

# The relationship of sleep quality, work stress, nutritional status with work fatigue of employees in the process part of the palm factory

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## ARTICLE INFO

### Article history:

Received Jun 15, 2024

Revised Jun 18, 2024

Accepted Jun 25, 2024

### Keywords:

Nutritional Status

Sleep Quality

Work Fatigue

Work Stress

## ABSTRACT

Work fatigue is one of the occupational health and safety problems which can be a risk factor for accidents while working. Fatigue can be caused by several factors, both internal and external factors. Internal factors include age, anemia status, length of service, sleep quality, and workload, while external factors include work shifts and hot work climate. The aim of this research is to analyze factors related to work fatigue in employees of the production section of PTPN IV Kebun Pabatu Tebing Tinggi. This research uses quantitative methods with a cross sectional design. The sampling technique is Stratified random sampling. The population and sample in this study were all 60 workers at PTPN IV Kebun Pabatu. Data was collected using a questionnaire and the variables studied included Nutritional Status, Environmental Quality, and Work Stress. The data was processed using the chi-square test using the SPSS version 20 application. The results of this study showed that there was a relationship between Nutritional Status and Work Fatigue ( $p$  value = 0.001), there was a relationship between Sleep Quality and Work Fatigue ( $p$  value = 0.004), and there was a relationship between Job Stress and Job Fatigue ( $p$  value = 0.003). It was concluded that the  $P$ -value  $< 0.05$  means that all variables have a significant relationship between nutritional status, work stress, and sleep quality with work fatigue.

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## INTRODUCTION

Rapidly developing industries also require longer production times so that production results reach standards in quality and quantity in accordance with customer demand and obtain maximum profits (Armadani & Paskarini, 2023). In this case, the industry will implement a 24-hour work shift system to carry out the production process continuously (Juliana et al., 2018). The shift

work system has a negative impact on work performance, especially the night shift system (Marchelia, 2014). The risk is 28% in the form of injuries, accidents, decreased work ability, affecting social and family relationships, increasing risks to the digestive system, nerves, heart and blood vessels, as well as sleep disorders experienced by night shift workers (Alfikri et al., 2021). Sleep disturbances experienced by night shift workers can affect the quality of their sleep (Armadani & Paskarini, 2023) (Khusna et al., 2023). Quality sleep plays an important role in a person's physical and spiritual health because sleep functions to enable the body to recover and rest after daily activities, reduce stress and anxiety, and increase concentration power for daily activities (Yunus et al., 2021).

Quality sleep is a very important source of fitness in increasing body productivity in the future. Like nutritious food and exercise, quality sleep is an absolute necessity that is just as important. Typically, adults need 7-8 hours of sleep every day to maintain optimal health and performance (Armadani & Paskarini, 2023). The body's recovery can be done during the sleep process (Gunarsa & Wibowo, 2021). Body recovery is said to be successful if a person becomes fresher and more energetic when working (Aulia et al., 2024)(Armadani & Paskarini, 2023). Fatigue is an issue that needs to be given serious attention. However, if someone exceeds the limits of their ability to work physically or mentally, they will experience fatigue and this condition will result in not achieving the quality of sleep they want to achieve. Inadequate sleep quality can have a serious impact on a person's health and performance at work (Armadani & Paskarini, 2023). However, it is often difficult to detect these sleep quality problems in the workplace, making them an invisible danger that can potentially threaten worker safety and health (Agustinawati et al., 2019). This research aims to determine the relationship between sleep quality and work fatigue in workers (Tanriono et al., 2019). In order to increase productivity at work and the need to maintain optimal work health so that in the future workers can minimize the occurrence of work fatigue due to poor sleep quality. Sleep disturbances felt by workers can affect the quality of their sleep (Armadani & Paskarini, 2023). Quality sleep plays an important role in a person's physical and spiritual health because sleep functions to enable the body to recover and rest after daily activities, reduce stress and anxiety, and increase concentration power for daily activities (Hendriana, 2023). Quality sleep is a very important source of fitness in increasing body productivity in the future (Tristianingsih & Handayani, 2021). Like nutritious food and exercise, quality sleep is an absolute necessity that is just as important. Typically, adults need 7-8 hours of sleep every day to maintain optimal health and performance (Dimkatni et al., 2020).

There were 173,105 work accident cases that occurred, and the majority of them occurred in the construction sector with a percentage of 32%. The main cause of the high number of work accidents in the construction sector is the symptoms of fatigue felt by workers. Workers who visit health centers often complain of fatigue as their main symptom. It is important to pay attention to work fatigue in every field of work. Work fatigue can have an impact on decreasing work performance, which has the potential to cause errors while working. Steps to reduce work fatigue need to be taken so that work productivity and effectiveness can be maintained (Armadani & Paskarini, 2023). However, if someone exceeds the limits of their ability to work physically or mentally, they will experience fatigue and this condition will result in not achieving the quality of sleep they want to achieve (Rudyarti, 2020). Inadequate quality sleep can have a serious impact on a person's health and performance at work. However, it is often difficult to detect these sleep quality problems in the workplace, making them an invisible danger that can potentially threaten worker safety and health (Armadani & Paskarini, 2023).

The World Health Organization (WHO) confirms that the number 2 killer disease after heart disease is feelings of severe fatigue. The Japanese Ministry of Manpower conducted research on 12 thousand companies and involved around 16 thousand workers who were randomly selected. The results of the research showed that 65% of workers complained of physical fatigue due to routine work, 28% complained of mental fatigue and around 7% of workers complained of

severe stress and felt left out (Hardianti et al., 2023). In the production department of one of the companies in Indonesia, research was conducted, the results of the research showed that the symptoms of fatigue experienced by the average worker were headaches, stiff shoulders and back pain. The factors that cause fatigue in industry vary greatly. The work environment can affect worker performance, for example noise, hot work climate, poor lighting, work stress and vibration can cause discomfort at work. If you work in uncomfortable conditions, over time it will cause fatigue (Al Ikhsan et al., 2023).

36% of work accidents were caused by fatigue, and as a result approximately 18% or 152 people experienced disabilities, 63.3% of work fatigue occurred in workers who had poor nutritional status (Farha et al., 2022). The same thing was also expressed by BPJS Employment, which revealed that in 2019 there were 114,235 work accident cases in Indonesia. Meanwhile, in 2020 BPJS Employment recorded 117,161 work accident cases with one of the work accident factors being work fatigue. Work accidents in West Java are the highest number of work accidents in Indonesia, this is stated by BPJS Employment. In 2020, there were 35,291 work accidents in West Java Province, including 26,699 work accidents, 930 disability cases and 271 death cases (BPJS Employment, 2020). This data makes it clear that work accidents caused by work fatigue are quite large.

Job stress is an individual's inability to fulfill the demands of his work so that he feels uncomfortable and unhappy. Stress doesn't just happen. However, stress arises generally followed by events that affect a person's psyche and the event occurs beyond his or her ability so that the condition has put pressure on the person's soul (Alfikri et al., 2021). Job stress can have various consequences on individual workers. both physiologically, psychologically and even behaviorally. Stress that is experienced continuously and uncontrollably causes burnout, which is a combination of physical, psychological and emotional fatigue. As a result of experiencing work stress, employees will lose their ability to make decisions and their behavior will become irregular and trigger the employee's desire to leave (Armadani & Paskarini, 2023).

According to Tarwaka (2020) in research by Augyantantri Dwivira Widyastuti (2019), the impact of work-related stress can cause emotional reactions, changes in habits or mentality, and physiological changes. One of the physiological changes is fatigue. Factors that influence stress are physical factors such as noise and fatigue, while other factors are workload and the nature of the work. One of the factors that causes stress is work fatigue. Work fatigue is a variety of conditions accompanied by a decrease in efficiency and endurance at work, which can be caused by fatigue whose main source is the eyes (visual fatigue), general physical fatigue, nervous fatigue, and fatigue from a monotonous environment, fatigue from a chronic environment that continuously - continuous as a determining factor (Russeng, 2021). According to (Nursafitriandevi et al., 2024) there are various factors that can influence the occurrence of work fatigue, ranging from inadequate work environment factors for work to psychosocial problems that can influence the occurrence of work fatigue. Work stress can affect employee fatigue in achieving targets and employees do not feel at home in the company because the burden the employees bear feels heavy.

Suboptimal nutritional status is one of the factors causing work fatigue. Adequate nutrition for employees must be considered in every company because fulfilling nutrition is one of the requirements for implementing work safety, and also as an effort to improve employee health and increase work productivity (Simanungkalit et al., 2023). Adequate nutritional needs will produce sufficient energy so that when taking on the workload there is no shortage of energy. If employee calorie intake is not sufficient, workers will quickly experience work fatigue compared to workers whose calories are sufficient and in accordance with their needs (Ramadhan, 2023). Employees with poor nutritional status and with a heavy workload can more easily experience work fatigue. Workload is the work ability and job demands that vary for each individual. The greater the workload on employees, the greater the risk of work fatigue they receive (Basalamah et al., 2021). The severity of a workload is related to the type of activity (as the main load) and the

environment (as an additional load). Work that is too heavy and excessive will result in muscle contractions that exceed the body's capacity, which can accelerate work fatigue (Dewi, 2018).

During the day, the presence of the sun causes the environment to become bright, making humans have the instinct to work and vice versa, because the influence of darkness at night causes the human instinct to rest. The period during the day is called the ergotropic phase, namely human performance is at its peak, while the nighttime period is called the trophotropic phase, namely the process of rest and energy recovery (Salam et al., 2023). Workers who work using a rotational work system and do it only once, then circadian rhythms can return to normal. However, if workers work using a rotational work system continuously, the circadian rhythms will not return to normal. By not returning to circadian rhythms, it can cause sleep disorders and various other symptoms (Armadani & Paskarini, 2023).

Based on an initial survey conducted by researchers at PTPN IV Pabatu, there were 22 employees who experienced increased work fatigue. Where this is caused by several workers who experience poor nutritional status due to abnormal eating patterns, then the increase in the production process of palm fruit bunches and lack of appreciation from leadership results in decreased performance and increased work stress, the resulting production process does not only depend on machines. - Modern machines, but depending on the workers in the palm fruit bunch processing section, with the increase in production demand, it must be supported by optimal nutritional status, sufficient quality sleep, and not experiencing heavy work stress, the person carrying out the work, as is the case.

From the description above, it can be concluded that researchers are interested in conducting research with the title "Relationship between the quality of the work environment, work stress, nutritional status and work fatigue of employees in the process section of the PTPN IV Palm Oil Factory, Tebing Tinggi Pabatu Plantation." In this research, the author chose the PTPN IV Kebun Pabatu Tebing Tinggi Palm Oil Factory for the reason that the object of this research was one of the companies that operates plantations and processes palm oil commodities which includes processing of areas and plants, seed gardens and maintenance of mature plants, processing of commodities into raw materials for various industries, this article explores work fatigue at PTPN IV Kebun Pabatu Tebing Tinggi.

The objectives of this research are: (1) To find out the relationship between nutritional status and work fatigue of employees in the Palm Oil Factory process section at PTPN IV Pabatu plantation (2) To find out the relationship between work stress and fatigue at PTPN IV Pabatu Tebing Tinggi (3) To find out the relationship between sleep quality and work fatigue in workers (4) To find out the relationship between sleep quality, work stress, nutritional status, and work fatigue in employees in the PTPN IV Kebun Palm Oil Factory process section Pabatu Tebing Tinggi.

## RESEARCH METHOD

This research uses quantitative methods with a cross sectional design. This research was conducted at PTPN IV Kebun Pabatu Tebing Tinggi. This research was carried out in March-April 2024. The population and sample in this research were all 60 employees in the process section who used the Stratified Random Sampling method. Stratified Random Sampling is a sampling process by dividing the population into strata, selecting random samples from each stratum, and combining them to estimate population parameters. Determining the number of samples in this study used the Slovin formula which was obtained from 60 samples with an error rate of 5%. Sleep quality assessment used the PSQI (Pittsburgh Sleep Quality Index) sheet. Job stress assessment uses descriptive analysis. Nutritional Status is carried out by categorizing Body Mass Index (BMI). Each employee in the process section and their work fatigue data are assessed using the IFRC (Industrial Fatigue Rating Committee) questionnaire. The analysis used in this research is univariate and bivariate using the chi square test. This research uses primary data sources obtained directly from

the questionnaire provided. The data collection method uses a questionnaire with respondents filling in based on a Likert scale by categorizing very often, frequently, sometimes and never.

## RESULTS AND DISCUSSIONS

### Univariate Analysis

**Table 1.** Frequency distribution of respondent characteristics at PTPN IV Pabatu High Cliff (n=60)

Variable	n	Percentage %
Age		
21-30	13	21.7
31-40	9	15.0
41-50	23	38.3
51-60	15	25.0
Gender		
Man	60	100%
Woman	0	0 %
Last education		
elementary school	1	1.7
JUNIOR HIGH SCHOOL	10	16.7
SENIOR HIGH SCHOOL	47	78.3
S1	1	1.7
DIII	1	1.7
Length of work		
1-10 years	18	30.0
11-20 years old	2	3.3
21-30 years old	26	43.3
31-40 years old	14	23.3
Nutritional status		
Not good	22	36.7
Good	38	63.3

Based on the results of the study in table 1, it shows that the respondents aged in the category (21-30) were 13 people (21.7%), in the age category (30-40 years) there were 9 people (15%), in the age category (41 -50 years) as many as 23 people (38.3%), in the age category (51-60 years) as many as (25%), who worked during this period were calculated based on the year the worker started working until the direct research. In the gender category, 0 worker respondents are dominated by women and 100% of the 60 worker respondents are male workers, where male workers have a greater comparative advantage than women in employment.

Furthermore, in the last education category, the highest number of workers' last educational history was high school where there were 47 respondents (78.3%), elementary school 1 respondent (1.7%), middle school 10 respondents (16.7%), bachelor's degree 1 respondent (1.7%) and DIII 1 percent (1.7%). In the old defender category work, shows the length of time the individual was exposed to work at work until the time of the study. With the majority working in the category period (1-10) as many as 18 people (30%), working in the category period (11-20) as many as 2 people (3.3%), working in the category period (21-30) as many as 26 people (43.3%), working in the category period (31-40) as many as 14 people (23.3%).

Then, in the Nutritional Status category, it can be concluded that the nutritional status of the majority of respondents was good nutritional status, as many as 38 people (63.3%) with nutritional status measurements carried out using the Body Mass Index (BMI) standard. Which is divided into 2 categories, namely good and not so good. Nutritional status is one of the factors that influences workers' fatigue levels because nutritional status is related to health and work capacity. This is also in line with practical guidelines for monitoring the nutritional status of adults

(DepkesIR, 2019) which explains that someone who has poor nutritional status has a risk of getting tired easily and a high risk of contracting infectious diseases, depression and anemia.

### Bivariate Analysis

Bivariate analysis was carried out to test the relationship between independent variables, namely nutritional status, quality of work environment, work stress and work fatigue at PTPN IV Kebun Pabatu Tebing Tinggi using the Chi-Square test. The main goal of bivariate analysis is to determine whether there is a statistical relationship between two variables and if so, how strong and in what direction the relationship is.

**Table 2.** Relationship between nutritional status and work fatigue

Nutritional status	Work fatigue						Odd Ratio	P value
	Tall		Low		Total			
	f	%	f	%	f	%		
Good	31	32.3	7	5.7	38	38	299,143	0.001
Not good	20	18.7	2	3.3	22	22		
Total	51	51.0	9	9.0	60	60		

In table 2. From the results of the Chi-Square test, the p-value is  $0.001 < 0.05$ ; OR = 299.143, it can be seen that the high category of work fatigue was found in the nutritional status of the good nutritional category of 31 workers (32.3%), the less good category of work fatigue was found in the nutritional status of the poor nutritional category of 20 workers (18.7%). so  $H_0$  is rejected and  $H_a$  is accepted which states that there is a significant relationship between nutritional status and work fatigue in workers at PTPN IV Kebun Pabatu Tebing Tinggi. This means that there is a significant relationship between nutritional status and work fatigue.

**Table 3.** Relationship between sleep quality and work fatigue

Sleep Quality	Work Fatigue						Odd Ratio	P value
	Tall		Low		Total			
	f	%	f	%	f	%		
Good	10	68.3	8	11	18	86.3	421.54	0.004
Not good	41	13.3	1	49	42	62.3		
Total	51	81.6	9	60	60	148.6		

In table 3. Based on the results above, it can be seen that low sleep quality and work quality can result in a decrease in work quality. Decreased sleep quality will make it more difficult for workers to have enthusiasm and initiative in doing work, which may reduce attention to detail and increase the possibility of errors with Sig values. (2-tailed) between sleep quality and work fatigue of  $0.004 < 0.05$ ; OR = 421.54 This means that there is a significant relationship between the Sleep Quality variable and Work Fatigue. So  $H_a$  is accepted, which means there is a relationship between sleep quality and work fatigue.

**Table 4.** Relationship between work stress and work fatigue

Job Stress	Work fatigue						Odd Ratio	P value
	Light		Heavy		Total			
	f	%	f	%	f	%		
Light	0	3	9	8.7	9	11.7	754,667	0.003
Heavy	2	1.7	49	49.3	51	51		
Total	2	4.7	58	58	60	62.7		

In table 4. Based on the table above, it can be seen that between work stress and work fatigue it was found that the number of respondents who felt light work stress was 0 (3%), respondents who felt heavy work stress was 49 (49.3%). Judging from the p value of 0.003% ( $p < 0.05$ ), there is a relationship between work stress and work fatigue.

## Discussion

### The Relationship between Sleep Quality and Work Fatigue

The results of research conducted at PTPN IV Kebun Pabatu Tebing Tinggi show that there is a relationship between sleep quality and work fatigue, with  $p$  value = 0.004 where  $P < 0.005$ ; OR = 421.54. This research is comparable to other research, based on the results of the Chi-square statistical test, the  $p$ -value = 0.001, which means there is a relationship between sleep quality and work fatigue in production employees at PT. Arwana Anugrah Ceramics, Tbk. A total of 41 employees in the production department of PT. Arowana Anugrah Keramik, Tbk has poor sleep quality (Juliana et al., 2018). This research is in line with other research with the results of the bivariate correlation test showing a significant relationship between sleep disturbances and the subject's level of fatigue ( $p = 0.024$ ). A positive  $r$  value indicates that the higher the sleep disturbance, the higher the subject's level of fatigue (Wulandari & Luh Made, 2015). The higher the level of fatigue experienced by respondents, the worse their sleep quality became. Likewise, if the level of fatigue is lower, the quality of sleep will be better. Fatigue that a person gets from work that exceeds the limits of one's abilities will cause the burden of this fatigue to disrupt the sleep process. If the sleep process is disturbed, the expected quality of sleep will not be achieved (Wijanarti & Anisyah, 2022). The quality of sleep obtained by nurses is due to the hours of sleep they spend working so that the need for 7-8 hours of sleep per day is not met.

There are several factors that can affect fatigue is the quality of sleep which will result in a person experiencing sleep disorders. In this situation it can be concluded that sleep disturbances and fatigue have a significant relationship (Rudimin et al., 2017).

### Relationship between nutritional status and work fatigue

The results of research conducted at PTPN IV Kebun Pabatu Tebing Tinggi show that there is a relationship between nutritional status and work fatigue, with  $p$  value = 0.001 where  $P < 0.005$ ; OR = 299,143. This is in line with (Tasmi et al., 2015) regarding loading and unloading workers at Tapak Tuan Port. The results show that there is a relationship between nutritional status and work fatigue with a value of  $p = 0.009$  using the Chi-Square statistical test.

This is in line with research conducted by (Triana et al., 2017) shows that there is a relationship between energy consumption and fatigue. The relationship that occurs is a negative relationship, meaning that an energy deficit will increase the opportunity for fatigue, and vice versa. (Purnamasari & Ulfah, 2012) research on female workers in the PT. Hyup Sung false eyelash industry and Adi, et al.'s (2020) research on the packaging department of the Float Glass glass company also showed similar results. The result is that there is a relationship between energy intake and work fatigue.

### The Relationship between Job Stress and Job Fatigue

The results of research conducted at PTPN IV Kebun Pabatu Tebing Tinggi show that there is a relationship between work stress and work fatigue, with  $p$  value = 0.003 where  $P < 0.005$ ; OR = 754,667. This means that there is a significant relationship between the Job Stress variable and Job Fatigue. According to Rees 2020 and Silalahi 2022 in Mauritz 2019, it is explained that stress can affect work fatigue but is different for each worker. Similar research was also conducted by Lendombela et al (2020) which found that there was a significant relationship between work stress and work fatigue. The stress that occurs in each individual varies depending on the level of work and problems.

This agrees with Widyasari's (2022) research which shows that there is a significant relationship between work fatigue and work stress among inpatient nurses at the Surakarta Islamic Hospital. The correlation coefficient between work fatigue and work stress is 0.742 (12). This research is also supported by the research results of Ardian, Hengky (2019), who said there was a relationship between work fatigue and work stress in nurses (17). Based on the work fatigue questionnaire, the majority of respondents (11.9%) often experience yawning while working, for

the indicator of weakening motivation, the majority of respondents often experience reduced self-confidence, 8 respondents (11.9%), and for the indicator physical fatigue, the majority of respondents often felt stiffness in their shoulders, 5 respondents (7.5%). Based on physiological indicators of work stress, the majority of nurses felt their heart palpitations when dealing with very serious patients, 20 respondents (29.9%), while for psychological indicators of work stress, the majority of nurses experienced sweaty palms when facing patients, 10 respondents (14.9%). and for cognitive indicators of work stress, the majority of nurses always blame themselves if they cannot care for patients, 2 respondents (3%). The state and feeling of fatigue is a functional reaction.

## CONCLUSION

The results of research conducted at PTPN IV Kebun Pabatu Tebing Tinggi, researchers concluded that the factors related to work fatigue were caused by nutritional status, sleep quality and work stress. Nutritional status has a relationship with work fatigue, namely the higher the nutritional status of workers, the greater the increase in work fatigue. Apart from that, sleep quality is related to work fatigue. Based on a comprehensive analysis, sleep quality is related to work fatigue experienced by workers in various fields of work. This association was obtained from workers with types of work such as goods delivery couriers, mechanical workers, office workers, palm oil farmers, online motorcycle taxi drivers, bendor drivers, and factory workers which is in accordance with the theory that poor sleep quality of workers can increase the risk of work fatigue. Efforts that can be made by workers are adopting a healthy lifestyle by exercising regularly, consuming nutritious food and drinks, arranging adequate rest and sleep times. Apart from that, work stress also has a relationship to work fatigue because the higher the work stress felt by workers, the higher the work fatigue of workers. The Company should provide education in an effort to optimize employee nutrition, sleep quality and work stress as well as provide guidance to workers in improving nutritional status so that the nutritional status of all workers is balanced so that there is less work fatigue. Leadership must improve the approach to workers in all departments to always provide enthusiasm. or support and by giving employees the opportunity to participate in making policies for the company's progress towards workers in order to motivate workers to become workers with high performance productivity and without the accumulation of work stress that they always think or feel. For future researchers to be able to research other factors that have not been been researched in relation to work fatigue.

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