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Factors Related to Work Fatigue in Jambi City Environmental Service Waste Carriers in 2024

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ABS T RAC T

This research discusses factors related to work fatigue in Jambi City environmental service waste transporters in 2024. The aim of this research is to examine and analyze factors related to work fatigue. This research is a quantitative study with a cross sectional design with univariate and bivariate analysis with a 95% confidence interval. The total population was 165 people and the sample was 108 respondents, the sampling technique used simple random sampling. The research variables are age, length of service, workload, sleep quality, work attitude and heat stress. The results of this study were that 88% of them experienced moderate fatigue and 12% experienced mild fatigue in relation to the variables age (p=0.037), length of service (p=0.003), workload (0.006), length of work (p=0.038), work attitude (p=0.029), heat stress (p=0.045) and no relationship with sleep quality (p=0.055) with work fatigue in Jambi City Environmental Agency waste haulers in 2024.

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INTRODUCTION

Occupational Safety and Health (K3) are all activities to guarantee and protect the safety and health of workers through efforts to prevent work accidents and work-related diseases(Peraturan Menteri Tenaga Kerja RI, 2015). According to the International Labor Organization (ILO), occupational safety and health is improving and maintaining the highest level of physical, mental and social well-being of all workers in all types of work, preventing health problems caused by work, protecting workers in every work from risks arising from factors that can harm health, placing and maintaining workers in a work environment that is appropriate to the workers' physiological and psychological conditions and to create compatibility between work and workers and each person with their duties(International Labour Organization, 2018). In 2018, the deaths of two million workers were reported by the International Labor Organization (ILO). The deaths of workers are caused by work accidents that stem from fatigue. The research stated that of 58,115 samples, 32.8% of them or around 18,828 samples suffered from fatigue.(International Labour, 2018).

Many factors cause work accidents, one of which is fatigue. Work fatigue contributes to half of the work accidents that occur, but is still often considered trivial and not a priority for companies or industries(Techera, n.d.). The World Health Organization WHO shows that in 2020, severe fatigue is the second killer disease after heart disease (WHO, 2020).One of the main causes of work accidents caused by humans is stress and fatigue.(Apriliani, 2019). In Indonesia, in 2022, the number of work accidents reported to the Ministry of Manpower through the Provincial Manpower Office is 7,298 work accidents with a total of 9,224 victims. According to Tarwaka (2010), the risks of work fatigue are: decreased work motivation, low performance, low work quality, lots of errors, low work productivity, work-related stress, work-related illnesses, injuries and work accidents.(Larasatie et al., 2022)

The population in metropolitan cities and large cities in Indonesia shows signs of increasing, this causes the volume of waste accumulation to increase. Waste is a consequence of daily community activities. Every human activity inevitably produces waste or waste. Efforts to handle waste need to be carried out correctly and involve the government, private sector and the community. Handling and management of waste problems needs to be considered in line with city development and the rate of population growth(Fauziah & Suparmi, 2022).

The Jambi City Environmental Service (DLH) plays a role in the waste transportation process, the process of carrying waste from the source or temporary storage area to the integrated waste processing site or final processing site. It is impossible for waste transport officers to avoid fatigue due to work due to the large volume of waste being transported manually and the distance between the temporary disposal site and the final disposal site being very far, in addition to the erratic working hours due to the amount of waste and the distance traveled, these activities can cause fatigue if done repeatedly

and it is possible that waste haulers will suffer from work fatigue. In addition, outside activities result in workers being directly exposed to light or hot temperatures, which are environmental factors that can cause fatigue. Apart from environmental factors, there are several main factors that cause fatigue, such as age, length of work, length of service, sleep quality, workload and work attitude.

Based on the results of the initial survey through observations and interviews conducted by researchers to see an overview of the work process of waste transporters. The results of the initial survey conducted on 10 officers showed that several officers had different ages and lengths of service, namely officers with more than 5 years of service and less than 5 years of service, where length of service was one of the factors that caused work fatigue. Officers with >5 years of service are more at risk of experiencing work fatigue compared to officers with <5 years of service. The condition of waking up from sleep feeling restless and dissatisfied, this is due to working hours that are longer than the provisions which can result in poor sleep quality, where sleep quality is one of the factors that causes work fatigue.

Based on previous research and the background created, the author is interested in conducting research related to "Factors related to work fatigue among Garbage Transporters in Jambi City in 2024"

THEORETICAL REVIEW

Definition of Job Fatigue

Fatigue shows different conditions, but all result in a reduction in work capacity and body endurance. Fatigue is a subjective feeling. The term fatigue refers to a condition of weakening the energy to carry out an activity. Fatigue due to work is often interpreted as a process of decreased efficiency, work performance and reduced strength or physical endurance of the body to continue the activities that must be carried out. Work fatigue will reduce performance and increase the level of work errors. Even static muscular loading (static muscular loading) if maintained for a long time will result in RSI (Repetition Strain Injuries), namely pain in muscles, bones, tendons, etc. caused by repetitive types of work(Ir, Dr.Yulianus Hutabarat, 2015).

Types of work fatigue

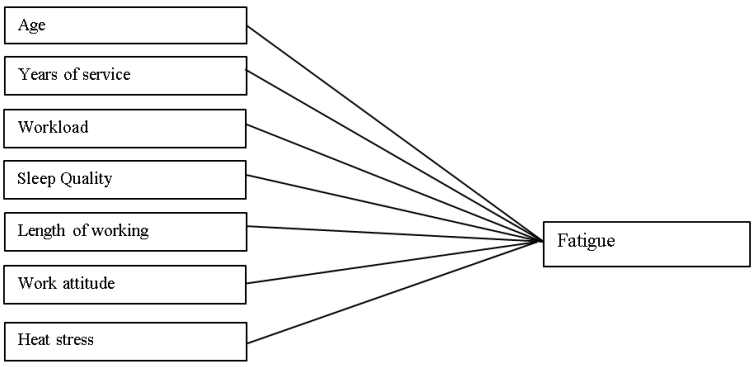
According to Suma'mur, there are two types of fatigue, namely muscle fatigue and general fatigue. Muscle fatigue is characterized, among other things, by tremors or pain in the muscles. General fatigue is indicated by a loss of will to work, the cause of which is a state of central nervous system or psychic-psychological conditions. The root of the problem of general fatigue is the monotony of work, the intensity and duration of mental and physical work that is not in line with the wishes of the worker concerned, environmental conditions that are different from the original estimate, unclear responsibilities, deep worries and inner conflicts as well as the illness suffered by the worker(Dwienda & Ahmad Satria Efendi, 2021).

Factors Associated with Fatigue

1. Age
   The age factor can influence workers' reaction times and feelings of fatigue. Older workers experience a decrease in muscle strength, but this situation is offset by better emotional stability compared to younger workers, so it can have a positive impact on doing their work. According to Tarwaka (2014), health complaints generally begin to be felt at the working age of 25-65 years. The first complaint is at risk of being felt at the age of >35 years and the level of complaints will continue to increase as muscle endurance begins to decline so that the risk of health complaints and fatigue will increase(Permatasari et al., 2022).
2. Years of service
   The period of work will be related to the work experience a person has in carrying out his work at an agency or institution. According to Suma'mur, the working period is divided into 2 parts, namely:
   A. New work period: ≤ 5 years,
   B. Long service period: >5 years.
   Workers who have worked for more than five years usually have a higher level of job burnout compared to new workers. This boredom has the potential to cause stress or frustration. In the end, this will cause a decrease in productivity and an increase in work output, as well as increasing the opportunity for work accidents to occur. Apart from that, working time can also affect work fatigue, especially chronic fatigue. The longer a worker works in a work environment that is less comfortable and enjoyable, the more fatigue the person will accumulate over time(Tarwaka, Solichul HA. Bakri, 2004).
3. Workload
   Workload is the burden felt by the workforce as a result of the work carried out by the worker. According to Tarwaka (2004), work that is too heavy and excessive will accelerate a person's work fatigue. Work pulse is an indication of the size of the workload. As a result of a workload that is too heavy, it can result in workers suffering from work-related disorders or illnesses.(Tarwaka, Solichul HA. Bakri, 2004)
4. Sleep Quality
   According to Buysee et al, sleep quality is a state of sleep that a person experiences, resulting in freshness and fitness when awakened. Sleep quality is each person's ability to maintain a state of sleep and to obtain REM and NREM sleep stages that suit their needs(Buysse et al., 1989)
5. Length of working
   Length of work is one of the factors that influences the incidence of fatigue, apart from that, the length of work for a worker can be used as a reference in determining the level of productivity and efficiency. A good working time is a maximum of 8 hours per day, where the remaining time can be used by workers to rest.
   1. 6 days a week:

work 7 hours a day or 40 hours a week
2. 5 days a week:
work 8 hours a day or 40 hours a week(KEMENPERIN, 2003)

6. Work attitude
   Ergonomics is the science, art and application of technology to harmonize or balance all the facilities used for activity and rest with human abilities and limitations, both physical and mental, so that the overall quality of life becomes better. According to Setyoningsih (2015) musculoskeletal fatigue is one of the ergonomic problems often found in the workplace which, if left continuously, can cause work fatigue and muscle fatigue. Apart from that, sitting activities carried out when riding a motorbike or car can trigger muscle fatigue if done for a long period of time. In connection with the function of skeletal muscles to maintain body posture and position, it turns out that when in a sitting position, the skeletal muscles and spine, especially the waist, must be supported by the back of the chair to avoid pain and fatigue(Tarwaka, Solichul HA. Bakri, 2004).
7. Heat Pressure (heat stress)
   According to OSHS (1997) heat stress can cause physiological changes commonly known as heat strain. Heat strain is the overall physiological response resulting from heat stress which is dedicated or aimed at removing heat from the body. In theory, high heat stress is an additional burden for workers. The combination of physical stress and heat stress will increase the worker's burden so that it can cause worker fatigue. This is reinforced by Suma'mur's opinion that the effect of heat stress can cause skin temperature to increase, the body loses salt, sweats and causes fatigue(Suma'mur, 1996).



METHODOLOGY

This research design was carried out by researchers using quantitative methods with a Cross Sectional research design which is a research design where the time and place of research on the independent variables and dependent variables is carried out once at a time, the analysis technique used by researchers uses the Chi Square test with a 95% confidence interval (α=0.05). This research was carried out simultaneously and the relationship between all the variables to be analyzed was analyzed. The aim of this research is to

examine the relationship between the independent variables age, length of service, workload, sleep quality, length of work, work attitude, and heat stress on the dependent variable, namely work fatigue for Jambi City Environmental Service Waste Transporters.

RESULTS AND DISCUSSION

Univariate Analysis

Variable	Frequency	Percentage
Fatigue		
Currently	95	88%
Low	13	12%
Age (year)		
≥35 year	80	74,1%
<35 year	28	25,9%
Working period		
>5 year	75	69,4%
≤5 year	33	30,6%
Workload		
Currently	85	78,7%
Low	23	21,3%
Sleep quality		
Bad	32	29,6%
Good	76	70,4%
Length of working		
≥8 hour	84	77,8%
<8 hour	24	22,2%
Work attitude		
High risk	67	62%
Low risk	41	38%
Heat stress		
High risk	65	60,2%
Low risk	43	39,8%

Based on the table of work fatigue measurement results, it shows that 88% of respondents experienced moderate fatigue and 12% of respondents experienced mild fatigue. The results of measuring the risk factor variables for work fatigue showed that the frequency distribution of the highest age was ≥35 years, 74.1%, the highest working period was >5 years, 69.4%, the highest workload was in the medium category, 78.7%, the highest sleep quality was in the good category, 70, 4%, the longest working time was >8 hours at 77.8%, the work attitude at the highest risk level was 62% and the highest heat stress was low risk at 63%.

Bivariate Analysis

The relationship between age and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Age								
≥35 year	74	70,4	6	9,6	80	1,23	0,98-1,54	0,037
<35 tahun	21	24,6	7	3,4	28			
Total	95		13		108			

Based on the table above, it is known that 74 people (70.4%) of respondents aged ≥35 years experienced moderate fatigue, 6 people (9.6%) experienced low fatigue. It is also known that the proportion of respondents aged <35 years who experienced moderate fatigue was 21 people (24.6%) and 7 people (3.4%) experienced low fatigue. The results of bivariate analysis using the chi-square test show that there is a significant relationship between age and work fatigue with a p-value of 0.037 with a PR value of 1.23. This means that Jambi City Environmental Service Waste Transporters aged ≥35 years are at 1.23 times the risk (PR 1.23 95%CI 0.98-1.54) of experiencing moderate work fatigue compared to those aged <35 years.

This research is in line with the results of research conducted by AdhindaPutriPratiwi and TenriDiah T.A on the Port of Parepare Port Loading and Unloading Workers with a p-value of 0.000 (<0.05) which means there is a significant relationship between the respondent's age and work fatigue in the Workers. Loading and Unloading Work at Parepare City Port (Pratiwi & A, 2023).

The age factor influences the occurrence of work fatigue in Jambi City Environmental Service Waste Transporters. Based on research results from 80 workers aged ≥35 years, 75 of them experienced moderate fatigue, which means that the influence of age on work fatigue is caused by changes in the body's physiological function with age. This happens because there is no difference between young and old workers in doing a job. Young and young waste haulers both carry out the same physical activity and have the same workload. Workers aged ≥35 years tend to experience complaints such as headaches, stiff shoulders, dizziness and back pain.

The relationship between years of service and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Working period								
>5 year	71	66,0	4	9,0	75	1,30	1,04-1,61	0,003
≤5 year	24	29,0	9	4,0	33			
Total	95		13		108			

Based on table above, it is known that 71 people (66.0%) of respondents with a working period of >5 years experienced moderate fatigue, 4 people (9.0%) experienced low fatigue. It is also known that the proportion of respondents with work experience of ≤5 years who experienced moderate fatigue was 24 people (29.0%), 9 people (4.0%) experienced low fatigue. The results of bivariate analysis using the chi-square test show that there is a significant relationship between work experience and work fatigue with a p-value of 0.003 with a PR value of 1.30. This means that Jambi City Environmental Service Waste Transporters with a working period of >5 years are at 1.30 times the risk (PR 1.30 95%CI 1.04-1.61) of experiencing moderate work fatigue compared to those with a working period of ≤5 years.

This research is in line with AdhindaPutriPratiwi et al., 2021 on the Port of Parepare Port Loading and Unloading Workers, the p-value was 0.002 (<0.05), which means that Ho is rejected, Ha is accepted, meaning that there is a significant relationship between work experience and work fatigue in workers. Loading and Unloading Work at Parepare City Harbor. Workers who have worked for more than five years usually have a higher level of job burnout compared to new workers. Apart from that, working time can also affect work fatigue, especially chronic fatigue. The longer a worker works in a work environment that is less comfortable and enjoyable, the more fatigue the person will accumulate over time.

The research results showed that 75 respondents with a working period of >5 years were in the category, there were 71 people (66%) experiencing moderate fatigue, this is because in line with the theory used, a longer working period has a big influence on a person's work fatigue.

The relationship between workload and work fatigue

Variabel	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Workload								
Currently	79	92,9	6	7,1	95	1,33	1,01-1,76	0,006
Low	16	69,6	7	30,4	13			
Total	95		13		108			

Based on table above, it is known that 79 people (92.9%) of respondents with moderate workload experienced moderate fatigue, 6 people (7.1%) experienced low fatigue. It is also known that the proportion of respondents with a light workload who experienced moderate fatigue was 16 people (69.6%), 7 people (30.4%) experienced low fatigue. The results of bivariate analysis using the chi-square test showed a p-value of 0.006 with a PR value = 1.33 (1.01-1.76), which means there is a significant relationship between workload and work fatigue in Jambi City Environmental Service Waste Transporters.

This research is in line with the results of research conducted by (Alfiyanti Linda Lewenuss et al, 2022) which was carried out by waste officers at the environmental service in Masohi City, Maluku Province, where a p-value of 0.004 (<0.05) was obtained, meaning that Ho was rejected, Ha was accepted. This

means that there is a relationship between work experience and work fatigue among waste officers in the Masohi City Environmental Service, Maluku Province. There are internal and external factors that influence, namely workload, work environment factors and an average working period of <5 years, resulting in waste officer fatigue still being in the low and medium categories. This is because the body is able to adapt to working conditions and the level of loading so that the body is used to accepting the workload(Alfiyanti Linda Lewenussa, Arief Fardiansyah, 2022). Pulse pulse measurements were carried out while workers were carrying out work using an oximeter. Based on the results obtained, there was a relationship between workload and work fatigue in Jambi City Environmental Service Waste Transporters. This is because the burden carried out by the waste collection officers is too burdensome for the officers, so many officers experience a moderate workload, which results in fatigue.

The relationship between sleep quality and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Sleep Quality								
Bad	25	28,1	7	3,9	32	0,84	0,69-1,03	0,055
Good	70	66,9	6	9,1	76			
Total	95		13		108			

Based on table above, it is known that 25 people (28.1%) of respondents with poor sleep quality experienced moderate fatigue, 7 people (3.9%) experienced low fatigue. It is also known that the proportion of respondents with good sleep quality who experienced moderate fatigue was 70 people (66.9%), 6 people (9.1%) experienced low fatigue. The results of bivariate analysis using the chi-square test obtained a p-value of 0.055 with a PR value = 0.84 (0.69-1.03) which means there is no significant relationship between sleep quality and work fatigue in Environmental Service Waste Transporters. Jambi City. This research is in line with (Eva Ambar Sari, 2019) entitled Analysis of factors related to the level of work fatigue in workers transporting freshwater fish at the main market in Jakabaring, Palembang(SARI, 2019). The result was a p-value of 1,000 > 0.05, which means there is no relationship between sleep quality and work fatigue. Based on the results obtained, there is no relationship between sleep quality and work fatigue in Jambi City Environmental Service Waste Transporters. This can happen because the majority of waste haulers feel tired after work and feel sleepy more quickly so they get enough sleep and can use their rest time well so that the quality of sleep they get is also good.

The relationship between length of work and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Length of work								
>8 hour	92	84,4	4	11,6	96	3,83	1,43-10,23	0,038
≤8 hour	3	10,6	9	1,4	12			
Total	95		13		108			

Based on table 4.14 above, it is known that 92 people (84.4%) of respondents who worked >8 hours experienced moderate fatigue, 4 people (11.6%) experienced low fatigue. It is also known that the proportion of respondents who worked ≤8 hours who experienced moderate fatigue was 3 people (10.6%), 9 people (1.4%) experienced low fatigue. The results of bivariate analysis using the chi-square test show that there is a significant relationship between length of work and work fatigue with a p-value of 0.038 with a PR value of 3.83. This means that Jambi City Environmental Service Waste Transporters with a working time of >8 hours are at 3.83 times the risk (PR 3.83 95%CI 1.43-10.23) of experiencing moderate work fatigue compared to those with a working time of ≤8 hours. This research is in line with the results of research conducted by (PutiAndamDewi et al., 2019) entitled factors related to fatigue in transport workers at the BalaiTangah market, LintauBuo Utara sub-district, West Sumatra with a p-value of 0.001, which is the value The result obtained was <0.05, which means there is a relationship between length of work and work fatigue. Length of work affects work fatigue in Garbage Transporters(Dewi et al., 2019). Based on research, work fatigue occurs in workers who work ≥8 hours. Length of work is very influential in the occurrence of work fatigue, waste transporters carry out work for ≥8 hours of work in 7 days, which according to the regulations that have been established, if the duration of work or length of work is 8 hours, then the work can only be done for 6 days. For this reason, to avoid work fatigue that will occur, workers can manage their rest time.

The relationship between work attitude and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Work attitude								
High risk	86	79,2	4	10,8	90	1,91	1,20-3,04	0,029
Low risk	9	15,8	9	2,2	18			
Total	95		13		108			

Based on table 4.15 above, it is known that 86 people (79.2%) of respondents with high-risk work attitudes experienced moderate fatigue, 4 people (10.8%) experienced low fatigue. It is also known that the proportion of respondents with low-risk work attitudes who experienced moderate fatigue was 9 people (15.8%), 9 people (2.2%) experienced low fatigue. The results of bivariate analysis using the chi-square test show that there is a significant relationship

between work attitude and work fatigue with a p-value of 0.029 with a PR value of 1.91. This means that Jambi City Environmental Service Waste Transporters with a high-risk work attitude have a 1.91 times risk (PR 1.91 95% CI 1.20-3.04) of experiencing moderate work fatigue compared to those with a low-risk work attitude. Different types of work will affect body position when working. Each work position has a different effect on a person's body. Jambi City Environmental Agency waste collection officers work in a dynamic position where they rely on their hands and feet. Workers carry out lifting and lifting manually without using tools, so that many of the workers' body movements are forced with wrong, awkward and out-of-character work attitudes, which increases the risk of injury to the muscles(Syuhada et al., 2019). Research conducted by (AmbarDaniSyuhada et al, 2021) obtained a p-value of 0.014 (<0.05), which means that Ho is rejected, Ha is accepted, meaning that there is a relationship between work attitude and work fatigue caused by inappropriate work attitude or not ergonomic in doing work, causing fatigue(Syuhada & Widodo, 2020).

In research conducted, waste haulers carry out activities by bending over and scraping rubbish into baskets, and lifting into rubbish trucks. The body posture used when working is also too bent, which often causes pain around the waist and shoulders. Workers who complain of pain around the waist and shoulders are mostly workers aged 35 years and over. For this reason, it is hoped that waste haulers can change or improve their work attitudes when working and balance their age with the workload being transported in order to minimize the occurrence of work fatigue.

The relationship between heat stress and work fatigue

Variable	Fatigue				Total	PR	(95%CI)	P-Value
	Currently		Low					
	n	%	n	%				
Heat stress								
High risk	61	57,2	4	7,8	65	1,18	1,00-1,40	0,045
Low risk	34	37,8	9	5,2	43			
Total	95		13		108			

Based on table 4.16 above, it is known that 61 people (57.2%) of respondents with heat stress were at high risk of experiencing moderate fatigue, 4 people (7.8%) experienced low fatigue. It is also known that the proportion of respondents with low risk heat stress who experienced moderate fatigue was 34 people (37.8%), 9 people (5.2%) experienced low fatigue. The results of bivariate analysis using the chi-square test show that there is a significant relationship between work experience and work fatigue with a p-value of 0.045 with a PR value of 1.18. This means that Jambi City Environmental Service Waste Transporters with high risk of heat stress have a 1.18 times risk (PR 1.18 95% CI 1.00-1.40) of experiencing moderate work fatigue compared to those with low risk of heat stress. Heat stress can cause physiological changes commonly known as heat strain. Heat strain is the overall physiological response resulting from heat stress which is dedicated or aimed at removing heat from the body. Working environment temperatures above NAB are very risky for workers

because the minerals and body fluids of workers are reduced, which can cause heat stress in workers. In theory, high heat stress is an additional burden for workers. The combination of physical stress and heat stress will increase the worker's burden so that it can cause worker fatigue(Lestari, 2019). This research is in line with the results of research conducted by (YufliyatiYulianaLona et al, 2023) entitled risk factors for work fatigue in transport workers in the traditional market of Kupang City. The result was a p-value of 0.001 (<0.05), which means there is a relationship between pressure hot with work fatigue(Roga et al., 2023). Based on research results from Jambi City Environmental Service waste transporters, there is a relationship between heat stress and work fatigue. The work is all done outdoors and is also exposed to sunlight, the majority of clothing worn is not wearing long sleeves and hats when working, which can accelerate the occurrence of work fatigue.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of research related to work fatigue in Jambi City Environmental Service Waste Transporters, the conclusions are as follows. The results of measuring work fatigue show that 88% of respondents experienced moderate fatigue and 12% of respondents experienced mild fatigue. The results of measuring the risk factor variables for work fatigue showed that the frequency distribution of the highest age was ≥35 years was 74.1%, the highest working period was >5 years 69.4%, the highest workload was in the medium category 78.7%, the highest sleep quality was in the good category 70, 4%, the highest working time was >8 hours at 77.8%, the highest work attitude was at a high risk level at 62% and the highest heat stress was at a low risk at 63%.

The results of the bivariate analysis showed a relationship between age, length of service, workload, length of work, work attitude and heat stress, and there was no relationship between sleep quality and work fatigue.

1. *For Jambi City Environmental Service Waste Transporters*

Respondents are expected to manage their rest time, consume lots of water a day, wear long-sleeved clothes and wear hats to avoid excessive heat which can cause fatigue, take short breaks when they have time off to recover physically caused by a high workload and enough in rest.

2. *For the Jambi City Environmental Service*

The Jambi City Environmental Service is advised to provide officers with an understanding of the causes and steps to overcome work fatigue, stretch officers before work, adjust the age of workers to the workload they are carrying out, and urge officers to bring water when working because Based on research results, 43.5% of officers often feel thirsty while working.

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