
Analysis Of Factors Associated With Occupational Fatigue Among Motorcycle Workshop Workers In Jambi City, 2026

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Abstract

Occupational fatigue is a common occupational health problem that may reduce productivity and increase the risk of workplace accidents, particularly among motorcycle workshop workers who are exposed to physically demanding tasks and unfavorable working conditions. This study aimed to analyze factors associated with occupational fatigue among motorcycle workshop workers in Jambi City. A quantitative cross-sectional study was conducted involving 46 workers selected using simple random sampling. Data were collected through questionnaires, observation, anthropometric measurements, and the Industrial Fatigue Research Committee (IFRC) Subjective Self-Rating Test. Data were analyzed using univariate and Chi-square analyses at a 95% confidence level. The results showed that 58.7% of respondents experienced occupational fatigue. Age, length of service, smoking habits, and work environment were significantly associated with occupational fatigue, with age demonstrating the strongest association. These findings indicate that both individual and workplace factors contribute to occupational fatigue. Improving workplace conditions and strengthening occupational health promotion programs are recommended to reduce fatigue and enhance workers' health, safety, and productivity.

Keywords: Occupational Fatigue, Age, Length Of Service, Smoking Habits, Work Environment.

INTRODUCTION

Occupational fatigue is one of the occupational health issues frequently encountered across various work sectors. It is characterized by a decline in physical ability, mental capacity, and concentration resulting from continuous work activity. This condition can reduce productivity, increase work errors, and raise the risk of workplace accidents. Occupational fatigue is a contributing factor to high rates of work accidents and decreased labor productivity (Suma'mur, 2014; Tarwaka et al., 2014). Therefore, efforts to prevent occupational fatigue are an essential part of implementing occupational safety and health (OSH).

Motorcycle workshop workers are among the groups at risk of experiencing occupational fatigue, as they perform repetitive physical activities, lift loads, work in non-ergonomic postures, and are exposed to environmental conditions such as high temperatures, noise, and inadequate ventilation. In addition to work environment factors, occupational fatigue is also influenced by internal factors of the workers, such as age, length of service, smoking habits, and nutritional status, as well as external factors such as workload and working conditions. These factors can affect a person's work capacity, thereby increasing the risk of fatigue (Suma'mur, 2014; Tarwaka et al., 2014).

Various studies have shown that both internal and external factors are associated with the occurrence of occupational fatigue. Older workers tend to experience a decline in physical capacity, making them more susceptible to fatigue (Wati et al., 2025). Longer length of service increases exposure to workplace risk factors (Dwiseli, 2025). Abnormal nutritional status can affect physical endurance (Hidayati et al., 2023), while smoking habits reduce lung capacity and oxygen supply to body tissues (Iwan et al., 2025). On the other hand, an unfavorable work environment and heavy workload can also accelerate the onset of occupational fatigue. However, research findings across different types of work still show variations, necessitating studies specifically focused on the motorcycle workshop sector, which has distinct work characteristics (Aini & Paskarini, 2022; A. S. Putri et al., 2023).

Based on this context, this study aims to analyze the relationship between internal and external factors and occupational fatigue among motorcycle workshop workers in Jambi City. The findings are expected to serve as a source of information for workshop owners and relevant stakeholders in developing strategies to prevent and control occupational fatigue through improvements in work environment conditions, workload regulation, and the implementation of occupational safety and health programs.

RESEARCH METHODS

This study employed a quantitative cross-sectional design to analyze factors associated with occupational fatigue among motorcycle workshop workers in Jambi City, Indonesia. The study was conducted from May to June 2026 in motorcycle workshops located in Kotabaru, Telanaipura, and Alam Barajo Districts. A total of 46 workers were selected using simple random sampling. Eligible participants were workers aged ≥ 18 years who had worked for at least six months and voluntarily provided written informed consent. Occupational fatigue was assessed using the Subjective Self-Rating Test developed by the Industrial Fatigue Research Committee (IFRC), while the independent variables included age, length of service, work environment, and smoking habits. Data were collected through structured questionnaires and direct observation. Descriptive statistics were used to summarize respondents' characteristics and study variables, whereas associations between independent variables and occupational fatigue were analyzed using the Chi-square test. The strength of the associations was expressed as Prevalence Ratios (PRs) with 95% Confidence Intervals (95% CIs), and statistical significance was established at $p < 0.05$. Participants' confidentiality was maintained throughout the study.

RESULTS AND DISCUSSION

Results

Characteristics of Respondents

This study involved 46 motorcycle workshop workers in Jambi City. Most respondents were in the at-risk age group (69.6%), had an at-risk length of service (56.5%), and reported regular smoking habits (67.4%). Regarding educational attainment, the largest proportion had completed senior high school (32.6%). In addition, the distribution of work environment categories was equal, with 50.0% of respondents classified as having an at-risk work environment and 50.0% as having a non-at-risk work environment. Overall, 27 workers (58.7%) experienced occupational fatigue.

Table 1. Frequency Distribution of Respondent Characteristics and Study Variables

Respodent Characteristics	n	(%)
Age		
At-risk	32	69,6
Not at-risk	14	30,4
Education		
Elementary School	6	13,0
Junior High School	8	17,4
Senior Haigh School	15	32,6
Vocational High School	12	26,1
College/University	5	10,9
Leth of Service		
At-risk	26	56,5
Not at-risk	20	43,5
Work Environment		

At-risk	23	50,0
Not at-risk	23	50,0
Smoking Habits		
Regular	31	67,4
Irregular/None	15	32,6
Occupational Fatigue		
Experienced	27	58,7
Did not Experience	19	41,3

Source: Processed Primary Data, 2026

Analysis of the Relationship Between Internal and External Factors and Occupational Fatigue

The results of bivariate analysis showed that all variables studied had a significant relationship with occupational fatigue ($p<0.05$). The variable with the strongest association was age ($PR=5,469$), followed by smoking habits ($PR=2,782$), work environment ($PR=2.857$), length of service ($PR=2.198$).

Table 2. Relationship Between Internal and External Factors and Occupational Fatigue

Variable	Occupational Fatigue				Total		P Value	PR (95% CI)
	Experienced		Did not Experience					
	n	%	n	%	n	%		
Age								
At-risk	25	78,1	7	21,9	32	100	0,001	5,469 (1,496-19,989)
Not at-risk	2	14,3	12	85,7	14	100		
Length of Service								
At-risk	20	76,9	6	23,1	26	100	0,010	2,198 (1,167-4,140)
Not at-risk	7	35,0	13	65,0	20	100		
Work Environent								
At-risk	20	87,0	3	13,0	23	100	0,001	2,857 (1,510-5,407)
Not at-risk	7	30,4	16	69,6	23	100		
Smoking Habits								
Regular	23	74,2	8	25,8	31	100	0,006	2,782 (1,172-6,605)
Irregular/None	4	26,7	11	73,3	15	100		

Source: Processed Primary Data, 2026

Discussion

Relationship Between Age and Occupational Fatigue

This study found a significant relationship between age and occupational fatigue, with a p-value of 0.001. Workers in the at-risk age group were 5.469 times more likely to experience occupational fatigue than those in the non-at-risk group. This finding indicates that increasing age is associated with a higher risk of fatigue.

Theoretically, Tarwaka explains that advancing age leads to a decline in physiological capacity, muscle strength, tissue elasticity, and the body’s recovery ability after work, making workers more prone to fatigue. These results are consistent with research by (Hidayatunikmah & Ardyanto, 2025), who reported a correlation between age and occupational fatigue with a p-value of 0.003, confirming that perceived fatigue levels increase with age. Younger workers generally have better physical fitness and health, so they experience less fatigue compared to older workers.

As age increases, muscle mass decreases, and connective tissue gradually replaces muscle fibers. Workers aged 40 and above are typically more susceptible to occupational fatigue due to reduced function in various body systems. Although individuals over 40 remain within the productive age range, their work capacity begins to decline. Compared to those aged 25, their physical and mental work capacity is only about 60%–80% (Wati et al., 2025). This study assumes that aging causes

reduced physical capacity, endurance, and muscle strength, making workers more easily fatigued during work. This is particularly relevant for motorcycle workshop work, which demands significant physical effort and stamina, resulting in higher fatigue risk among older workers.

Relationship Between Length of Service and Occupational Fatigue

For this variable, a p-value of 0.010 was obtained, indicating a significant relationship between length of service and occupational fatigue. Workers with longer service periods had a 2.198 times greater chance of experiencing fatigue compared to those with shorter tenure.

This result aligns with research by (Iwan et al., 2025), which found a significant correlation between length of service and occupational fatigue at PT Wijaya Inti Nusantara ($p=0.012$). Occupational fatigue occurs when a person works for extended periods and is exposed to unfavorable work environments. Additionally, (Darimi et al., 2024) reported a correlation between length of service and fatigue ($p=0.037$), noting that longer employment provides workers with greater knowledge, experience, and skills to perform tasks.

Length of service is considered a potential factor linked to occupational fatigue. Work duration reflects the extent to which a worker is exposed to work demands and pressures; thus, longer service generally means higher cumulative exposure and increased fatigue risk. However, work experience gained over time can also improve efficiency, safety practices, and occupational health habits (Dwiseli, 2025). Therefore, the relationship between length of service and fatigue may vary depending on work characteristics and individual conditions. Continuous exposure to workloads exceeding physical capacity leads to excessive strain. This study assumes that longer tenure means longer exposure to work demands and risk factors, resulting in the accumulation of physical and mental fatigue over time, hence higher fatigue risk.

Relationship Between Work Environment and Occupational Fatigue

The results show that work environment has a significant relationship with occupational fatigue, with a p-value of 0.001. Workers in at-risk environments were 2.857 times more likely to experience fatigue than those in better conditions.

This finding is consistent with (Afridon et al., 2024), who found a significant correlation between work environment and fatigue ($p=0.011$), noting that workplaces not meeting standards or exceeding safe exposure limits increase fatigue risk. Similarly, Ananda & Mustopa (2023) found a significant association between work environment and fatigue among production workers at PT Mediafarma, confirming that workplace conditions influence fatigue levels. Fatigue risk rises in environments lacking comfort, safety, and health standards.

A safe, comfortable, and suitable work environment improves productivity, maintains comfort during work, and reduces fatigue. Conversely, unsafe or uncomfortable conditions lead to increased fatigue (S. A. Putri et al., 2024). A pleasant workplace also boosts motivation and positive attitudes, such as job satisfaction, enthusiasm, good relationships with colleagues and supervisors, and compliance with work rules—all of which improve work quality and productivity (Wibowo et al., 2022).

This study concludes that uncomfortable or non-compliant work environments increase fatigue among motorcycle workshop workers. Factors such as high temperatures, noise, poor ventilation, and inadequate workspace create discomfort and add to physical workload, making fatigue more likely.

Relationship Between Smoking Habits and Occupational Fatigue

The study found that 74.2% of workers smoked regularly, with a p-value of 0.006 indicating a significant relationship between regular smoking and occupational fatigue; smokers were 2.782 times more likely to experience fatigue than non-smokers or occasional smokers. This risk is influenced by the duration and intensity of smoking, including use during work, rest periods, or after meals.

This aligns with Suharmawati et al. (n.d.), who found a significant correlation between smoking habits and fatigue ($p=0.021$). This is likely due to long-term smoking, which gradually reduces lung function and oxygen absorption capacity. Nicotine and carbon monoxide in tobacco decrease the blood's ability to transport oxygen, lowering oxygen supply to body tissues. This impairs metabolic

efficiency, causing workers to tire more quickly during physical activity. The findings confirm that smoking is one of the determinants of occupational fatigue.

CONCLUSIONS

This study demonstrates that both internal and external factors are significantly associated with occupational fatigue among motorcycle workshop workers in Jambi City. Internal factors, including age, length of service, and smoking habits, were found to have significant associations with occupational fatigue. Likewise, the external factor of work environment was also significantly associated with occupational fatigue. Among all variables examined, age emerged as the strongest risk factor for occupational fatigue.

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