One local farmer stated: "Father usually uses pesticides as needed, can use glyphosate, paraquat, propicanazole, carbendazim or delmatrin, various kinds, if it's the season of other caterpillars and other insect seasons too, use only 25-50mg, if there is a lot it is dangerous, the soil is quickly damaged and also sick because it is inhaled, it makes you dizzy, spray it in the morning or evening." (IUPL 1)

On the other hand, transmigrant farmers often use pesticides excessively due to lack of experience and understanding of safe dosages with a dose of 70-100mg per spray tank used every time they spray pesticides on plants. They often do not have knowledge of the type of pesticide used, so they tend to follow the written advice on how to use listed on the product excessively or the seller who in this case also lacks knowledge. One transmigrant farmer said: "You usually buy pesticides from the store, but you don't really understand how much to use. You usually use 70-100mg because pests die quickly with that amount, so until now that's the amount you use when you want to spray." (IUPT1)

Observation results also show that transmigrant farmers pay less attention to important factors such as wind direction and weather conditions when spraying. This increases the risk of direct exposure to pesticides, especially when they work in strong winds that can carry pesticide particles to their bodies and faces and be inhaled directly through the respiratory tract if they do not use PPE in the form of masks. The results of this study indicate a significant difference in the pattern of pesticide use between local farmers and transmigrant farmers in Purwodadi Village. Local farmers are more skilled in regulating the dosage and time of pesticide spraying from their

experience working while farming, the dosage of pesticides usually uses 25-50mg per tank and sprays in the morning or evening. They understand that excessive use of pesticides can damage the soil, plants, and potentially affect their health. In contrast, transmigrant farmers more often use excessive doses due to limited knowledge, following recommendations from sellers who in this case also have minimal knowledge about the use of appropriate pesticide dosages. According to the Head of the Farmer Group, this indicates the need for increased understanding and training for farmers, especially transmigrant farmers, to reduce health risks. The head of the farmer group explained: "There are still farmers who do not understand the dosage of pesticides, especially new farmers (transmigrants) who are still lay and new. That's why we also often hold training, sometimes it's like sharing with fellow farmers to learn from each other" (IP)

Occupational Diseases (PAK) Due to Exposure to Pesticides

Based on the results of in-depth interviews, key informants from local farmers and transmigrant farmers described symptoms of illnesses experienced during farming, such as headaches, skin irritation, and respiratory disorders such as shortness of breath at night. Local farmers who have worked for longer periods of time tend to experience chronic symptoms that they consider to be the impact of fatigue from daily work. One local farmer stated: "Every time I finish spraying, I often have a headache, and I often have shortness of breath at night. I used to think it was because of the heat, but now I know it might be because I often inhale this pesticide because I don't wear a mask, I was told by the health center doctor, my skin has been like this since I started farming like this (irritation)" (IUPL2)

Transmigrant farmers, who have a lower level of awareness of the dangers of pesticides, also experience similar problems. However, they often ignore these symptoms and do not seek medical help because they feel that the symptoms they feel are just a matter of fatigue due to work and age. One transmigrant informant stated that he experienced nausea and dizziness every time he sprayed and had difficulty sleeping at night, one transmigrant informant stated: "I don't know, lately I have difficulty sleeping after spraying plants, because it's the season of earthworms here now, especially every time I finish spraying I definitely have a headache and feel nauseous too." (IUPT3)

The results of this study indicate that pesticide exposure has long-term health impacts, especially on the respiratory tract, for both local farmers and transmigrant farmers in Purwodadi Village. Local farmers who have worked in this field for a longer time tend to experience chronic symptoms, such as headaches and shortness of breath which are at risk for COPD, bronchitis, Allergic Pneumonitis Disease, pulmonary fibrosis, neurological syndrome and lung cancer, but consider it a normal consequence of work. According to the Head of the Farmer Group, this is due to a lack of knowledge about the impacts and risks of pesticides in the long term. According to the Health Center Doctor, several cases of diseases due to pesticide exposure are not reported because farmers are not aware of the relationship between the symptoms they experience and the risk of pesticide exposure. A key informant from the Health Center stated: "We often have to explain this risk to them. Because in the respiratory system, inhaled pesticides can irritate the respiratory tract, causing chronic inflammation, shortness of breath, coughing, and the risk of chronic obstructive pulmonary disease (COPD) and other respiratory diseases. In addition, pesticides can penetrate the skin, causing irritation or allergic reactions and even the risk of cancer if exposed continuously ." (IC)

Patterns of Use of Personal Protective Equipment (PPE)

Based on the results of interviews and observations, the use of PPE by farmers in Purwodadi village was found to be very minimal, PPE for farmers is the responsibility of each farmer and is not facilitated by farmer groups and other institutions in the village. Based on six main informants of local farmers and transmigrant farmers, only two local farmers routinely use PPE with makeshift when spraying pesticides by using medical masks, rubber gloves and hats. More experienced local farmers are aware of the importance of PPE, although they feel uncomfortable using it in hot weather conditions and reduce the comfort of working and use the makeshift PPE they buy. One

local farmer stated: "Dad wears a mask and gloves when spraying, dad also has those stocks (pointing to the stock of gloves and medical masks in the hut), but sometimes when it's hot it's tight to wear that mask, so dad doesn't always wear it. Because dad gets dizzy if inhaled" (IUPL3). This is in contrast to transmigrant farmers who almost never use PPE due to economic factors and minimal knowledge of the risks of pesticide exposure. They assume that PPE only adds to costs and do not understand the long-term risks of pesticide exposure without protection. One transmigrant farmer said: "You're just ordinary, spraying, just spraying, you want to buy a mask or gloves, there are actually ones for spraying, but they're expensive, so you don't buy them." (IUPT3)

Based on the results of the study related to the pattern of use of PPE, differences in farmer behavior indicate that awareness of the risk of long-term disease among farmers in Purwodadi village is still minimal, as evidenced by the low use of PPE, especially among transmigrant farmers. Based on the results of the interview, only 2 local farmers used PPE for health reasons due to dizziness if inhaled pesticides, although they often felt uncomfortable using it in hot weather due to shortness of breath. This is supported by a statement from a supporting informant, namely the head of the farmer group, who emphasized that the discomfort of farmers while working is one of the factors, which is often the main reason for local farmers to be inconsistent in using PPE, although some of them are aware of the risk of pesticide exposure. On the other hand, transmigrant farmers almost never use PPE due to economic constraints, lack of understanding of the long-term dangers of pesticides and PPE infrastructure.

The Health Center doctor also highlighted the importance of education for farmers regarding health risks and the risk of PAK without PPE, because they often ignore preventive measures in order to save costs and the comfort of working without PPE, ultimately this phenomenon increases the risk of health problems due to pesticide exposure. The informant supporting the head of the farmer group stated: "Sir, I often see some of them when spraying without wearing masks or gloves, when asked they always say it's hot and uncomfortable, it interferes with work if they wear it and some say it's because there's no PPE to wear. Although there are some of our farmers who bring their equipment when they want to spray, that's why they don't consistently wear PPE." (IP)

3.2 DISCUSSION

Pesticide Use Patterns: The Relationship between Knowledge and Experience

This study analyzes the pattern of pesticide use between local farmers and transmigrant farmers in Purwodadi Village using a qualitative approach. The background of differences in experience and knowledge and length of work as farmers 15-30 years, local farmers tend to be more skilled in regulating the dosage and timing of pesticide spraying than transmigrant farmers. This pattern is closely related to the theory of attitudes towards behavior or Attitude Toward Behavior (ATB), which emphasizes that individual behavior is influenced by knowledge, experience, and attitudes (Smith and Jhonson 2020).

Local farmers generally have more knowledge about pesticide use patterns. From the results of the interview, local farmers often use varying doses of pesticides with a dose of 25-50mg per 5 liter spray tank. The dose used by local farmers is in accordance with the provisions set by the Ministry of Agriculture, local farmers carry out spraying activities at certain times such as morning or evening. This attitude is in line with the ATB theory, which shows that awareness of knowledge and field experience makes local farmers more experienced in using pesticides, this study is also in line with the results of research by Hidayat et al. (2020) which found that knowledge and attitudes influence the practice of pesticide use in vegetable farmers in Central Java.

Based on this, there is a significant difference in transmigrant farmers who show a tendency to use higher doses of pesticides due to their limited experience and understanding by using 70-100mg per 5-liter spray tank. They often follow instructions from sellers who in this case also have minimal knowledge, as well as other things without taking into account factors such as wind

direction or weather conditions. This lack of skills increases the risk of pesticide exposure, especially in wind conditions that carry pesticide particles towards the body. This study is also supported by the findings of Rahmawati's research (2021) which states that limited information and knowledge about pesticides often leads to inappropriate and risky pesticide use.

Based on the results of this study, there are significant differences in pesticide use patterns between local and transmigrant farmers in Purwodadi village, which are influenced by the experience, knowledge, and attitudes of each group. Local farmers with longer farming experience and a better understanding of dosage settings and spraying times tend to use pesticides in a better way and in accordance with the provisions of the threshold value for the use of chemical pesticides. In contrast, transmigrant farmers tend to use higher doses and do not pay attention to other factors when using pesticides, which can increase the risk of exposure. These findings support the Attitude Toward Behavior (ATB) theory which emphasizes that knowledge and experience play an important role in shaping individual behavior.

Occupational Diseases (PAK) and Health Risks

This study analyzes the risk of Occupational Diseases (PAK) with symptoms such as respiratory disorders, skin irritation, and headaches in farmers who are chronically exposed to pesticides in Purwodadi village. These symptoms often appear after spraying over time. Local farmers who have worked for a long time tend to experience chronic symptoms, while transmigrant farmers who have a lower level of awareness of the risks of pesticides often consider these complaints to be the effects of work fatigue and age factors. This phenomenon is in line with the Occupational Health Risks theory, which states that long-term exposure to toxic substances in the work environment has the potential to cause various diseases (Prasetyo, DS, & Setiawan., 2021)

Risk of Respiratory Symptoms: Biological and Pathophysiological Perspectives

Exposure to pesticides in agricultural environments, especially among local vegetable farmers and transmigrants, can cause various health problems, especially in the respiratory tract. From a biological perspective, inhaled pesticides can directly enter the respiratory system and cause irritation to the respiratory tract. According to Setiawan et al. (2020), exposure to pesticides containing hazardous chemicals such as organophosphates and carbamates can trigger inflammatory reactions in the respiratory tract, which have the potential to lead to conditions such as acute bronchitis, chronic obstructive pulmonary disease (COPD) in the long term. This is also supported by the statement of a health center doctor who stated that continuous exposure to pesticides poses a risk of Allergic Pneumonitis, pulmonary fibrosis, neurological syndrome and lung cancer.

Based on the pathophysiological perspective, pesticide exposure can cause a body response involving changes in lung function and the respiratory system. Inhaled pesticides can enter the lung alveoli, stimulate excess mucus production, and cause swelling in the lung tissue that interferes with oxygen circulation in the blood. In line with Widodo et al. (2022) showed that farmers who work in conditions exposed to pesticides tend to experience decreased lung capacity and experience disorders in the exchange of gases between oxygen and carbon dioxide known as hypoxia.

The Occupational Health Risks Theory explains that any exposure to hazardous chemicals, including pesticides, increases the potential for health problems, especially in individuals who are exposed continuously or in high doses. In line with Rahmawati & Utami (2021), farmers who are exposed to pesticides without adequate protection have a higher risk of developing chronic respiratory diseases. Repeated exposure to pesticides in the agricultural work environment leads to the accumulation of toxins in the body that can affect the respiratory system and cause long-term symptoms such as coughing, shortness of breath, and excessive mucus production.

Risk of Skin Irritation Symptoms: Impact of Chemical Toxin Penetration on the Skin Surface

Exposure to pesticides in local and transmigrant vegetable farmers is at risk of causing various health problems, one of which is skin irritation. Chemical pesticides that can penetrate the skin's protective layer, such as organophosphates, carbamates, and pyrethroids can cause allergic

reactions or irritation leading to contact dermatitis, which is characterized by redness, itching, and inflammation of the exposed skin. In line with Rahmawati et al. (2021) showed that farmers who work with pesticides without adequate personal protective equipment tend to experience an increased risk of skin irritation due to direct contact with hazardous chemicals.

Penetration of chemical toxins on the skin surface not only causes irritation, but can also trigger systemic reactions if the chemicals are absorbed into the body. Some pesticides, especially those that are fat-soluble, can easily enter the blood through the epidermis and reach internal organs, such as the liver and kidneys, which increases the risk of poisoning. According to Prasetyo & Setiawan (2022), chemicals in pesticides can damage the structure of skin cells and weaken the skin's ability to regenerate. Farmers in Purwodadi village are prone to redness on their skin, with indications of pesticide exposure as evidenced by the fact that when spraying activities do not actively use PPE, they are at risk of developing dermatitis. According to the theory of Dermatotoxicology, repeated exposure to pesticides can cause the accumulation of toxic compounds in the epidermis, thereby disrupting the skin's protective function and increasing susceptibility to secondary infections (Sari et al., 2019).

Headache and Nausea: Systemic Effects of Exposure to Neurotoxic Substances

Exposure to pesticides containing neurotoxic substances, such as organophosphates and carbamates, can cause various systemic health disorders. Headaches and nausea are early symptoms often experienced by farmers due to excessive exposure to pesticides. Neurotoxic substances in pesticides work by disrupting the function of the central nervous system, inhibiting the enzyme acetylcholinesterase, which plays a role in regulating the transmission of nerve impulses. This can cause nerve poisoning that leads to symptoms such as headaches, nausea, dizziness, and confusion. In line with Rahmawati et al. (2021) which shows that farmers who are exposed to pesticides in the long term, without adequate protection, are at high risk of experiencing systemic health disorders such as cardiovascular disease, heart disease and others, which can lead to more serious health problems, including neurological damage.

Symptoms of headaches and nausea that appear after exposure to pesticides are not only temporary disorders, but can be an early sign of the risk of poisoning. Repeated exposure to pesticides can trigger more serious conditions, such as chronic neurological disorders, memory disorders, and decreased cognitive function. Prasetyo & Setiawan (2022) explain that exposure to neurotoxic substances in farmers can increase the risk of developing peripheral nerve disorders, which cause tingling, muscle weakness, and paralysis in the extremities. In addition, repeated exposure to these neurotoxic chemicals can increase the risk of developing Alzheimer's disease or premature dementia, especially in individuals who are continuously exposed.

Use of PPE: Knowledge Factors and Barriers

Personal protective equipment in the agricultural sector plays a very important role in reducing exposure to occupational diseases, based on the incident theory by Irzal (2020) the use of PPE minimizes the emergence of hazards or diseases in the agricultural sector in contact with chemical sources that exceed the threshold and continuous exposure. Based on research by Khalishah et al (2023) stated that the use of PPE in the agricultural sector workplace includes head protection (hats), eye protection (glasses), respiratory protection (3-ply masks), rubber gloves, and rubber boots (Khalishah et al., 2023).

Based on the results of interviews with six main informants of local and transmigrant farmers, only two farmers used incomplete PPE by only using hats, gloves and 3-ply masks when spraying pesticides, but in this case they were also inconsistent in their use due to discomfort while working. This is in contrast to transmigrant farmers who almost never use PPE due to economic factors and minimal knowledge about the risks of pesticide exposure. Local farmers with more experience generally realize the importance of using PPE, but they have difficulty in consistent use.

Discomfort when using PPE, especially in hot weather, is a major inhibiting factor. One local farmer stated. "You wear a mask and gloves when spraying, you also have those in stock (pointing to the stock of gloves and medical masks in the hut), but sometimes when it's hot, it's tight to wear the mask, so you don't always wear it. Because you get dizzy if you inhale it" (IUPL3). This statement reflects the reality that despite awareness of health risks, comfort while working is still a dominant priority, which can increase the risk of pesticide exposure.

On the other hand, based on the results of interviews with three main informants, transmigrant farmers never use PPE due to economic reasons and ignorance. They assume that PPE is an unnecessary additional cost, without understanding the long-term health risks of pesticide exposure without PPE protection. A transmigrant farmer said, "I'm just used to it, just spraying, I want to buy a mask or gloves, there are actually ones for spraying, but they are expensive, so I don't buy them" (IUPT3). Based on this statement, this is in line with the ATB theory which emphasizes that individual attitudes towards behavior are based on certain factors, based on this, the use of PPE is greatly influenced by their beliefs about the risks and benefits. More experienced local farmers tend to have a positive attitude towards the use of PPE, but discomfort and environmental conditions such as weather influence their decisions to be inconsistent in their use. Individual perceptions of certain factors greatly influence the actions taken. Based on this, although 2 local farmers wore PPE such as masks, gloves and hats, the discomfort caused by using PPE in hot conditions encouraged them to ignore its use. Based on participatory observation, it is seen that awareness of the use of PPE among farmers in Purwodadi village is still very minimal. This is evidenced by the low use of complete PPE among farmers, especially among transmigrant farmers. Lack of knowledge and discomfort are the main barriers for them to use PPE.

The Health Center doctor also explained the importance of education for farmers, regarding the health risks without using PPE. Proper education can increase their awareness of the importance of self-protection, thereby preventing potential health risks. Economic limitations that are the reason for farmers not to buy PPE must be addressed with counseling and the provision of more affordable alternatives. This study is in line with previous findings showing that discomfort, economic limitations, and lack of understanding are the main factors inhibiting the use of PPE among farmers, as stated by Santoso et al. (2020), "Low use of PPE among farmers in rural areas is caused by a lack of knowledge and understanding of the health risks posed by exposure to agricultural chemicals." Likewise, research by Arifin et al. (2021) shows that better education can contribute to increased use of PPE among farmers, with an emphasis on the importance of long-term health protection.

4. CONCLUSION

Based on the results of this study, the phenomenon of pesticide use patterns among local farmers tends to better understand and regulate pesticide use according to the threshold value set by the Ministry of Agriculture, which is 0.1-10 mg per kg/liter for all types of chemical pesticides. Local farmers use a pesticide dose of 25-50 mg/5 liters of pesticide sprayer and spray at certain times such as morning and evening, in contrast to transmigrant farmers who use excessive doses of 70-100 mg/5 liters of pesticide sprayer tank and spray without considering time and other factors. This is due to a lack of knowledge and experience. Inappropriate pesticide use patterns and continuous exposure can result in a risk of disease in farmers. It was found that the use of pesticides among farmers, both local farmers and transmigrant farmers, has a risk of disease to health with symptoms experienced by farmers such as nausea, dizziness, difficulty sleeping at night and shortness of breath.

Based on the results of interviews with health center doctors, uncontrolled and continuous exposure to pesticides in farmers is at risk of various health problems, local and transmigrant farmers are at risk of short-term diseases such as poisoning and irritation, as well as long-term diseases such as cancer, respiratory disorders, and cardiovascular disease. The results of this study revealed that the pattern of pesticide use among local and transmigrant farmers showed significant differences in terms of dosage and spraying time, which had an impact on health risks. Further research is recommended to explore the types of pesticides and the dosages used and the frequency

of pesticide use with long-term health impacts on farmers, it is hoped that it can identify more significant health risk factors and support the development of safer pesticide management policies.

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