3. STRATEGY TO PROMOTE PATIENT CENTERED CARE PCC FOR IMPROVING PATIENT SATISFACTION: A LITERATURE REVIEW

By Arista Maisyaroh

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Original Research Article: Quantitative Research

DETERMINANTS OF INJURY IN AGRICULTURAL AREA

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Abstract

Background: Nearly half of the world's population lives in rural areas where agriculture is the primary source of livelihood (FAO, 2013). Many factors affect the health of agricultural workers, and improving the health of this population will require a variety of approaches. Farmers can experience various diseases and chronic diseases similar to the general population; however, there is evidence that they are at higher risk for acute injuries due to work, certain chronic diseases, and pesticide diseases.

Objectives: This study aims to analyze the factors causing injury in the area of Agriculture.

Methods: This study adopted a cross-sectional explanatory method. The variable consists of several factors that cause injury, namely, vulnerability, threat factors, and ability factors. The population consists of farmers who are members of farmer groups under the assistance of the Lumajang District Agriculture Office. The participants were recruited using multi-step sampling steps with 354 respondents. Data were collected using a questionnaire, which was then analyzed using Structural Equation Modelling (SEM) variance base Partial Least Squares (PLS)

Results: By using the PLS-3 program, the effect of susceptibility factor on injury events is 0.487, and the effect of susceptibility factor on injury events through threat factor is 0.107 so that the total impact of susceptibility factor on injury events is 0.595, the impact of ability factor on injury events is 0.286. The influence of susceptibility factor to injury events through the threat factor is 0.063, so the total impact of the ability factor on injury events is 0, 349. While the threat factor only increases by 21.9% of injury events. So, it can be concluded that the vulnerability factor is the highest factor increasing the incidence of injury by 59.5% compared to other factors.

Conclusion: The development of a injury prevention model can be done by reducing the vulnerability of farmers by limiting working hours in agricultural areas, paying attention to nutrition and fluid intake, controlling accompanying diseases, and facilitating insurance for farmers.

Keywords: *Agriculture, Injury, Nursing*.

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INTRODUCTION

Nearly half of the world's population lives in rural areas where agriculture is the primary source of livelihood (FAO, 2013). Many factors affect the health of agricultural workers, and improving the health of this population will require a variety of approaches. Farmers can experience various diseases and chronic diseases similar to the general population; however, there is evidence that they are at higher risk for acute injuries due to work, certain chronic diseases, and pesticide diseases (Schenker, Mccurdy, Riden, & Villarejo, 2015). Workers in the agricultural sector are among the groups most at risk in terms of fatal work accidents. Long working hours, exposure to severe weather conditions, and using equipment and machinery with high potential to pose serious hazards create a hazardous work environment (Rorat, Thannhauser, & Jurek, 2015).

Socio-economic, cultural, and environmental factors influence the health and living conditions of farmers and agricultural workers. Agriculture is one of the most dangerous jobs in the world. In some countries, the rate of fatal accidents on agriculture is double the average for all other industries (International Labour Office, 2011). Agricultural activities are recognized as heavy physical labor; musculoskeletal disorders are common in agriculture. Low Back Pain is identified in farmers increasing with age and duration of work. The most common hazards occur in agricultural machinery such as tractors, trucks and harvesters, and cutters and piercers; hazardous chemicals: pesticides, fertilizers, antibiotics, and other veterinary products; toxic or allergic agents: plants, flowers, dust, animal waste, gloves (chrome), oil; carcinogenic substances or agents: certain pesticides such as arsenic and phenoxy-acetate; herbicides, UV radiation, parasitic diseases such as bilharziasis and fascioliasis; infectious animal diseases: brucellosis, bovine tuberculosis, hydatid disease, tularaemia, rabies, Lyme disease, tinea, listeriosis; other infectious and parasitic diseases: leishmaniasis, bilharziasis, facioliasis, malaria, tetanus, mycosis; confined spaces such as silos, holes, basements, and tanks; noise and vibration; ergonomic hazards: inadequate use of equipment and tools, improper posture or prolonged static posture, carrying heavy loads, repetitive work, excessive working hours; extreme temperatures due to weather conditions; contact with wild and poisonous animals: insects, spiders, scorpions, snakes, certain wild, mammals (International Labour Office, 2011).

Education in injury prevention is an attractive choice because it is relatively inexpensive and can be accepted by agricultural entrepreneurs. Most agricultural injuries are caused by complex root layers that are classified as errors in the safety system. This result shows that not only training and personal protection equipment, but also safety design regulations, mitigation devices, workplace inspection/maintenance, and other factors that play an essential role in preventing agricultural injuries. Error identification will help farmers to implement effective prevention programs 6 quickly. However, studies that analyze the incidence of injury in agrarian areas are still not widely done. Therefore this study aims to investigate the prevalence of trauma in agrarian areas.

METHODS

Study Design

This study adopted a cross-sectional explanatory method.

Setting

The research was conducted at the working area of Lumajang Regency Agriculture Office on July until December 2020.

Research Subject

The population in this study were farmers who were members of farmer groups in the working area of the Lumajang Regency Agriculture Office, amounting to 50,450 farmers who were members of farmer groups combined under the guidance of the Agriculture

Department of Lumajang Regency. The sample in this study will be referred to as respondents. The sampling technique in this study uses simple random sampling, which is the technique of determining the sample of data by randomly selecting respondents to be studied. The method to be carried out is from 50,450 farmers chosen randomly as many as 357 farmers in Lumajang Regency.

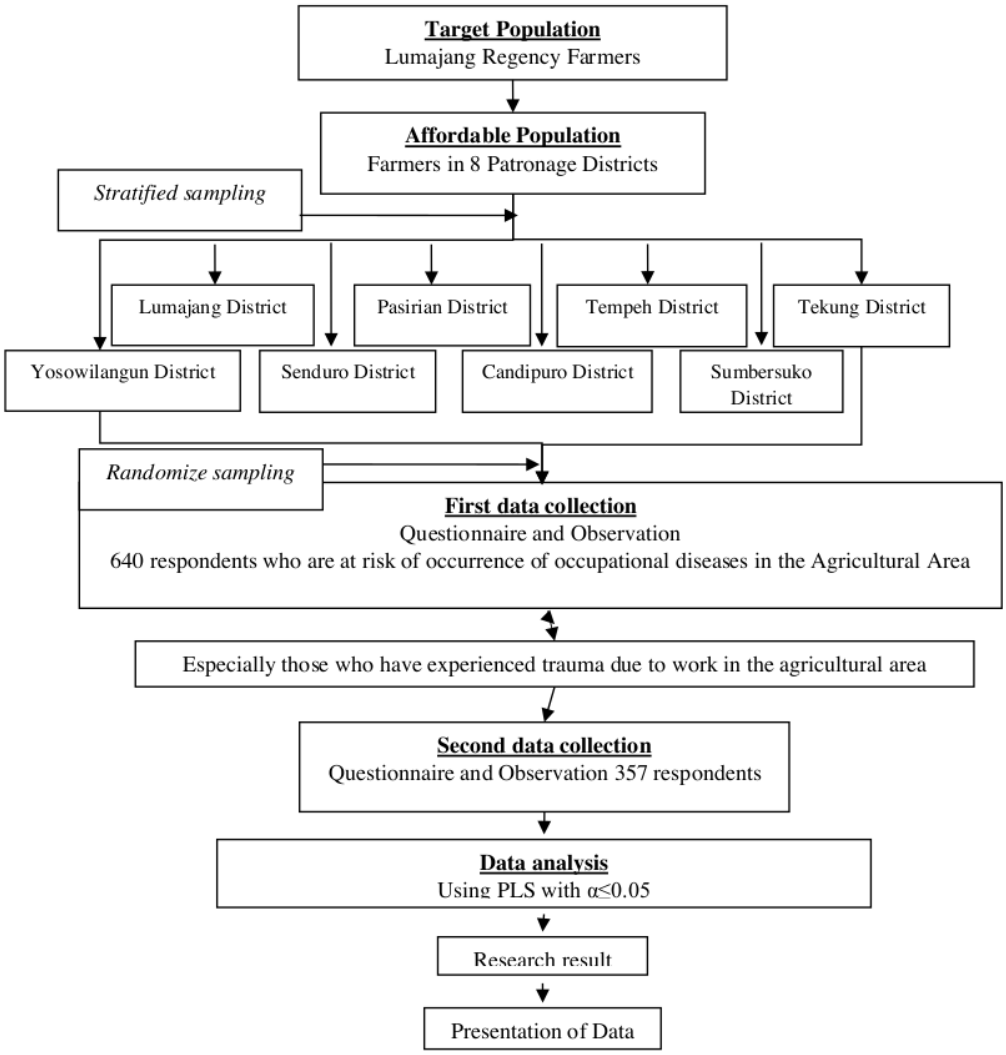

Figure 1. Framework of Injury Cause Analysis in Lumajang District Agricultural Area.

Instruments

The variable consists of several factors that cause injury, namely, vulnerability, threat factors, and ability factors. Data were collected using a questionnaire, data collection using survey methods for a certain period with cross-sectional data through questionnaires, and interviews with modified scoring. The scoring used was the Job Safety Analysis scoring of the Australian and New Zealand Standard on Risk Management (AS / NZS). Data is sought about vulnerability, threats, and the ability of farmers to cause injury in agricultural areas. Vulnerability assessment consists of internal

weakness factors of farmers. The evaluation of threats consists of external or environmental factors that cause injury/injury. The ability factor is all the resources of the farmer in recognizing risk reduction due to hazardous substances in agriculture. The details of each questionnaire are as follows (1) the vulnerability factor consists of 11 statements that are ranked with a rating scale of 4 points. This questionnaire covers an individual vulnerability that causes a high risk of work accidents such as length of work in agricultural areas, nutrient and fluid intake, insurance, having comorbidities. (2) the threat factor contains 14 items assessed on a four-level Likert scale that measures the magnitude of external or environmental influences that can increase the risk of workplace accidents in agricultural areas such as the use of pesticides, sharp agricultural equipment, land slope, and dangerous animals in the agricultural field. (3) the ability factor contains 13 items that are ranked with a rating scale of 4 points rank measuring farmers' knowledge in accident risk management in agricultural areas such as the ability to use PPE, the ability to manage pesticides, knowledge in early handling of work accidents due to sharp objects, bitten by animals or pesticide poisoning. For all of these questionnaires, four answers can be given: 1 = 'never', 2 = 'sometimes', three = 'often,' 4 = 'very often', scores are grouped into four categories, namely, low risk, medium risk, high risk, and high risk, all of these tools are assessed for their level of validity and reliability coefficient.

Data Analysis

The analysis was carried out using partial least square (PLS). PLS results are used as a basis for determining the relationship between risk factors and injury events. The results of the Query Analysis are used for FGD materials with representatives of farmers, agricultural instructors, Health Safety Unit and public health service to identify strategic problems and make recommendations.

Ethical Consideration

The Research Ethics Committee approved this study of the Faculty of Dentistry, University of Jember with No. 982/UN.25.8/KEPK/DL/2020.

RESULTS

Demographic Data of Respondents

Table 1. Characteristics of Respondents at the working area of Lumajang Regency Agriculture Office on July until December 2020 (n = 357).

Characteristics		Frequency (people)	Percentage (%)
Gender	Male	235	65.83
	Female	122	43.17
Education	No School	27	7.56
	Elementary School	218	61.06
	Junior High School	56	15.69
	Senior High School	46	12.89
	Other	10	2.80
Crop Commodities	Banana	50	14.01
	Coffee	44	12.32
	Vegetables	65	18.21
	Rice	132	36.97
	Corn	66	18.49
Long Time Farming	< 10 years	23	6.44
	10-20 years	234	65.55
	> 20 years	100	28.01

Sources: Primary Data of Questionnaires, 2020.

Based on table 1 shows that the characteristics of respondents, more than half (65%) are male, and most (36%) of the crop commodities are rice/food crops. Most work as farmers (65%) for 10 -20 years. The education of peasants without school attained 27 (8%), elementary school 215 people (60%), junior high school 56 people (16%), high school as many as 46 people (13%) and outside education as many as ten people (3%).

Results of Validity and Reliability of Instruments

Table 2. Results of Validity and Reliability with Cronbach's Alpha and AVE.

	Cronbach's Alpha	Average Variance Extracted (AVE)
Threat Factor	.890	0.819
Ability Factor	.915	.854
Vulnerability Factor	.900	.770
Injury Event	.929	.934

Sources: Primary Data of Questionnaires, 2020.

The results of validity and reliability in table 2 using the Cronbach's Alpha and AVE tests on vulnerability factors, capability factors, threat factors, and injury events obtain Cronbach's Alpha values above 0.7 and AVE above 0.5, so the data meets the validity and reliability requirements.

Models of Injury Factor Analysis in Agricultural Areas

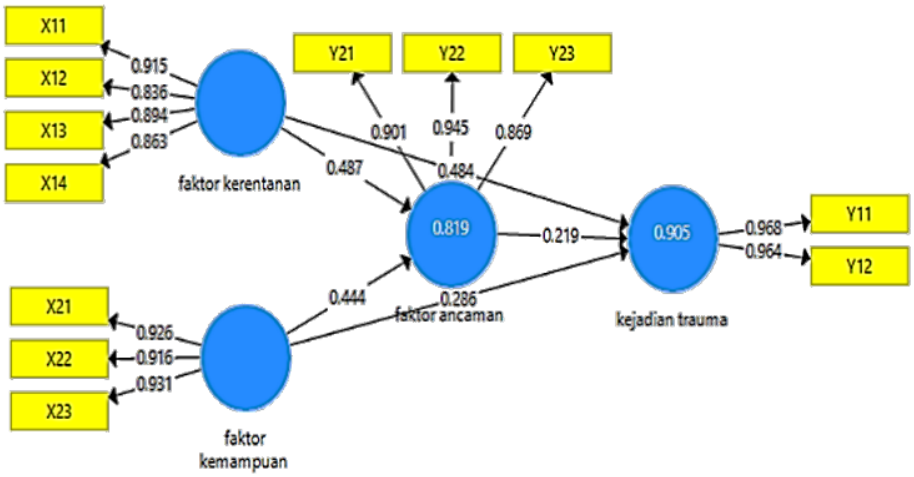

Figure 2. Ability Factor

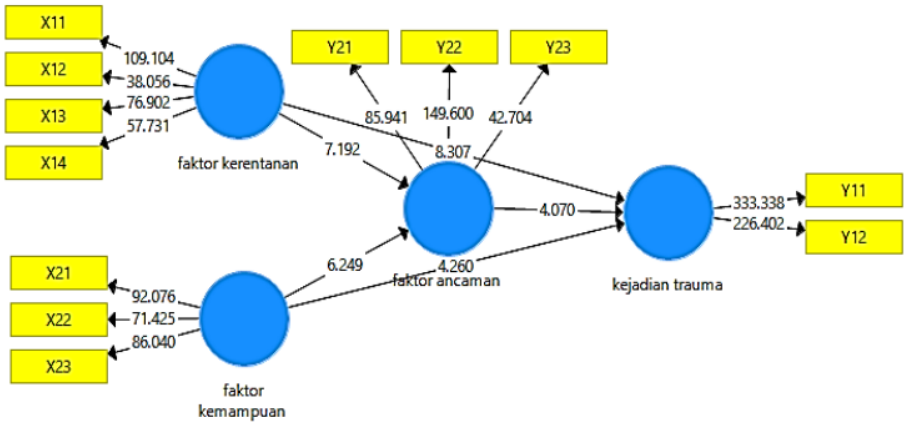

Figure 3. Models of Injury Factor Analysis in Agricultural Areas.

Note:
Vulnerability Factor
X11: Length of time working in the agricultural area
X12: intake of nutrients and fluids
X13: insurance participation
X14: has comorbidities
Capability factor
X21: the ability to use PPE,
X22: ability to manage pesticides
X23: knowledge in the initial handling of work accidents due to sharp objects, bitten by animals or pesticide poisoning
Threat Factor
Y21: use of pesticides
Y22: Sharp agricultural tools and dangerous animals in the agricultural area
Y23: land slope,
Truma incident
Y11: Frequency of occurrence
Y12: degree of injury

The results of multivariate analysis in table 3 using PLS-3 program participants found the influence of susceptibility factors on the incidence of injury 0.487. The power of susceptibility to injury through the threat factor is 0.487x0.219 = 0.107. That the fastest path to injury is from vulnerability rather than vulnerability through threat factors (0.487> 0.107). The results of the total effect Influence factor of vulnerability to injury is 0.487 + 0.107 = 0.595, meaning that the vulnerability factor can increase 59.5% of the incidence of injury.

Effect of ability factors on the incidence of injury 0.286. The influence of susceptibility to injury through the threat factor is 0.286x0.219 = 0.063. That the vulnerability factor is more influential on the occurrence of injury than through the ability path through threats (0.286> 0.063). The results of the total effect Effect of the ability factor on the incidence of injury is 0.286 + 0.063 = 0, 349. This means that the ability factor can be. Increase 34.9% incidence of injury. While the threat factor coefficient of 0.219 means it only increases by 21.9% the incidence of injury.

DISCUSSION

Farming is one job that has a high risk of accidents. In many countries, agriculture is one of the most dangerous jobs[8], there were 195 workers killed, 27% consisting of farmers. Many incidents of work-related injuries or illnesses caused by farming, but only a few people understand and know the impact of farming work. Age is one of the internal causes that causes physical injury to the perpetrators. Injuries in agriculture can result in substantial morbidity and mortality, from minor injuries to severe injuries (Pfortmueller et al., 2013).

In this study, age is very influential on the incidence of injuries that occur in agriculture. Farmers who do their work have a variety of ages, from young to old — ranging from ages 15 years to 55 years and over. This is by the study of Lower A and Herde (2012), in his research stating that 17% of all deaths occur in those aged less than 15 years, and 40% occur in people aged over 55 years [10]. 55% of deaths on agriculture occur in farmers older than 55 years[11]. Age factor has a role in the level of knowledge such as the theory of Juliana et al. in Hutapea (2012) about human relations with the understanding that the younger the individual's age, the higher the ability to remember, including the ability to retain information received. Individuals who have experienced aging will experience a physiological decline in the body which will affect the ability to retain information(Fibriansari, Maisyaroh, & Widianto, 2020).

In the field, farmers not only consist of men, but women also have a role in this work. But in the event of injury, there are differences in the incidence between men and women. Thus, gender influences the number of injury risk events. Acording to Widianto, Suhari, Fibriansari, & Maisyaroh (2020) farmer's age influence the quality of life of farmers from the perspective of Agricultural Nursing. In the study of Lower A and Herde (2012) in the 2003-2006 period, there were 326 deaths due to agricultural-related injuries. 87% consisted of men, and 13% consisted of women. Over time, this number may change. But because men are

the most dominant working in the agricultural sector, although women also have a much lower presentation, both must still understand what risks exist in their environment and how to minimize those risks(Weichelt & Bendixsen, 2018).

Agricultural activities have risks from hazardous materials in the farming process. Farmers do not consider this as a threat because it is considered as part of work in agriculture (Maisyaroh, Widianto, & Fibriansari, 2019). One factor that is a threat is the sharp tools of agriculture and dangerous animals on agriculture. These sharp objects have many forms and functions according to their needs so that it can simplify and ease the work of the farmers. Even more effective and efficient when using sharp objects. But there are also negative effects from the use of this sharp object if it does not perform according to the procedure. In this study, there is a relationship between the use of sharp objects with the risk of injury. As referred to by Das (2007), the leading external causes of agricultural injuries are hand tools (64.7%)), agricultural machinery (29.1%), and others (6.2%). The tools most commonly involved in hand injuries are shovels and sickles. The fingers of both limbs are the most affected body parts, followed by the feet, ankles, hands, wrists, and lower back (Das, 2014).

One factor that is a threat is the state of agricultural land. Land clearing for agriculture tends to increase soil erosion. The slope of the land will increase the risk of injury to farmers, such as landslides (U.S. Environmental Protection Agency). In horticultural commodities, pesticide residues are reported to have health hazards. For example, in the United States, the EPA found 14 out of 41 pesticides commonly used in horticultural commodities classified as carcinogenic compounds in which pesticide residues were reported to have polluted 83% of the samples of horticultural crops observed(Amilia, Joy, & Sunardi, 2017). Some description of chemical exposure in Agriculture Nursing, among others, pesticides, herbicide, insecticides, fungicides and rodenticides [16]. This is consistent with the results of the analysis of threat factors only increase by 21.9% of the incidence of injury.

Factors that can be the ability of farmers is the ability to use Personal Protective Equipment (PPE) becomes very important in farming. With the use of tools or sharp objects, direct exposure to the sun, contact with pesticides and other activities, farmers should realize the importance of protecting themselves from the risk of injury. The use of PPE is one of the last countermeasures against injury. In this study, there is a relationship between the use of PPE and the incidence of injury. As explained by Wismaningsing and Oktaviasari (2015), farmers who have complete availability of PPE plus a level of knowledge about PPE and a positive attitude will encourage farmers to behave properly using PPE. From this good use of PPE, it is expected that the risk of injury can be reduced, and farmers can also work optimally, while increasing the productivity of agricultural products (Wismaningsih & Oktaviasari, 2016). The use of PPE can reduce the risk of injury and provide comfort in work(Widianto, Maisyaroh, & Fibriansari, 2019)

The current industrial era has very high demands that everything takes place quickly and instantly. Likewise, in the world of agriculture, where the harvest period in one year can take place three times. In contrast to earlier times, in one year, harvest can only be up to twice. So, there must be a substance that can support the process of growing and developing plants quickly. One of them is by using pesticides. Farmers are exposed to many dangers, many suffering severe consequences. This includes long-term exposure and adverse effects of fertilizers and pesticides(Chiu et al., 2015).

Another factor that is the ability of farmers is the ability to manage pesticides the use of these substances does not necessarily only increase agricultural productivity. There are also negative impacts that are no less important than just high yields. The use of these pesticides not only has an effect on environmental damage

but also human health. Damalas & Eleftherohorinos (2011) states that one of the ingredients in a pesticide is carcinogenic. Thus, farmers must learn exactly what pesticides are used and what PPE must be used to reduce the risk of injury (Bondori, Bagheri, Damalas, & Allahyari, 2018). Comprehensive interventions are needed to reduce exposure and health risks, including training, labeling improvements, measures to reduce cost barriers to implementing safe behavior, promotion of control measures other than PPE and support for Integrated Pest Management (IPM) (Kapeka, Lekei, & Hagali, 2016).

In Indonesia, pesticide residues contained in horticultural products such as carrots, potatoes, mustard greens, onions, tomatoes, and cabbage in some vegetable production centers have been reported to have residues that exceed the maximum limit of 2 ppm. Our concern about the impact of pesticide residues and their dangers on human health requires the management of horticultural product quality, which is not only based on visual appearance but must also be safe for consumers (Amilia et al., 2017).

Another factor that is the ability of farmers is the ability of knowledge in the early handling of work accidents either because of sharp objects, bitten by animals or pesticide poisoning. Farmers need to know the risks of what farmers do. Because injuries can be prevented by knowing what are the causes and effects. In this case, farmers' knowledge of the risk of injury needs to be well studied, to reduce the number of injuries on the field. The results of this study found that farmer education is very influential on the incidence of injury. The Minaka study et al. (2016) explained that farmers know that dosage, duration of spraying, and wind direction can cause poisoning. Still, only 46% know that certain types of pesticides can cause poisoning. Experienced poisoning can range from poisoning in the respiratory system that causes shortness, then itching on the skin, irritation to the eye, and so forth (Minaka, Sawitri, & Wirawan, 2016).

Educational interventions delivered through the AHSN program are not related to differences that can be observed in agricultural safety practices, physical agricultural hazards, or agricultural-related injuries. There is a need for the farm sector to broaden the scope of injury prevention initiatives to fully include health, education, engineering, and public health regulation models (Hagel et al., 2008). Healthy products are produced by using natural ingredients and avoiding chemicals in the whole process, from planting to processing the results by healthy lifestyle patterns(Hagel et al., 2008). Along with the ability of knowledge can also be improved by means of training for farmers in the initial management of emergency in the agricultural area. One that can be trained is the ability to provide basic life support (BLS) (Fibriansari et al., 2020). This is consistent with the results of the analysis of the ability factor that can increase 34.9% of the incidence of injury.

The factor which is the vulnerability of farmers is the length of work in the agricultural area Farmers usually work with high loyalty. Do not know the time even to forget if he had to take his life. The heavy physical workload becomes a challenge that must be resolved in a short time and cannot be postponed. Farmers will not stop working if they have not finished. Such activities make farmers exhausted because they have spent a lot of energy. In this study, it is known that the length of work of the farmers influences the incidence of injury. The study of Utami tahun 2016 states that the length of time a farmer is in work if it exceeds the time limit of work will cause productivity to decrease and the emergence of fatigue, illness, and work accidents. Being a farmer is definitely in direct contact with sharp objects (Utami, 2016).

Another vulnerability factor is having comorbidities. Chronic health conditions can interfere with farmers' ability to carry out agricultural tasks safely. Compared to other occupations, the risk of farmers significantly increases the prevalence of cardiovascular disease, arthritis, skin cancer, hearing loss, and

chronic respiratory diseases. This burden can be partly attributed to constant exposure to sunlight, allergens, and various pesticides, hard equipment, and repetitive movements. Agricultural workers experience a variety of diseases and chronic diseases, such as the general population. However, there is evidence that they are at increased risk of acute injury due to work, certain chronic diseases, and pesticide diseases. Agricultural workers are at higher risk for several critical non-work conditions (e.g., obesity, diabetes) and working conditions (e.g., injuries, respiratory illnesses, chemical injuries). These factors affect other vulnerability factors, namely lack of nutrition and fluid intake. Major fundamental factors that influence the risk of chronic diseases are low socioeconomic status. This may be more influenced by low levels of education, poor housing conditions, and reduced public health services(Schenker et al., 2015).

External factors of injury risk in agricultural areas include ergonomic chronic diseases as well as education. Occupational injuries in the agricultural sector have been reported to be higher than the average accident rate in all other industries (Chae et al., 2014). Ergonomic factors cause musculoskeletal disorders. Farmers feel fatigue/discomfort at various levels of their body parts when using agricultural tools (Alwall Svennefelt & Lundqvist, 2019). According to Gupta and Tarique (2013), poor posture and lack of ergonomic awareness in the agricultural community are the two main contributing factors that contribute to the development of MSD. Emerging data shows that musculoskeletal disorders have been a widespread problem in Indonesian agriculture for more than a decade. According to Fuch 2007 states that farming is physically difficult at work, and the activities of agricultural workers lead to the potential for risk of musculoskeletal disorders such as osteoarthritis (OA) in the hips and knees, lower back pain (LBP), neck and upper limb complaints, and hand-leg lumbar disorders (OA) (Susanto, Purwandari, & Wuri Wuryaningsih, 2016). Farming work includes static positions, forward bending, lifting and carrying weight, kneeling, and dangetaran in agriculture. Limited application of research related to ergonomics and musculoskeletal disorders, although farmers often report musculoskeletal signs and symptoms. Identification of occupational health hazards and the development of systems to evaluate, intervene, and reduce the risk of musculoskeletal factors and the resulting disturbances are essential for the safety of agricultural workers(Kumari, 2018). The next vulnerability factor is the absence of health insurance for occupational diseases in agriculture. Some ergonomic problems are the awkward postures of farmers and related work of musculoskeletal disorders, hand tools, rest schedules, and also training of workers, must be done. Ergonomics can develop and introduce several feasible solutions for agricultural tasks, which are affordable in terms of economic concepts, especially for low-income people. Also, the implementation of ergonomic cost-benefit solutions can be done by relevant government agencies, large-scale agricultural companies, and employers. Also, as this review shows, ergonomic health and study work in agriculture has been carried out in developed and developing countries. This is consistent with the results of the analysis of vulnerability factors that can increase 59.5% of the incidence of injury.

CONCLUSION

Factors causing injury in agricultural areas have been influenced by several factors. There are threat factors, capability factors, and vulnerability factors that have been proven capable of causing injury. Vulnerability factors (length of work in agricultural areas, nutrient and fluid intake, insurance participation, and having comorbidities) are the highest factors in increasing the incidence of injury. Although farmers have the ability and understand the source of the threat but not so influential with the incidence of injury. Conditions that increase vulnerability are the biggest cause of injury.

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DECLARATION OF CONFLICTING INTEREST

The authors declared no conflict of interest.

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AUTHOR CONTRIBUTION

Arista Maisyaroh: Collecting data, analyzing data, compiling research results, conducting discussions, compiling manuscripts.

Eko Prasetya Widianto: Assisting in the interpretation of research results, directing deeper discussions related to research results, directing the preparation of manuscript.

Rizeki Dwi Fibriansari: Assisting in the interpretation, of research results, directing deeper discussions related to research results, directing the preparation of manuscripts.

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