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Quantitative Research Article

Association Between Working Posture and Low Back Pain Among Tea Farmers in Cikoneng Village, Bogor Regency

Hafidz Alfarisi¹, Ulya Qoulan Karima¹, Afif Amir Amrullah¹, Ayu Anggraeni Dyah Purbasari¹

Abstract

Background/ problem: Low back pain (LBP) is one of the most common musculoskeletal complaints among informal sector workers, including farmers. When experienced repeatedly, LBP can negatively impact farmers' health and daily activities, resulting in reduced productive work hours.

Objective/ purpose: This study aimed to determine the association between Working Posture and LBP among tea farmers in Cikoneng Village, Bogor Regency.

Design and Methodology: Cross-sectional design was applied, involving 85 respondents selected through purposive sampling. Primary data were collected via interviews and observations using identity questionnaires, the Pain and Distress Scale, the Brinkman Index, and the REBA observation sheet.

Results: 83.5% of tea farmers reported LBP complaints. Chi-Square analysis indicated significant associations between LBP and Working Posture, Age, Length of Employment. There were significant association between Working Posture, Age, and Length of Employment. Respondents with Risky Working Posture are more at risk of experiencing LBP compared to those with Low Risk Working Posture (POR= 4.32, 95% CI: 1.23-15.19). Respondents aged >35 years were at greater risk of LBP compared to respondents aged ≤35 years (OR = 4.89, 95% CI: 1.38-17.25). Respondents who had worked for >5 years were at greater risk of LBP compared to respondents who had worked for ≤5 years (OR= 4.37, 95% CI: 1.17-16.34).

Conclusion and Implications: The study concluded that poor posture and longer employment duration increase the risk of low back pain. It is recommended that farmers adopt ergonomic practices especially for those with a long Length of Employment and old age.

Author Affiliation

¹Public Health Study Program, Faculty of Health Sciences, Universitas Pembangunan Nasional Veteran Jakarta, Indonesia

*Corresponding author e-mail: ulyaqoulan karima@upnvj.ac.id

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Introduction

Indonesia's abundant natural resources make it an agricultural country. Most of the population living in rural areas generally utilize these natural resources as a source of livelihood, one of which is in the agricultural sector. The majority of people living in highland areas work as tea farmers, and many farmers still use manual or traditional methods that can affect the health and posture of farmers. Indonesia has the fifth largest tea plantation area in the world and was the eighth largest tea producer in the world in 2022 (Coordinating Ministry for Economic Affairs, 2022).

Work as a farmer, especially in tea cultivation, includes various activities such as preparing the land, planting seedlings, cultivating, caring for plants, fertilizing, and harvesting the crops (Simanungkalit & Sitepu, 2020). Tea farmers who still use traditional methods rely heavily on foot and hand labor, even though modern technology is available. Tea farmer is classified as a type of work with a high potential for occupational accidents that pose risks to the health and safety of workers. The common working positions experienced by tea farmers when harvesting and picking tea leaves are prolonged standing, squatting, looking up, keeping their hands raised, and bending over while carrying heavy loads. Long working hours that exceed physical capacity can increase the risk of lower back pain (Sutami et al., 2021).

Low Back Pain (LBP) generally does not cause permanent injury, but it can lead to decreased productivity, performance, quality, and concentration at work. As a result, although not directly, low back pain can increase the risk of work-related accidents (Kaur, 2016). According to data from the World Health Organization (WHO), in 2020 there were 619 million people around the world who complained LBP (WHO, 2023). In Indonesia, according to the Riset Kesehatan Dasar (Riskesdas/Basic Health Research), the national prevalence of joint disease based on doctor's diagnosis is 7.30%, while the prevalence in West Java reaches 8.86% (Ministry of Health of The Republic of Indonesia, 2018). A number of studies have examined complaints of LBP among tea farmers in Indonesia. One such study, conducted by Dani Syuhada et al. (2018), found that posture during work and the weight of the load carried are factors associated with low back pain among tea pickers at the Ciater tea plantation in Subang Regency (Syuhada et al., 2018).

The majority of residents in West Java, especially in Cikoneng Village, work as tea farmers. The plantation area in Cikoneng Village covers 180 hectares. Farmers in Cikoneng Village must travel 50-100 meters to transport their tea harvest, carrying loads of around 30-50 kg per day for weighing and shipping. The load can even reach 100 kg per day if there are many tea buds in very good condition. When tea leaves are not in good condition, farmers only harvest 15-30 kg per day. Meanwhile, the carrying capacity of the baskets commonly used by farmers is 40-50 kg. Manual lifting of excessive loads is one of several factors that cause people to experience low back pain (Sumardiyono et al., 2023). Based on preliminary studies, it is known that the posture of farmers when picking tea shows characteristics that can lead to low back pain. Standing on sloping ground without stable footing, leaning forward slightly, and repetitive movements can trigger low back pain. Based on this background, the purpose of this study is to determine the relationship between Working Posture and low back pain complaints among tea farmers in Cikoneng Village, Bogor Regency.

Methods

Research Design

This study was using the cross-sectional research design to determine the association between working posture and low back pain among tea farmers in Cikoneng Village, Bogor Regency. The study

design is considered appropriate because the assessment of risk factors and diseases is conducted at a single point in time in order to obtain data quickly while maintaining relative accuracy.

Research Setting

This study was conducted among tea farmers in Cikoneng village, Bogor Regency, in May 2025. The research location was a fairly large tea plantation, making it a good reference location for tea plantations in describing the risk of low back pain in plantation workers.

Participants/ Sample

The research population consisted of tea-picking farmers working in Cikoneng Village, Bogor Regency, totaling 90 family cards, with the majority of workers being husbands and wives, amounting to 180 workers.

Sampling and Sample Procedures

Sampling was conducted using purposive sampling, which involved selecting tea farmers in Cikoneng Village based on predetermined criteria. Inclusion criteria included being over 18 years of age. Exclusion criteria included having a history of spinal injury and refusing to participate. This technique ensured that the sample was relevant to the research objectives and in line with purposive sampling practices, which emphasize selection based on specific characteristics.

The number of samples required in this study was calculated using the Lemeshow sample calculation formula, specifically the two-sided hypothesis test formula with a confidence level of 95% and power of 0.84 (Lemeshow et al., 1990). The results of calculating the minimum sample size for the study using the two-proportion hypothesis test formula based on the calculation of P1 and P2 from previous studies with minimal sample $n = 31 \times 2 = 62$. The final sample consisted of 85 respondents who met the inclusion and exclusion criteria.

Instruments and Procedures

The dependent variable (Low Back Pain/LBP) was measured using the Pain and Distress (PAD) Scale questionnaire developed by William J.K. Zung (1983) (Zung, 1983). This questionnaire has undergone validity and reliability testing and has been translated into Indonesian by Primala (2012) (Primala, 2012). It consists of 20 items related to low back pain complaints. Each answer is given in the form of a rating scale, namely: a score of 1 for “never”, a score of 2 for “rarely”, a score of 3 for ‘often’, and a score of 4 for “always”. After all questions have been answered, the researcher will calculate the total score by adding up all the values selected by the respondent. The final score that can be obtained ranges from 20 as the lowest value to 80 as the highest value. The categories for univariate analysis are as follows: 1) Low: score of 20-40, 2) Moderate: score of 41-60, 3) High: score of 61-80. The cutoff points for bivariate analysis are as follows: 1) Yes: score > 30 , 2) No: score ≤ 30 .

Working Posture is measured using the Rapid Entire Body Assessment (REBA) observation sheet, which is one of the approaches in ergonomics used to assess work position and body posture, particularly in the neck, arms, back, and wrists. This assessment is carried out by comprehensively analyzing the upper body posture, torso, neck, and legs simultaneously. The final score is obtained from the posture assessment, which is then added to the activity score, resulting in a total score that indicates the level of Working Posture risk. This study only observed the position of farmers picking tea while standing for approximately one hour, carrying the picked tea leaves, and then transporting them to the weighing station 40-50 meters away. The position of transporting the tea leaves to the weighing station was not considered a working position for farmers and was therefore not observed. The detail step by step of measuring this variable and the categories were based on Middlesworth (1989) (Middlesworth, 1989). For univariate analysis the categories

are as follows: 1) Very low: score of 1, 2) Low: score of 2-3, 3) Moderate: score of 4-7, 4) High: score of 8-7, 5) Very high: score of 11-15. The cutoff points for bivariate analysis are as follows: 1) Low Risk: score 1-7, 2) Risky: score ≥ 8 .

In addition to Working Posture, we also measured basic sociodemographic variables (Age dan Gender), as well as several other important variables that could theoretically be related to low back pain (Length of Employment, Smoking Habit, and Body Mass Index). Age were defined as length of life in years calculated from the respondent's birth until the time of the study and categorized as >35 years and ≤ 35 years (Rahmawati, 2021). Length of Employment were defined as the length of time respondents worked as tea farmers in Cikoneng Village and categorized as >5 years and ≤ 5 years (Rohmatillah et al., 2023). The Smoking Habit variable was measured with a "yes" or "no" question. If the respondent answered 'no' to the question, the questionnaire was not continued. If the respondent answered "yes," the question continued with the duration of smoking (in years) and the average number of cigarettes smoked per day. Smoking Habits were categorized based on the Brinkman Index (Perhimpunan Dokter Paru Indonesia, 2023). The product of the duration of smoking (years) and the average number of cigarettes smoked per day resulted in three categories of smoking severity, as follows: 1) Light Smokers (1–200 cigarettes), 2) Moderate Smokers (201–600 cigarettes), 3) Heavy Smokers (>601 cigarettes). Recategorization were done for bivariate analysis as 1) Risky: Moderate and Heavy Smokers, 2) Low Risk: Non Smokers and Light Smokers. Body Mass Index (BMI) is calculated based on measurements of weight and height. Scales are used to measure workers' weight. Tape measures are used to measure workers' height. BMI measurements are taken only once after respondents have filled in their personal details, with their bodies upright, heads held high, and without footwear. The categorization of BMI for univariate analysis were 1) Wasting (<18.5 kg/m 2), Normal Weight (18.5 kg/m 2 - <25.0 kg/m 2), Overweight (25.0 kg/m 2 - <27.0 kg/m 2), Obesity (≥ 27.0 kg/m 2) (Ministry of Health of The Republic of Indonesia, 2023). Recategorization were done for bivariate analysis as 1) Risky: Overweight and Obesity, 2) Low Risk: Wasting and Normal Weight.

Data Analysis

Univariate analysis was performed to see the distribution and frequency of each variable. Bivariate analysis was performed to see the statistical association (p-value) and the magnitude of the risk (Prevalence Odds Ratio/POR) between the independent variables and dependent variable (LBP). The statistical test used was Chi-square with an alpha of 0.05.

Ethical Considerations

This research has been approved by the Research Ethics Committee of the Veteran National Development University, Jakarta, with the number: 89/VI/2025/KEP

Results

This study sample consisted of all tea farmers in Cikoneng Village who met the inclusion and exclusion criteria (85 respondents). The proportion of LBP in univariate analysis were 51.8% (Low), 48.2% (Moderate), and 0.0% (High). The LBP category was then reduced to two categories (Yes and No) for bivariate analysis purposes. It was found that 83.5% of respondents were categorized as LBP. Meanwhile, for the Working Posture variable in the univariate analysis, it was found that Working Posture Risk began at a Moderate (42.4%), High (15.3%), Very High (42.4%) (Table 1).

Table 1. Distribution and Frequency of The Variables

Dependent Variable (LBP)	n (85)	Percentage (%)
3 Categories		
Low	44	51.8
Moderate	41	48.2
High	0	0.0
2 Categories		
Yes	71	83.5
No	14	16.5
Independent Variables		
Working Posture		
Very Low	0	0.0
Low	0	0.0
Moderate	36	42.4
High	13	15.3
Very High	36	42.4
Age		
≤35 Years	34	40.0
>35 Years	51	60.0
Gender		
Male	41	48.2
Female	44	51.8
Length of Employment		
≤5 Years	13	15.3
>5 Years	72	84.7
Smoking Habit		
Non Smokers	30	35.3
Light Smokers	29	34.1
Moderate Smokers	26	30.6
Heavy Smokers	0	0.0
BMI		
Wasting	15	17.6
Normal	49	57.6
Overweight	12	14.1
Obesity	9	10.6

Sample Characteristics

The number of respondents aged >35 Years was higher (60.0%) than those aged ≤35 Years. The proportion of Male and Female respondents was almost equal. The Length of Employment of respondents was dominated by >5 years (84.7%). The proportion of smoking habits among the categories of Non-Smokers (35.3%), Light Smokers (34.1%), and Moderate Smokers (30.6%) was almost equal, each at around 30%. There were no respondents classified as Heavy Smokers. The most common BMI was normal BMI (57.5%), but there were still 14.1% (Overweight) and 10.5% (Obese) (Table 1).

Bivariate Analysis

Bivariate analysis (Table 2), shows that there is a significant association between Working Posture and LBP. Respondents with Risky Working Posture are more at risk of experiencing LBP compared to those with Low Risk Working Posture (POR= 4.32, 95% CI: 1.23-15.19, p value 0.035). In addition, a significant association was also found in the variables of Age and Length of Employment. Respondents

aged >35 years were at greater risk of LBP compared to respondents aged ≤ 35 years (OR = 4.89, 95% CI: 1.38-17.25, p value 0.020). As for Length of Employment, respondents who had worked for >5 years were at greater risk of LBP compared to respondents who had worked for ≤ 5 years (OR= 4.37, 95% CI: 1.17-16.34, p value 0.035).

Meanwhile, no significant association was found for the variables of Gender, Smoking Habit, and BMI. However, based on the POR value, these three variables actually show an increase in risk in line with the theory.

Table 2. Bivariate Analysis

Variables	LBP				Total	p-value	POR (95% CI)
	n	Yes %	n	No %			
Working Posture							
Risky	45	91.8	4	8.2	49	100.0	0.035*
Low Risk	26	72.2	10	27.8	36	100.0	1
Age							
>35 Years	47	92.2	4	7.8	51	100.0	0.020*
≤ 35 Years	24	70.6	10	29.4	34	100.0	1
Gender							
Female	39	88.6	5	11.4	44	100.0	0.307
Male	32	78.0	9	22.0	41	100.0	1
Length of Employment							
>5 Years	63	87.5	9	12.5	72	100.0	0.035*
≤ 5 Years	8	61.5	5	38.5	13	100.0	1
Smoking Habit							
Risky	23	88.5	3	11.5	26	100.0	0.535
Low Risk	48	81.4	11	18.6	59	100.0	1
BMI							
Risky	19	90.5	2	9.5	21	100.0	0.501
Low Risk	52	81.3	12	18.8	64	100.0	1

*p-value <0,05

Discussion and Conclusion

Discussion of Main Results

The proportion of LBP in this study was 83.5%. When compared to other studies on LBP among farmers, the proportion of LBP in this study was very high. The proportion of LBP among farmers in the working area of Payangan Health Center, Gianyar was 68.6% (Kaur, 2016). The proportion of severe LBP in the farmer community in the working area of the Bermani Ulu Health Center, Curup, was 67.4% (Oktaviani et al., 2024). The proportion of LBP among palm oil loading and unloading workers at PT X in Aceh Singkil Regency was 76.92% (Ningrum et al., 2025). All of these studies are use the same study design (cross-sectional). The proportion of LBP in other studies also shows very high figures. However, our study found the highest figure. Within the population of workers with a farmer's posture (uneven footing, repetitive movements, and heavy loads from picking tea leaves), it is certain that the LBP figure will be high. However, there is still a possibility that the figures are overestimated due to the use of a cut-off point that is too low/too sensitive (LBP is considered to be present when the PAD score reaches 31). In the univariate analysis, this score is actually still within the low LBP risk range.

Observations using the Rapid Entire Body Assessment (REBA) method showed that most tea pickers in Cikoneng Village have Working Posture began at a Moderate (42.4%), High (15.3%), Very High (42.4%). This is in line with the findings of Syuhada (2018), who stated that the 50.5% tea farmers have risky back posture (Syuhada et al., 2018). This risk arises due to repetitive work, lifting heavy loads (30–50 kg), and monotonous body postures monotonous body postures, which are categorized as non-ergonomic Working Postures (Purnawinadi et al., 2022). This study also found that the majority of tea farmers in Cikoneng Village were >35 years old (60%) and had worked for >5 years (84.7%). This could be because the older participants in this study started working after graduating from high school. Some farmers even began working while still in elementary school. This is supported by the Employment Statistics Agricultural Sector which states that 67.4% of farmers in Indonesia are aged 25–59 years and 91.8% only have an elementary school education (Ministry of Agriculture of the Republic of Indonesia, 2023). In addition, based on interviews and observations, tea farming is carried out from generation to generation in tea farming families in Cikoneng Village. Agriculture in Indonesia generally applies a family farming model that is passed down from generation to generation and plays an important role in maintaining production sustainability and supporting the livelihoods of farmers (Marpaung & Bangun, 2023).

There is a significant association between Working Posture and LBP. Respondents with Risky Working Posture are more at risk of experiencing LBP compared to those with Low Risk Working Posture (POR= 4.32, 95% CI: 1.23-15.19, p value 0.035). A case-control study of tea farmers at the Ciater Tea Plantation in Subang Regency also showed an increased risk of LBP in respondents with abnormal back posture compared to those with normal posture (OR=2.510, 95% CI: 1.215-5.188, p-value: 0.020) (Syuhada et al., 2018). Based on observations, the working posture of tea farmers in Cikoneng Village tends to be non-ergonomic, especially when they pick tea leaves and lift harvests weighing 30–50 kg for approximately 4 hours every day. Repetitive movements when picking and lifting heavy loads for long periods of time with a monotonous body position are classified as non-ergonomic Working Postures (Purnawinadi et al., 2022). A static body posture that does not comply with ergonomic principles can hinder blood flow to the muscles, thereby reducing oxygen supply. As a result, the muscles become tense and easily fatigued. If this condition persists, it can exacerbate low back pain complaints.

In addition, a significant association was also found in the variables of Age and Length of Employment. Respondents aged >35 years were at greater risk of LBP compared to respondents aged ≤35 years (OR = 4.89, 95% CI: 1.38-17.25, p value 0.020). Several studies with similar age cutoff points also showed consistent results in terms of significant relationships (p-value < 0.05). These studies include a significant relationship between LBP and Age (≥ 35 years vs < 35 years) among rice farmers in Buahkapas Village, Sindangwangi District, Majalengka Regency (Assegaf et al., 2025), Age (≥ 35 years vs < 35 years) among rice farmers in Cialam Jaya Village, South Konawe Regency (Hendriani et al., 2025), Age (≥ 35 years vs < 35 years) among palm oil loading and unloading workers (Ningrum et al., 2025), Age (> 35 years vs ≤ 35 years) among rice farmers in Semen Village (Nurcahyani et al., 2024), age (on a numerical variable scale, with a correlation coefficient of 0.548) among vegetable farmers in Pinasungkulan Village (Purnawinadi et al., 2022), Age (≥ 35 years vs < 35 years) among farmers in the Kluet Selatan Subdistrict Health Center Working Area, South Aceh Regency (Rasmi et al., 2023), Age (≥ 35 years vs < 35 years) among tea farmers at PT Tambi Wonosobo (Sumardiyono et al., 2023). Among these studies, only a few presented measures of association. Respondents aged ≥ 35 years were at greater risk of LBP compared to respondents aged < 35 years (OR = 54.0, 95% CI: 4.825-604.38, p value 0.001) (Assegaf et al., 2025). Respondents aged ≥ 35 years were at greater risk of LBP compared to respondents aged < 35 years (PR = 4.667, p value 0.010) (Ningrum et al., 2025). As we age, our bones undergo degeneration, a process that begins when we reach the age of 30. At the age of 30, degeneration takes the form of tissue damage, tissue replacement with scar tissue, and fluid reduction. This causes a decrease in bone and muscle stability. The

older a person gets, the higher their risk of experiencing a decrease in bone elasticity, which triggers symptoms of lower back pain. As a person ages, the risk of suffering from lower back pain increases due to abnormalities in the intervertebral discs that occur in old age (Rahmawati, 2021)

As for Length of Employment, respondents who had worked for >5 years were at greater risk of LBP compared to respondents who had worked for ≤ 5 years ($OR = 4.37$, 95% CI: 1.17-16.34, p value 0.035). Several studies also showed consistent results in terms of significant relationships ($p\text{-value} < 0.05$). These studies include a significant relationship between LBP and Length of Employment (≥ 5 years vs < 3 years) among rice farmers in Buahkapas Village, Sindangwangi District, Majalengka Regency (Assegaf et al., 2025), Length of Employment (≥ 5 years vs < 55 years) among rice farmers in Cialam Jaya Village, South Konawe Regency (Hendriani et al., 2025), Length of Employment (≥ 10 years vs < 10 years) among rubber farmers in Megang Sakti District, South Sumatra (Herawati & Bratajaya, 2022), Length of Employment (> 5 years vs ≤ 5 years) among rice farmers in Semen Village (Nurcahyani et al., 2024), Length of Employment (> 5 years vs ≤ 5 years) among the farmers community in the working area of Bermani Ulu Health Center, Curup (Oktaviani et al., 2024), Length of Employment (≥ 10 years vs < 10 years) among farmers in the Kluet Selatan Subdistrict Health Center Working Area, South Aceh Regency (Rasmi et al., 2023), Length of Employment (> 10 years vs ≤ 10 years) among tea farmers in the Ciater Subang (Syuhada et al., 2018). Among these studies, only a few presented measures of association. Respondents with Length of Employment < 10 years were at greater risk of LBP compared to ≤ 10 years ($OR = 3.2$, 95% CI: 1.165-8.791, p value 0.036) (Syuhada et al., 2018). Respondents aged ≥ 35 years were at greater risk of LBP compared to respondents aged < 35 years ($PR = 4.667$, p value 0.010) (Ningrum et al., 2025). A person with longer working hours will be exposed to risk factors for longer periods of time, resulting in permanent narrowing of the disc space and degeneration of the spine, which is also influenced by an increase in working age (Rohmatillah et al., 2023).

Meanwhile, no significant association was found for the variables of Gender, Smoking Habit, and BMI. However, based on the POR value, these three variables actually show an increase in risk in line with the theory. In women, these complaints often occur during the menstrual cycle. In addition, the menopause process can also cause bone density to decrease due to a drop in the hormone estrogen, which can lead to back pain. Gender greatly affects the risk level of skeletal muscle complaints. This occurs physiologically, as women's muscle capacity is lower than men's (Sahara & Pristya, 2020). Smoking causes various adverse effects on organ systems, including an increased risk of LBP. Smoking can increase the frequency of coughing, and coughing increases abdominal pressure, which intensifies compression and stretching of the intervertebral discs on the nerve roots, thereby obstructing venous return from the inflamed nerve roots and increasing edema and nerve sensitivity to pain (Nugraha et al., 2023). When someone is overweight, the spine becomes compressed under the weight, making it prone to damage. One part of the spine that is most at risk from the effects of obesity is the lumbar vertebrae. Therefore, an obese person is five times more likely to suffer from LBP than someone with an ideal body weight (Sahara & Pristya, 2020).

Limitations

Sources of information bias may occur when measuring variables such as LBP, working posture, and age. LBP measurement using the Pain and Distress Scale (PAD) questionnaire may be influenced by honesty and perceptions of severity, which may vary among respondents. Age measurements based on interviews may be biased due to the influence of memory and honesty. It may be better if age measurements are based on official identity cards, such as resident identification cards. Measuring Working Posture through observation is rather difficult due to the difficult access to the research location. There are still other important variables that may be theoretically related to LBP that were not measured in this study, such as physical activity, rest patterns, stress, daily working hours, weight of loads carried, and medical history.

Conclusion

The proportion of LBP in univariate analysis were 51.8% (Low), 48.2% Moderate), and 0.0% (High). The LBP category was then reduced to two categories (Yes and No) for bivariate analysis purposes. It was found that 83.5% of respondents were categorized as LBP. For the Working Posture variable in the univariate analysis, it was found that Working Posture Risk began at a Moderate (42.4%), High (15.3%), Very High (42.4%). The number of respondents aged >35 Years was higher (60.0%) than those aged ≤ 35 Years. The proportion of Male and Female respondents was almost equal. The Length of Employment of respondents was dominated by >5 years (84.7%). The proportion of smoking habits among the categories of Non-Smokers (35.3%), Light Smokers (34.1%), and Moderate Smokers (30.6%) was almost equal, each at around 30%. There were no respondents classified as Heavy Smokers. The most common BMI was normal BMI (57.5%), but there were still 14.1% (Overweight) and 10.5% (Obese).

There were significant association between Working Posture, Age, and Length of Employment. Respondents with Risky Working Posture are more at risk of experiencing LBP compared to those with Low Risk Working Posture (POR= 4.32, 95% CI: 1.23-15.19, p value 0.035). Respondents aged >35 years were at greater risk of LBP compared to respondents aged ≤ 35 years (OR = 4.89, 95% CI: 1.38-17.25, p value 0.020). Respondents who had worked for >5 years were at greater risk of LBP compared to respondents who had worked for ≤ 5 years (OR= 4.37, 95% CI: 1.17-16.34, p value 0.035). The study concluded that poor posture and longer employment duration increase the risk of low back pain. It is recommended that farmers adopt ergonomic practices especially for those with a long Length of Employment and old age.

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Declarations

Conflicts of Interest: No conflicts of interest.

Ethical Approval Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Research Ethics Committee of the Universitas Pembangunan Nasional Veteran Jakarta, number: 89/VI/2025/KEP for studies involving humans.

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