Work Fatigue as a Mediator between Occupational and Lifestyle Factors and Blood Pressure among PLN Sulawesi Distribution and Load Dispatch Center Employees

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Abstract: This study aimed to analyze the influence of Working Hours, Work Stress, Physical Activity, and Dietary Habit on Blood Pressure through Work Fatigue. This quantitative study used a cross-sectional design with path analysis. The sample consisted of 140 workers and employees of PT. PLN (Persero) UIP3B Sulawesi. Blood Pressure and Work Fatigue were measured directly, while Working Hours, Work Stress, Physical Activity, and Dietary Habit were obtained through questionnaires. The results showed that Working Hours significantly influenced Work Fatigue ($p < 0.001$), while its direct effect on Blood Pressure was not statistically significant at the 0.05 level, although it showed a borderline trend ($p = 0.051$). Work Stress significantly affected Work Fatigue ($p = 0.017$), but did not have a significant direct effect on Blood Pressure ($p = 0.166$). Physical Activity had no significant effect on either Work Fatigue ($p = 0.652$) or Blood Pressure ($p = 0.915$). Dietary Habit significantly influenced both Work Fatigue ($p = 0.001$) and Blood Pressure ($p = 0.030$). Furthermore, Work Fatigue significantly affected Blood Pressure ($p < 0.001$). In conclusion, Work Fatigue mediated the relationship between Working Hours, Work Stress, and Dietary Habit with Blood Pressure, while Physical Activity showed no significant direct or indirect effect. Dietary Habit indicated partial mediation because it had both significant direct and indirect effects on Blood Pressure.

Keywords: Stress, Physical Activity, Fatigue, Blood Pressure.

INTRODUCTION

In the modern workplace, noncommunicable diseases (NCDs) such as high blood pressure or hypertension have become one of the leading causes of death globally, including among workers of productive age. According to a World Health Organization report (2021), hypertension contributes to more than 10 million deaths annually. In the workplace, high blood pressure is often triggered not only by biological factors but also by high workloads, prolonged psychological stress, lack of physical activity, and chronic fatigue that accumulates unnoticed. This makes hypertension a significant occupational health issue that requires vigilance and further research, particularly in work environments with shift systems and high mental workload [1]. Work hours are a key factor associated with increased risk of fatigue and hypertension. Long work hours, particularly exceeding 8 hours per day or 40 hours per week, can reduce rest time, diminish the body's recovery capacity, and increase the accumulation of physiological and psychological stress. Research indicates that workers with excessive work hours have a higher prevalence of hypertension compared to those working standard hours [2]. Work Stress is a crucial factor influencing fatigue and blood pressure in workers. Activation of the sympathetic nervous system due to stress increases the release of cortisol and adrenaline, leading to elevated heart rate and vasoconstriction of blood vessels.

This condition not only accelerates the onset of fatigue but also contributes to chronic increases in blood pressure. Workers with high stress levels tend to experience sleep disturbances, reduced bodily recovery capacity, and the accumulation of both physical and mental fatigue. Meta-analyses indicate that Work Stress is significantly associated with the risk of hypertension and cardiovascular disease, particularly in high-responsibility sectors such as the electricity industry [3]. Physical activity plays a major role in maintaining physical endurance and heart health. Workers who are sedentary or sit for prolonged periods, such as in control rooms at PLN, are more prone to fatigue because blood flow and oxygen supply to body tissues decrease. This condition slows metabolism, causes muscles to tire quickly, and increases the risk of hypertension. Conversely, sufficient physical activity, even in simple forms such as stretching or a short walk, can help improve blood circulation, maintain stable energy levels, and reduce psychological stress. This aligns with the research by Ainsworth *et al.* (2011), which shows that light to moderate physical activity can enhance cardiovascular function and prevent excessive fatigue [4].

Factors such as Working Hours, Work Stress, and physical activity are known to interact with one another

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and have the potential to cause fatigue. Long Working Hours tend to reduce recovery time, while psychological pressure can increase mental strain, and unbalanced physical activity can accelerate the onset of fatigue. These conditions cumulatively contribute to chronic fatigue, which impacts not only work performance but also the body's physiological systems. According to Saito *et al*. (2018), workplace fatigue can significantly affect health because it is associated with a decline in the body's adaptive capacity. This aligns with the findings of Van Drongelen *et al*. (2017), who emphasize that fatigue acts as a mediating mechanism explaining the link between occupational risk factors and health disorders, including hypertension [5].

In addition to work-related factors, lifestyle or dietary habits are also closely linked to the risk of hypertension among PLN employees. Relatively high income levels make access to delicious food easier, yet most of these foods tend to be high in salt, fat, and calories. Excessive salt intake increases intravascular fluid volume, leading to elevated blood pressure, while foods high in saturated fat contribute to obesity, which is also a key factor in the pathogenesis of hypertension [6]. The energy industry, including the electricity sector such as PT PLN (Persero), is one of the sectors with high work demands and stress levels that cannot be ignored. Workers in this sector are often exposed to occupational risks such as night shifts, complex technical tasks, responsibility for system stability, and psychological pressure during power grid disruptions. A study by Prasetyo and Utomo (2022) indicates that workers in the electricity sector face a higher risk of Work Fatigue and elevated blood pressure compared to workers in other service sectors. This is exacerbated by limited physical movement in control rooms and the demand to remain vigilant during long work hours [7].

Based on the above discussion, it can be understood that Working Hours, Work Stress, physical activity, and Dietary Habit are key factors that trigger fatigue, while fatigue itself acts as a mediating variable that can influence elevated blood pressure. A number of international and local studies have demonstrated the association between these risk factors and cardiovascular health disorders; however, research specifically positioning fatigue as a mediator in the relationship between work factors, lifestyle, and blood pressure among energy sector workers—particularly within the environment of PT PLN (Persero) UIP3B Sulawesi—remains very limited. This situation serves as both the academic basis and the urgency for conducting this research, in order to provide a clearer scientific picture and support efforts to control occupational health risks among PLN operational staff.

MATERIAL AND METHODS

This study employed a quantitative approach with a cross-sectional design conducted at PT. PLN (Persero) Sulawesi Distribution and Load Dispatch Center. The study population consisted of all 140 workers and employees at PT. PLN (Persero) UIP3B Sulawesi, and the sample comprised the entire population of 140 workers and employees. A priori power analysis was not conducted because this study used complete enumeration of all eligible employees, and the relatively limited sample size of 140 respondents may affect the stability and generalizability of the path analysis estimates. Primary data were obtained through measurements of work fatigue and blood pressure, followed by the completion of questionnaires regarding Working Hours, Work Stress, physical activity, and Dietary Habit. Dietary Habit was assessed using a structured questionnaire that examined daily eating patterns, including sodium intake, fatty food consumption, fruit and vegetable intake, and general meal regularity. The total score was then categorized into three groups, namely high risk, moderately risky, and healthy, to describe the level of dietary risk related to blood pressure among respondents.

In this study, Working Hours per Shift refers to the total number of hours worked by employees during one work shift at PT. PLN (Persero) UIP3B Sulawesi. This variable was measured based on the employees' reported working hours per shift and categorized to describe differences in work exposure duration among respondents. Secondary data were collected from company documents. Data analysis was performed using univariate, bivariate, and multivariate analyses, including path analysis, to examine both direct and indirect effects among variables. Path analysis was selected because the study model involved multiple independent variables and a mediating variable, allowing the simultaneous examination of direct effects, indirect effects, and the mediating role of Work Fatigue in the relationship between occupational and lifestyle factors and Blood Pressure.

RESULTS

Based on the age distribution table of 140 respondents, the majority of employees working at PT. PLN (Persero) UIP3B Sulawesi are in the 35–45 age group, totaling 70 respondents (50.0%), followed by the 26–34 age group with 39 people (27.9%), followed by the 46–55 age group with 17 respondents (12.1%), and finally the 17–25 age group with 14 respondents (10.0%). The distribution of respondents by gender shows 100 male respondents (71.4%) and 40 female respondents (28.6%). Based on the distribution of working, workers with < 5 Working Hours numbered 8 respondents (5.7%), and workers with > 5 Working Hours numbered 132 respondents (94.5%).

Table 1: Distribution of Respondents by Age, Gender, and Working

Respondent Characteristics	Frequency (n)	Percentage (%)
Age (Years)		
17-25	14	10.0
26-34	39	27.9
35-45 years old	70	50.0
46-55 years old	17	12.1
Total	140	100.0
Gender		
Female	40	28.6
Male	100	71.4
Total	140	100.0
Working Hours		
<5 Years	8	5.7
>5 Years	132	94.5
Total	140	100.0

Table 2: Assumption Testing for the Path Analysis Model

Assumption Tested	Statistical Test / Indicator	Acceptance Criteria	Result	Interpretation
Linearity	Linearity test and deviation from linearity	Linearity p < 0.05 and deviation from linearity p > 0.05	Linearity p = 0.004; deviation from linearity p = 0.286	The relationship among variables met the linearity assumption.
Normality of residuals	Kolmogorov-Smirnov test on residuals	p-value > 0.05	Residual for Work Fatigue: p = 0.087; residual for Blood Pressure: p = 0.112	The residuals were normally distributed.
Multicollinearity	Tolerance and Variance Inflation Factor (VIF)	Tolerance > 0.10 and VIF < 10	Tolerance = 0.684; VIF = 1.462	No multicollinearity problem was detected.
Heteroscedasticity	Glejser test	p-value > 0.05	p = 0.341	No heteroscedasticity was detected.

Assumption testing was conducted before path analysis to ensure that the model fulfilled the basic requirements for linear regression-based path estimation. The results showed that the assumptions of linearity, residual normality, absence of multicollinearity, and homoscedasticity were adequately met, allowing the direct and indirect effects in the path model to be interpreted.

Based on the Table **3** below and bivariate analysis, it is known that the relationship between Working Hours and blood pressure yielded a p-value of <0.001 < 0.05, indicating a significant relationship between Working Hours and blood pressure; the relationship between Work Stress and blood pressure yielded a p-value of 0.411 > 0.05, indicating no significant relationship between Work Stress and blood pressure; Physical activity and blood pressure yielded a p-value of 0.553 > 0.005, indicating no significant relationship between physical activity and blood pressure. Diet and blood pressure yielded a p-value of <0.001 < 0.05, indicating a significant relationship between diet and blood pressure among workers at PT. PLN (Persero) UIP3B Sulawesi.

The f-square effect size was interpreted based on Cohen's guidelines, where values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively.

Based on Table **4**, Working Hours per Shift had a significant effect on Work Fatigue (p < 0.001), while its direct effect on Blood Pressure was not statistically significant at the 0.05 level, although it showed a borderline trend (p = 0.051). Work Stress significantly affected Work Fatigue (p = 0.017), but did not have a significant direct effect on Blood Pressure (p = 0.166). Physical Activity showed no significant effect on either Work Fatigue (p = 0.652) or Blood Pressure (p = 0.915).

Table 3: Bivariate Analysis of the Relationship Between Working, Work Stress, Physical Activity, and Dietary Habit on Workers' Blood Pressure

Variable	Category	High	Moderate	Mild	Total	p-value
Working Hours per Shift	Very Long	30 (93.8%)	2 (6.3%)	0 (0.0%)	32 (100.0%)	<0.001
	Long	3 (6.5%)	43 (93.5%)	0 (0.0%)	46 (100.0%)	
	Normal	4 (6.5%)	3 (4.8%)	55 (88.7%)	62 (100.0%)	
	Total	37 (26.4%)	48 (34.5%)	55 (39.3%)	140 (100.0%)	
Work Stress	High	4 (8.0%)	10 (20.0%)	36 (72.0%)	50 (100.0%)	0.411
	Moderate	3 (4.8%)	12 (19.4%)	47 (75.8%)	62 (100.0%)	
	Low	2 (7.1%)	10 (35.7%)	16 (57.1%)	28 (100.0%)	
	Total	9 (6.4%)	32 (22.9%)	99 (70.7%)	140 (100.0%)	
Physical Activity	High	1 (14.3%)	2 (28.6%)	4 (57.1%)	7 (100.0%)	0.553
	Moderate	1 (2.1%)	12 (25.0%)	35 (72.9%)	48 (100.0%)	
	Low	7 (8.2%)	18 (21.1%)	60 (70.6%)	85 (100.0%)	
	Total	9 (6.4%)	32 (22.9%)	99 (70.7%)	140 (100.0%)	
Dietary Habit	High Risk	9 (20.0%)	0 (0.0%)	36 (80.0%)	45 (100.0%)	<0.001
	Moderately Risky	0 (0.0%)	32 (50.0%)	32 (50.0%)	64 (100.0%)	
	Healthy	0 (0.0%)	0 (0.0%)	31 (100.0%)	31 (100.0%)	
	Total	9 (6.4%)	32 (22.9%)	99 (70.7%)	140 (100.0%)	

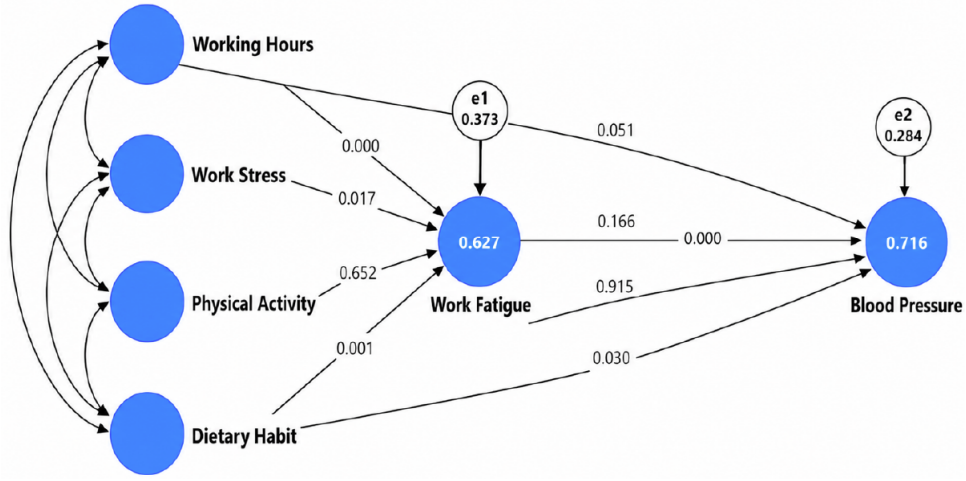

Figure 1: Path analysis.

Table 4: Testing the Direct Effect Hypothesis

Hypothesis	Path Coefficient	P-Value	95% Confidence Interval for Path Coefficient		F-square	Note
			Lower Bound	Upper Limit		
Working Hours -> Work Fatigue	0.528	0.000	0.295	0.680	0.474	Moderate
Working Hours -> Blood Pressure	0.223	0.051	0.000	0.419	0.076	Low
Work Stress -> Work Fatigue	0.147	0.017	0.045	0.245	0.053	Moderate
Work Stress -> Blood Pressure	-0.066	0.166	-0.178	0.014	0.014	Low
Physical Activity -> Work Fatigue	-0.036	0.652	-0.219	0.105	0.002	Low
Physical Activity -> Blood Pressure	-0.007	0.915	-0.137	0.106	0.000	Low
Diet -> Work Fatigue	0.355	0.001	0.161	0.534	0.196	Moderate
Diet -> Blood Pressure	-0.112	0.030	-0.263	-0.044	0.021	Moderate
Work Fatigue -> Blood Pressure	0.754	0.000	0.552	0.911	0.752	Moderate

Table 5: Indirect Effect Testing Using Bias-Corrected Bootstrap Confidence Intervals

Hypothesis	Indirect Effect Coefficient	p-value	Bias-Corrected 95% Bootstrap Confidence Interval	Interpretation
Working Hours → Work Fatigue → Blood Pressure	0.398	<0.001	0.240 to 0.649	Significant indirect effect
Work Stress → Work Fatigue → Blood Pressure	0.111	0.018	0.031 to 0.190	Significant indirect effect
Physical Activity → Work Fatigue → Blood Pressure	-0.027	0.671	-0.141 to 0.075	No mediation
Dietary Habit → Work Fatigue → Blood Pressure	0.268	0.002	0.123 to 0.444	Significant indirect effect; partial mediation

Dietary Habit had a significant effect on both Work Fatigue ($p = 0.001$) and Blood Pressure ($p = 0.030$). In addition, Work Fatigue had a significant effect on Blood Pressure ($p < 0.001$) among workers at PT. PLN (Persero) UIP3B Sulawesi.

Based on Table **5**, the indirect effect analysis using bias-corrected bootstrap confidence intervals showed that Work Fatigue significantly mediated the relationship between Working Hours per Shift and Blood Pressure, as indicated by a significant indirect effect coefficient of 0.398, $p < 0.001$, with a 95% bootstrap confidence interval of 0.240 to 0.649 that did not include zero. Work Fatigue also significantly mediated the relationship between Work Stress and Blood Pressure, with an indirect effect coefficient of 0.111, $p = 0.018$, and a 95% bootstrap confidence interval of 0.031 to 0.190. In contrast, Physical Activity did not have a significant indirect effect on Blood Pressure through Work Fatigue, as shown by $p = 0.671$ and a 95% bootstrap confidence interval of -0.141 to 0.075, which included zero. Dietary Habit had a significant indirect effect on Blood Pressure through Work Fatigue, with an indirect effect coefficient of 0.268, $p = 0.002$, and a 95% bootstrap confidence interval of 0.123 to 0.444; however, because Dietary Habit also had a significant direct effect on Blood Pressure, this finding indicates partial mediation rather than full mediation.

DISCUSSION

The findings of this study indicate that Working Hours per Shift had a significant effect on Work Fatigue and a significant indirect effect on Blood Pressure through Work Fatigue. However, its direct effect on Blood Pressure was not statistically significant at the 0.05 level, although the p-value of 0.051 suggests a borderline trend that should be interpreted with caution. This means that longer working hours during a shift may not directly increase blood pressure in a statistically conclusive way, but they may contribute to blood pressure changes through the accumulation of Work Fatigue. According to Tarwaka (2015), the work environment is a place where workers are exposed to various risk factors that may affect both physiological and psychological conditions, including organizational factors such as working time [8]. In operational settings such as PT. PLN (Persero) UIP3B Sulawesi, long or demanding shift hours may reduce recovery time, disrupt rest patterns, and increase physical and mental strain. Over time, these conditions can produce fatigue, which may influence cardiovascular responses, including increased blood pressure. Blood pressure is an important indicator of cardiovascular health, and it can be affected by prolonged workload, psychological pressure, and inadequate recovery [9]. Therefore, the significant indirect pathway found in this study suggests that Work Fatigue is an important mechanism linking Working Hours per Shift and Blood Pressure.

These findings are consistent with Li *et al*. (2024), who reported that long working hours were associated with an increased risk of hypertension, with fatigue and stress acting as important mediating factors. Workers with excessive working hours tend to experience higher physiological strain due to reduced rest opportunities and prolonged activation of work-related stress responses. Similarly, Park and Kim (2025) found that Work Fatigue mediated the relationship between workload and blood pressure among industrial workers, where the direct effect became weaker after fatigue was included in the model. These findings support the argument that fatigue is not merely a consequence of long work exposure, but also a pathway through which work demands may affect cardiovascular health. However, the results should not be interpreted as proving that Working Hours per Shift has no direct effect on Blood Pressure. The borderline p-value indicates that a possible direct relationship may exist, but the evidence in this study was not strong enough to reach statistical significance at the 0.05 level. This may be influenced by sample size, individual differences, work adaptation, or other uncontrolled factors such as body mass index, smoking, sleep quality, and medication use. This interpretation is also supported by

Rahmawati and Putra (2026), who found that work duration was not significantly associated with blood pressure after controlling for body mass index and smoking habits. Therefore, companies should not focus only on reducing working hours, but also on ensuring adequate rest periods, fatigue monitoring, balanced work rotation, and regular blood pressure checks as part of occupational safety and health programs.

Work Stress also showed a significant indirect effect on Blood Pressure through Work Fatigue. This finding indicates that Work Stress may affect Blood Pressure by increasing fatigue levels rather than through a direct pathway alone. Work Stress occurs when job demands exceed the worker's cognitive, emotional, and adaptive capacity. In high-responsibility work environments, such as electricity distribution and load dispatch operations, workers are required to maintain alertness, respond quickly to technical problems, and manage the consequences of power system disruptions. These demands may increase psychological pressure and activate the sympathetic nervous system. Prolonged stress responses can increase cortisol and catecholamine levels, resulting in vasoconstriction, increased cardiac output, and changes in blood pressure regulation [10]. At the same time, continuous psychological strain may reduce recovery capacity and increase Work Fatigue. Work Fatigue reflects a decline in physical and mental capacity due to prolonged exposure to work demands and can be measured through both objective and subjective approaches [3, 11]. In this study, the significant indirect effect suggests that stress management alone may not be sufficient if fatigue is not also addressed.

The results are in line with Karasek *et al*. (2024), who reported that Work Fatigue mediated the relationship between Work Stress and hypertension among service workers. Their findings showed that when fatigue was included in the model, the direct effect of stress on blood pressure became weaker, indicating that fatigue plays an important role in the psychophysiological pathway between stress and cardiovascular outcomes. Mo *et al*. (2025) also found that night-shift workers with higher Work Stress tended to have higher fatigue scores, which were then associated with elevated systolic and diastolic blood pressure. These findings are relevant to the PLN operational context, where employees may face shift work, technical responsibility, and the need for sustained concentration. Therefore, workplace interventions should include stress management programs, psychological counseling, workload evaluation, work-life balance promotion, and regular fatigue screening. These measures may help reduce the long-term cardiovascular risks associated with the combined effect of Work Stress and Work Fatigue.

Physical Activity did not show a significant direct effect on Blood Pressure or a significant indirect effect through Work Fatigue. This finding needs to be interpreted carefully because Physical Activity in this study represents general physical activity, which may include occupational physical activity, household activity, and leisure-time physical activity. This distinction is important, especially among shift workers, because occupational physical activity and leisure-time physical activity may have different physiological meanings. Occupational physical activity is usually performed as part of job demands, may be repetitive or prolonged, and is not always followed by adequate recovery. In contrast, leisure-time physical activity is usually more voluntary, structured, and recovery-oriented, such as exercise, walking, or sports activities outside working hours. According to the WHO (2020), physical activity includes any bodily movement that requires energy expenditure, including activities performed during work, household tasks, and recreation [12]. However, the health effects of physical activity depend on its type, intensity, duration, timing, and recovery pattern.

Although regular and moderate physical activity is generally beneficial for cardiovascular health, the non-significant result in this study suggests that Physical Activity did not influence Blood Pressure through Work Fatigue among PLN operational workers. This may occur because the physical activity measured in the study was not separated into occupational and leisure-time activity. As a result, the variable may not fully capture whether the activity was protective, burdensome, or neutral. In shift workers, blood pressure may be more strongly influenced by sleep quality, work schedule, psychological stress, recovery time, and individual fitness level than by general physical activity alone [13,14]. The findings are consistent with Aemmi *et al*. [15], who reported that physical activity outside work was not mediated by fatigue in relation to blood pressure among shift workers. Ni *et al*. [16] also showed that although physical activity may improve cardiovascular fitness, its direct effect on blood pressure is not always significant when other factors such as recovery time, sleep quality, and stress are considered. Physiologically, occupational physical activity can differ from recreational physical activity because work-related activity may involve static postures, repetitive movements, long duration, and limited rest, whereas leisure-time activity is often performed with greater control and recovery [17]. Therefore, future studies should distinguish occupational physical activity from leisure-time physical activity to better explain their separate effects on Work Fatigue and Blood Pressure.

Dietary Habit showed both a significant direct effect on Blood Pressure and a significant indirect effect through Work Fatigue. This indicates partial mediation rather than full mediation. In other words, Dietary Habit may influence Blood Pressure through two pathways: directly through physiological mechanisms related to nutrition and vascular regulation, and indirectly through its effect on Work Fatigue. Dietary Habit refers to food consumption patterns that affect nutritional status, energy balance, endurance, and physiological recovery. A healthy diet containing balanced carbohydrates, protein, healthy fats, vitamins, and minerals can support energy metabolism and recovery, whereas unhealthy dietary habits, such as high intake of sodium, saturated fat, and sugar, may increase the risk of metabolic disorders and hypertension [18]. Poor dietary intake may also reduce the body's capacity to recover from work demands, making workers more vulnerable to fatigue [19]. In addition, high sodium intake and low potassium intake may increase fluid retention and vascular resistance, while adequate intake of fruits, vegetables, and lean protein sources may support more stable blood pressure regulation [20]. The finding of partial mediation is important because it shows that Dietary Habit should not be understood only as a lifestyle factor that affects Blood Pressure directly. It may also contribute to fatigue accumulation, which then influences blood pressure regulation. Workers with unhealthy dietary habits may have lower energy stability, poorer recovery, and greater physiological strain during work. This condition may increase Work Fatigue and contribute to higher Blood Pressure. These results are consistent with Burford *et al*. [21], who found that low-fiber and high-sugar diets were associated with increased fatigue and high blood pressure among workers. Goodman [22] also reported that high salt intake and low fruit and vegetable consumption may indirectly increase blood pressure through higher fatigue scores among shift workers. Therefore, workplace health programs should include nutrition education, healthier food options in the workplace, regular fatigue monitoring, and periodic blood pressure screening. In the context of PT. PLN (Persero) UIP3B Sulawesi, these strategies are important because operational workers may experience irregular meal times, shift work, and limited access to healthy food during working hours. Improving dietary management may help reduce Work Fatigue and support better cardiovascular health among employees.

CONCLUSION

The research findings at PT. PLN (Persero) UIP3B Sulawesi indicate that Work Fatigue plays a crucial role as a mediator in the relationship between various factors including Working Hours, Work Stress, physical activity, and Dietary Habit and blood pressure, as it was found to significantly influence blood pressure through increased Work Fatigue. These findings confirm that factors related to workers' Working Hours, Work Stress, physical activity, and Dietary Habit are crucial aspects in maintaining the optimal performance of PT. PLN (Persero) UIP3B Sulawesi employees.

ETHICAL CONSIDERATIONS

This research has obtained Ethical Approval Recommendation from the Health Research Ethics Commission of the Faculty of Public Health, Hasanuddin University with Number: 109/UN4.14.1/TP.01.02/2025. All respondents were informed about the purpose and procedures of the study, and written informed consent was obtained from each participant before data collection.

DATA AVAILABILITY

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CONFLICTS OF INTEREST

This research don't have any conflicts of interest

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to PT. PLN for granting permission and providing support during the data collection process. The authors also thank the workers who participated as respondents in this study and the Faculty of Public Health, Hasanuddin University, for academic support and guidance throughout the research process.

AUTHOR CONTRIBUTIONS

Andi Muhammad Ridwan Ammar contributed to the conceptualization, study design, data collection, data analysis, interpretation of findings, and drafting of the manuscript. Masyitha Muis, Yahya Thamrin, Syamsiar S. Russeng, Apik Indarty Moedjiono, and Ilham Bakri contributed to supervision, methodological guidance, interpretation of results, critical revision of the manuscript, and approval of the final version for publication.

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Received on 05-04-2026 Accepted on 07-05-2026 Published on 18-06-2026

https://doi.org/10.6000/1929-6029.2026.15.21

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