JOURNAL LA MEDIHEALTICO

VOL. 06, ISSUE 04 (897-908), 2025
DOI: 10.37899/journallamedihealtico.v6i4.2372

Relationship Between Sleep Quality And Shift Work Sleep Disorder (Swsd) Occurrences Of Technical Services Pt. Pln Customer Service Unit Pancur Batu

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Article Info
Article history:
Received 7 June 2025
Received in revised form 28 June 2025
Accepted 19 July 2025

Keywords:
Sleep Quality
Shift Work Sleep Disorder
Shift Workers

Abstract

Shift Work Sleep Disorder (SWSD) is a common sleep disorder among workers with a shift work system, including field workers in the technical service division at PT PLN ULP Pancur Batu. This disorder can negatively affect quality of life, workplace safety, and productivity. This study aims to analyze the relationship between sleep quality and the incidence of SWSD, as well as examine the role of age and gender as risk factors. A quantitative analytic observational method with a cross-sectional design was used. The sample consisted of 54 respondents selected through total sampling. Data were collected using the Pittsburgh Sleep Quality Index (PSQI) questionnaire and analyzed with the chi-square test. The results showed a significant relationship between sleep quality and the incidence of SWSD (p = 0.000). Workers with poor sleep quality were found to be at higher risk of experiencing SWSD. Older age and female gender were also identified as contributing risk factors. Poor sleep quality significantly contributes to the incidence of SWSD. Interventions such as better shift schedule management, education on the importance of quality sleep, and the provision of adequate rest facilities are necessary to improve workers' health.

Introduction

Adequate and quality sleep is needed to restore energy, improve concentration, and maintain stable mood and work performance. However, along with the development of the industrial and service world, many workers are faced with irregular work schedules, one of which is workers involved in the shift system . Sleep is a basic human need. According to the National Sleep Foundation (1999), 37% of young adults aged 18-29 years reported experiencing sleep deprivation and sleep disorders. According to the World Health Organization (WHO), sleep quality refers to how sleep can meet the body's needs for optimal rest.

It includes several factors, such as sufficient sleep duration, consistent sleep time, and good quality sleep without interruption. Refers to sleep disorders that occur in individuals who work with a shift system or irregular working hours, especially those involving night work or alternating between day and night.

Signs and symptoms of someone experiencing poor sleep quality include difficulty falling asleep at night, waking up frequently at night, waking up too early, fatigue or drowsiness during the day, anxiety, decreased concentration and attention, increased errors and accidents, and tension and headaches. This shift work system can disrupt the body's circadian rhythm (the body's biological clock), which functions to regulate the sleep and wake cycle. The World

Health Organization (WHO) officially classified Shift Work Sleep Disorder (SWSD) in the International Classification of Sleep Disorders (ICSD) in 1990. Then, in subsequent editions, especially the second edition published in 2005, SWSD was still recognized as one of the sleep disorders associated with the shift work system.

Workers exposed to shift work , especially those working at night or on inconsistent schedules, often experience difficulty getting adequate sleep, impaired sleep quality, and other health effects, such as excessive fatigue, cognitive problems, and decreased concentration. These conditions can lead to decreased work productivity as well as the risk of long-term health problems, such as heart disease, digestive problems, or mood disorders. WHO emphasizes that poor sleep quality can be associated with a variety of health problems, both physical and mental, such as mood disorders , decreased cognitive function, and increased risk of chronic diseases.

Tarwaka (2004) stated that a person needs about 8 hours of sleep at night. The goal is to restore the energy that is drained in each individual, so that in carrying out activities the next day in a fit condition. If someone spends less than 8 hours of sleep at night, it can affect the decline in work performance due to fatigue. According to Tarwaka (in his book entitled Occupational Health and Safety Management), work sleep or Shift Work Sleep Disorder (SWSD) is a sleep disorder that occurs due to changes in sleep patterns caused by work with a shift system.

This disorder occurs because the body has difficulty adapting to irregular changes in sleep and wake times, such as in workers who work at night or with rapid shift rotations. Tarwaka also emphasized the importance of paying attention to occupational health factors, such as sleep quality, in shift workers in order to reduce the risk of sleep disorders and improve overall worker well-being.

Shift worker disorder (SWD) is also called Shift worker sleep disorder (SWSD). SWD is a sleep disorder in the circadian rhythm that occurs in workers who work outside the sleep period (22.00-06.00) and outside the usual working hours in an organization such as afternoon, evening or a combination of both that change periodically. SWD or SWSD is characterized by insomnia and excessive sleepiness (d'Ettorre & Pellicani, 2020). Generally, night shifts are considered the most difficult part of shift work which can disrupt circadian regulation and sleep homeostasis. The body's circadian rhythm is an internal process that regulates the wake-sleep cycle (light-dark) which runs in 24 hours. The human body is designed to be awake during the day and sleep at night. This causes night shift workers to be more easily sleepy and feel tired quickly (Afifah et al., 2021). Poor sleep quality will also have a negative impact on the health and safety of workers (Afifah et al., 2020).

Customer Service Unit (ULP) is a key element in the structure of PT. PLN (Persero), the technical service sector tasked with ensuring that all customer needs related to electricity services are met properly and providing the necessary support to maintain customer satisfaction and trust. In the context of workers at the PLN Pancur Batu Customer Service Unit (ULP), a shift system is implemented to maintain operations and ensure that electricity services run without stopping. When night shift workers experience customer electricity trouble , technical workers must immediately handle the disruption and result in health challenges, the risk of sleep disorders in circadian rhythms that can affect people who work at unusual hours.

International Labor Organization , or in Indonesian called the International Labor Organization. The ILO is a specialized agency of the United Nations (UN) that has a role in promoting workers' rights, improving work standards, and addressing labor issues around the world. The ILO (2004) states that shift work is a method of organizing working hours when each worker takes turns at work, so that the company can operate beyond standard working hours (International Labour Organization (ILO), 2004). Generally, the average productive working hours for employees to work are 40 hours in one week. According to the Manpower Law

Number 13 of 2003 which has now been updated in Government Regulation Number 35 of 2021, it explains that the maximum working time limit for an employee is 40 hours in one week, with details: First, a 7-hour work system one day and 40 hours in one week for 6 working days. Second, a 8-hour work system one day and 40 hours in one week for 5 working days (Republik Indonesia, 2003).

Based on research conducted by Khusna et al. (2023), it was stated that there was a significant relationship between night shifts and mental workload with a strong relationship category. that there was a significant relationship between night shifts and mental workload (p = 0.685) and there was a significant relationship between sleep quality and mental workload (p = 0.674 significant relationship between sleep quality and mental workload with a strong relationship category.

In a study conducted by Agustian et al. (2020) The results of the existing study show that sleep quality is related to work accidents, where workers with poor sleep quality are at greater risk of experiencing work accidents 7 The results obtained based on the article review, it can be concluded that worker characteristics , work shifts , sleep quality, and work fatigue have a relationship with work accidents in the construction sector. Meanwhile, the results of research conducted by Juliyati et al. (2020) explain that working at night is not ideal for humans because it can cause rhythms.

The body's circadian rhythm is disturbed, resulting in digestive disorders, health and sleep patterns and affecting physiological functions 8 . Research conducted by Christiana (2022) showed that the sleep quality of night shift nurses was related to nurse performance 9 Based on the results of the study, the picture of nurse sleep quality was good with 26 respondents (61.9%) and the picture of nurse performance was good for 28 respondents (66.7%). The results of the statistical test were known with a P value = 0.002 <0.05 Furthermore, the study was strengthened by the research findings of Triwijayanti, Rumiko, and Dewi (2020) which also proved that there was a correlation between sleep problems and nurse performance in hospitals (Triwijayanti et al., 2020).

Based on research by Aryanti & Indriani (2022) Conclusion There is a significant relationship between Nurses' sleep quality and the implementation of patient safety in the Emergency Room (IGD) of Dr. Soekardjo Hospital, Tasikmalaya City. Based on research by Sawitri et al. (2024) There is a significant relationship between anxiety and nurses' sleep quality and there is no significant relationship between workload and nurses' sleep quality in the inpatient ward. Based on research by Mufadhol & Ardyanto (2023) Research Results: There are quite high sleep quality problems in nurses at Hospital X, Gresik, marked by the high number of nurses who experience poor sleep quality (69.8%)

Every year, sleep disorders reach 20% -50% and 17% experience quite serious sleep disorders. The prevalence of sleep disorders tends to increase every year, this is also in accordance with increasing age and various causes, but sleeping too long will cause disease and damage to body organs (Aziza, 2019). Sleeping less than eight hours each night for two consecutive weeks will reduce thinking power and reduce brain function, as experienced by people who do not sleep for two consecutive days (48 hours) (Elzaky, 2015).

There are many negative effects that can be felt by humans due to poor sleep quality, such as decreased daily activities, wound healing that takes a long time, poor neuromuscular conditions, decreased immunity, depression, anxiety, stress, unstable vital signs and lack of concentration. This study focuses on the incidence of shift work sleep disorder in engineering service field workers, based on an initial survey conducted by the author on 10 field workers, it is known that from the results of the PSQI scoring of 10 field workers aged 20-55 years in night shift workers experience poor and very poor sleep quality due to the existence of night

shifts which cause workers to tend to sleep at night under 8 hours of sleep and reversed sleep hours.

Based on the explanation above, it was found that there has been no research related to the relationship between sleep quality and the incidence of shift work sleep disorder , therefore the purpose of this study is to determine whether there is a relationship between sleep quality and the incidence of shift work sleep disorder in technical service field workers (yantek). And to identify age and gender factors that play a role in the risk level of this disorder. Research involving variables such as work shifts , sleep quality, gender, age, and education recently found that these factors contribute to the incidence of shift work sleep disorder.

Methods

This study was conducted in September using an analytical observational quantitative research method. Data were collected using a cross-sectional approach, namely independent variables and dependent variables were observed at the same time. The population in this study were field workers in the technical service sector (Yantek) of PT. PLN ULP Pancur Batu as many as 54 people. The sample used was total sampling, namely a sampling technique using all members of the population as samples.

The research instrument used was the Pittsburgh Sleep Quality Index (PSQI) questionnaire, an instrument for measuring sleep quality developed by Buysse in 1989. This instrument measures seven assessment components, namely: sleep latency, sleep disturbance, sleep duration, subjective sleep quality, sleep pattern habits, use of sleeping pills, and disruption of daytime activities, all of which are included in the occurrence of Shift Work Sleep Disorder. The PSQI has a total of 9 questions. The scoring on the PSQI questionnaire is as follows: Very good = 0 Good = 1 Poor = 2 Very bad = 3, The higher the total PSQI score, the worse a person's sleep quality. A total PSQI score ≥ 5 indicates poor sleep quality.

The analysis techniques used include univariate and bivariate data analysis using the Pearson Chi-Square test. Data analysis was performed using IBM SPSS (Statistical Package for the Social Sciences) software version 20.

Result and Discussion

Workers with a shift work system, such as that implemented at PT. PLN ULP Pancur Batu, face major challenges in maintaining their sleep quality. Workers who work at night or with irregular shift rotations often experience sleep disorders that affect their well-being. One of the most common sleep disorders in shift workers is Shift Work Sleep Disorder (SWSD), which is characterized by difficulty falling asleep, fragmented sleep, and excessive daytime sleepiness. In this context, factors such as age, gender, work shifts, and education level of workers greatly influence the extent to which sleep disorders occur.

The shift system is implemented to maintain operations and ensure that electricity services run non-stop every day in accordance with the AKHLAK values in terms of employee loyalty if there is a trouble disruption, resulting in workers having to immediately handle the disruption and resulting in health challenges at the risk of disruption to the circadian rhythm that can affect people who work at unusual hours which is called Shift Work Sleep Disorder (SWSD).

Respondent Characteristics

Respondent characteristics that can be used in research on the relationship between sleep quality and the incidence of Shift Work Sleep Disorder (SWSD) in field workers in the engineering service sector of PT. PLN ULP Pancur Batu. This explanation includes relevant factors that influence respondent characteristics, as well as how these characteristics relate to the research topic. Factors considered in this study include age, gender, education level, and type of work shift. Each of these factors can affect the extent to which a worker experiences

sleep disorders such as Shift Work Sleep Disorder (SWSD) and how they adapt to the shift work system at PT. PLN ULP Pancur Batu.

Table 1 contains a description of the gender characteristics of field workers in the engineering service sector of PT. PLN ULP Pancur Batu. Gender can also affect sleep quality. Research shows that women and men can experience different impacts on their sleep quality due to the shift work system. Female workers, especially those who are married, often experience greater challenges in managing their sleep time, because they may also have household responsibilities that add to their workload. Meanwhile, male workers may be more adaptable to the shift work system. In this study, dividing respondents by gender helps understand the differences in experiences between men and women regarding sleep quality and sleep disorders.

Table 1. Respondent Characteristics

Characteristics	Frequency	Percentage (%)
Type Male Female **Gender** Total	49 5 54	90.7 9.3 100.0
Age Category Under 25 26- 40 41- 55 Total	 18 34 2 54	 33.3 63.0 3.7 100.0
Education Final D3/D4 S1 SMA/SMK Total	 22 6 26 54	 40.7 11.1 49.1 100.0

Based on table 1 Characteristics of respondents, the frequency distribution of the gender of respondents with the male category is 49 people with a percentage of 90.7% and the number of respondents with the female category is 5 people with a percentage of 9.3%. While the frequency distribution of the age of respondents with the category under 25 years is 18 people with a percentage of 33.3% the number of respondents with the category 26-40 years is 34 people with a percentage of 63.0% the category 41-55 years is 2 people with a percentage of 3.7. Furthermore, the frequency distribution of the last education with the category D3 / D4 is 22 people with a percentage of 40.7% the number of S1 graduates is 6 people with a percentage of 40.7% and high school / vocational high school graduates is 26 people with a percentage of 48.1%.

Work Shift Overview

Table 2 contains a description of the shifts of field workers in the technical service sector (yantek) of PT. PLN ULP Pancur Batu. The type of work shift applied at PT. PLN ULP Pancur Batu plays a significant role in the quality of workers' sleep. Some respondents work morning and afternoon shifts (08.00 - 16.00), while others work afternoon and evening shifts. Respondents who work night shifts (00.00 - 08.00) are at greater risk of experiencing sleep disorders, because their sleep time does not match the body's biological rhythm. Workers who are exposed to bright light at night or who have to sleep during the day often have difficulty sleeping or fragmented sleep. Respondents who work morning or afternoon shifts tend to have better sleep quality, but they are still at risk of sleep disorders if the work shift rotation is irregular.

Table 2. Work shifts

Work *Shift*	Frequency	Percentage (%)

Evening	28	51.9
Morning	2	3.7
Afternoon	24	44.4
Total	**54**	**100.0**

Based on table 2. Work Shifts, the frequency distribution of respondents' work shifts shows that there are 28 respondents who have night shifts with a percentage of 51.9%, 2 people for morning shift workers with a percentage of 3.7%, and 24 people for afternoon shift workers with a percentage of 44.4%.

Sleep Quality Overview

Table 3 contains a description of the sleep quality of respondents in the technical service field (yantek) of PT. PLN ULP Pancur Batu. Sleep quality is the extent to which a person's sleep provides the physical and mental recovery needed to carry out daily activities well. Quality sleep is not only measured by the duration of sleep, but also by how deep and restful the sleep is, and how well the body can carry out the restoration process during sleep. In the context of sleep disorders such as Shift Work Sleep Disorder (SWSD), workers' sleep quality is often disturbed due to the mismatch of the body's biological rhythm with changing working hours.

Table 3. Overview of Sleep Quality

Sleep Quality	Frequency	Percentage (%)
Good	8	14.8
Bad	34	63.0
Very bad	11	20.4
Very good	1	1.9
Total	54	100.0

Based on table 3 Description of Sleep Quality, the frequency distribution of the description of sleep quality of respondents in the field of Engineering services of PT. PLN ULP Pancur Batu for one month is known that in the good category there are 8 people with a percentage of 14.8%, the bad category is 34 people with a percentage of 63.0% and the very bad category is 11 people with a percentage of 20.4% and it is known that the category of very good sleep quality is 1 person with a percentage of 14.8%.

Overview of Shift Work Sleep Disorder (SWSD)

Table 4 explains the description of the occurrence of Shift Work Sleep Disorder (SWSD) in field workers in the Technical Services Sector of PT. PLN ULP Pancur Batu,

Table 4. Overview of shift work sleep disorder events

SWSD	Frequency	Percentage (%)
Very bad	1	1.9
Bad	13	24.1
Good	25	46.3
Very good	15	27.8
Total	54	100.0

Based on table 4 Description of shift work sleep disorder incidents, frequency distribution of the description of Shift Work Sleep Disorder (SWSD) incidents with a very bad category of 1 person with a percentage of 1.9% in the bad category of 13 people with a percentage of 24.1% in the good category of 25 people with a percentage of 46.3% in the very good category of 15 people with a percentage of 27.8%.

Bivariate Analysis

Relationship between Sleep Quality and the Incidence of Shift Work Sleep Disorder SWSD

Table 5 contains the results of the correlation between the relationship between sleep quality and the occurrence of Shift Work Sleep Disorder (SWSD) in field workers in the technical service sector of PT. PLN ULP Pancur Batu.

Based on data processed statistically using the Pearson Chi correlation test

- Square using the SPSS version 20 program obtained a p value = 0.000 (<0.05) and an OR of 0.05, which means that there is a significant relationship (there is a meaningful relationship) between sleep quality and the occurrence of Shift Work Sleep Disorder (SWSD).

Table 5. Bivariate Results of Pearson Chi Square Test

Shift Work Sleep Disorder								
Sleep Quality		Very good	Good	bad	Very bad	**Total**	Pvalue	OR
Very good	N	0	0	1	0	1	0,000	17, 5
	%	0.0%	0.0%	100.0%	0.0	100.0%		
Good	N	1	2	4	1	8		
	%	12.5%	25.0%	50.0%	12.5%	100.0%		
bad	N	0	11	19	4	34		
	%	0.0%	32.4%	55.9%	11.8%	100.0%		
Very bad	N	0	0	1	10	11		
	%	0.0%	0.0%	9.1%	90.9%	100.0%		

Table 5 shows that those who have the occurrence of Bad Shift Work Sleep Disorder (SWSD) are mostly experienced in the poor sleep quality category. The results of the Statistical Test obtained a coefficient (r) = 0.000 and a p value = 0.00 (<0.05) indicating that there is a relationship between sleep quality and the occurrence of Shift Work Sleep Disorder (SWSD). People with poor sleep quality are 17.5 times more likely to experience bad SWSD than people with good sleep quality.

Workers who undergo *shift work systems* often experience sleep disorders due to the mismatch between work patterns and the body's circadian rhythm. In the context of field workers in the engineering service sector at PT. PLN ULP Pancur Batu, who work with a *shift system* to ensure smooth electricity distribution, sleep quality problems and sleep disorders such as *Shift Work Sleep Disorder* (SWSD) can be a major concern (Zhou et al., 20200. *Shift Work Sleep Disorder* (SWSD) is the most common sleep disorder experienced by workers with *shift work systems*. Some of the main symptoms of *Shift Work Sleep Disorder* SWSD are difficulty falling asleep, fragmented sleep, and excessive daytime sleepiness (Hasan et al., 2018). Workers who experience it often feel awake during working hours, but have difficulty falling asleep or poor sleep quality after their working hours end. This condition has a significant impact on the physical and mental well-being of workers, and has the potential to reduce their work productivity. In addition, several factors such as age, type of shift work, and education level can also affect the extent to which workers experience sleep disorders.

Based on the results of the study, there is a significant relationship between sleep quality and the occurrence of *Shift Work Sleep Disorder* SWSD in field workers in the field of engineering services with a strong relationship category. This was obtained from the results of the Pearson chi square test which showed a coefficient value of 0.000 with a significance value of 0.05 that the relationship was very statistically significant, so that sleep quality does have a relationship with the occurrence of *Shift Work Sleep Disorder* SWSD. A coefficient value of 0.000 indicates a very strong correlation between the two variables. With a significance level of 0.05, these results confirm that poor sleep quality significantly increases the risk of *Shift Work Sleep Disorder* SWSD. According to research conducted by Maria Christiana (Christiana, 2020), *shift* workers have a higher risk of experiencing sleep disorders compared to workers who work

regular working hours. This sleep disorder can lead to decreased work productivity, as well as affect the long-term health of workers, such as an increased risk of cardiovascular disease, diabetes, and mental disorders.

Based on the interview results, the majority of new workers can only fall asleep after 00.00 WIB with a sleep duration of 3 to 5 hours, the poor quality of workers' sleep is also reinforced by disturbances during daytime sleep hours. Some of them can even not sleep at all after working the night *shift* and some experience long sleep hours that are reversed. This is what makes them experience sleep dysfunction when working at night such as lack of concentration and drowsiness which are characteristics of workers with high mental workloads (Hidayat et al., 2020). Workers who experience workloads have characteristics such as loss of concentration, difficulty communicating, often coming late, not coming to the office, and not caring about their own health.

Observation results at PT. PLN ULP Pancur Batu show that workers on *shifts* experience poor sleep quality, with an average sleep time of less than 8 hours. This is in line with Tarwaka's theory (2004). Agustina (2020) which states that a person needs about 8 hours of sleep at night. The goal is to restore the energy that is drained in each individual, so that in carrying out activities the next day in a fit condition. If someone spends less than 8 hours of sleep at night, it can affect a decrease in work performance. With sleep hours below 8 hours, poor sleep quality results in the occurrence of *Shift Work Sleep Disorder (SWSD).*

In the engineering service sector, there are morning, afternoon and night *shifts* with a total of 28 night shift workers with a percentage of 51.9% of half of the workers who get night shifts. Workers with a *shift work system,* especially night *shifts*, often experience sleep quality disorders. Workers who alternate between morning, afternoon and night shifts are also at risk of experiencing more severe sleep disorders because the body has difficulty adjusting to rapid changes in sleep time. At PT. PLN ULP Pancur Batu, an irregular *shift system* can cause circadian rhythm disorders in workers, increasing the likelihood of SWSD. Changes in circadian rhythms due to irregular work schedules can cause *Excessive Daytime Sleepiness* (EDS) or excessive sleepiness during the day. In this case, it is in line with the research of Hidayat (2019) who found a moderate but significant relationship between sleep quality and EDS in *shift workers* , with a correlation value of r = 0.545 and p = 0.000. This shows that the worse the sleep quality, the higher the level of daytime sleepiness which can have a negative impact on work performance and safety.

The results of this study are supported by the majority of workers in the technical service sector, namely 25-40 years old, as many as 25 people. Workers aged >25 years who have just entered the workforce tend to experience sleep pattern disorders (Hamel et al., 2018) due to adaptation to changing working hours. They are more likely to have difficulty sleeping and excessive daytime sleepiness, which can lead to *Shift Work Sleep Disorder* SWSD if not managed properly, age factors play an important role in determining sleep quality and the risk of experiencing *Shift Work Sleep Disorder* SWSD. In a study conducted by Hamel et al. 2018 Workers aged <25 years are at an age that is susceptible to sleep pattern disorders. This is because the age under 25 years is the initial age for someone to work. So at this age workers begin to adapt to their work.

Poor sleep quality in *shift workers* is also often associated with mental and physical health problems stress, anxiety, and certain medical conditions can worsen sleep disorders. Therefore, company support for workers' mental health is very important in creating a healthy and productive work environment. The *frequency results* show a picture of the sleep quality of respondents in the field of Engineering services at PT. PLN ULP Pancur Batu for 1 month, it is known that in the good category with a score of 36 people with a percentage of 66.7% in the bad category with a score of 7 with a percentage of 13.0% the category is very bad with a score

of 11 with a percentage of 20.4% there is still a good category of 36 people but there is still a very bad percentage with a score of 11 with a percentage of 20.4% for that it is still said that sleep quality is bad and bad with a score of 7 with a percentage of 13.0% and not found in respondents who have sleep quality in the very good category. For *shift workers*, irregular sleep times are a key factor that affects their sleep quality. The change between morning, afternoon, and night *shifts* can disrupt the body's circadian rhythm. Inconsistent *shift* work makes it difficult for the body to adapt to a new sleep schedule. Workers who frequently switch between night and day *shifts* are more prone to severe sleep disorders.

Education level can also affect workers' understanding of the importance of quality sleep and how to overcome sleep disorders due to *shift work*. Workers with higher education levels are more knowledgeable about managing the negative effects of sleep deprivation on their health and are more open to finding solutions, such as setting better sleep times or seeking medical help if needed. Conversely, workers with lower education levels may be less knowledgeable about the importance of sleep quality and how to deal with it, which can contribute to their ignorance in managing sleep disorders caused by *shift work systems*. Therefore, companies such as PT. PLN ULP Pancur Batu need to consider education factors in designing occupational health and safety education programs related to sleep and sleep disorders in *shift workers*. It is known that the percentage of the last education with vocational education is 26 people and D4 24 experts owned by PT PLN ULP Pancur Batu.

In the study by Mohammad R. Alosta 2024, it was stated that Dinyanti (2021) findings indicated that women may be more susceptible to sleep disorders related to *shift work* than men. Therefore, it is important for companies and institutions to consider gender factors in designing work schedules and health interventions to minimize the risk of *Shift Work Sleep Disorder* SWSD in *shift workers*. In the engineering service sector, the majority of workers were in the male category, as many as 49 people with a percentage of 90.7%, which shows that the company has tried to reduce the vulnerability of *shifts* carried out by male workers.

Shift work disorder is a circadian rhythm disorder characterized by excessive sleepiness or insomnia due to a work schedule that is not synchronized Rizany et al. (2024) with the natural sleep cycle. Night *shift workers* often experience a significant decrease in sleep quality, which can affect their health and performance. Field workers in the field of engineering services, such as at PT PLN ULP Pancur Batu, often face high physical and mental demands. Poor sleep quality can increase the risk of fatigue, reduce concentration, and increase the likelihood of work accidents. Controlling the risk of sleep quality disorders with the occurrence of *Shift Work Sleep Disorder* SWSD can be handled by regular health screening for shift workers to detect sleep disorders early, Education about healthy sleep patterns for workers at high risk of experiencing *Shift Work Sleep Disorder* SWSD23 but in the results of observations there has never been education related to diseases caused by the shift system *Shift Work Sleep Disorder* SWSD .

Workers who work night *shifts* often sleep during the day, when the environment is noisier and brighter. Fragmented sleep refers to frequent awakenings or interrupted sleep during the 24-hour night. Workers who work night *shifts* or rapid *shift rotations* often experience discontinuous sleep, because their bodies are unable to fully adjust to the change in sleep time. This leads to disruption of the circadian rhythm, which can reduce sleep quality and cause excessive daytime sleepiness. This can affect the ability to get restful, quality sleep.

In sleep deprivation, the homeostatic drive for sleep is increased and sleep is more likely to occur at inappropriate or unusual times. A common phenomenon in sleep deprivation is “microsleep” (when a person will disengage from their physical environment due to a momentary interruption in visual processing). Sleep deprivation can be remedied, but the long-term effects of sleep deprivation can be detrimental to physical, mental, and emotional health.

This is in line with the Two-Process Model *of Sleep Regulation.* This model states that sleep is regulated by two main processes: Process S (homeostatic sleep drive) – the drive to sleep that increases with the length of wakefulness and Process C (circadian rhythm) – the biological rhythm that regulates when the body feels sleepy or awake. Slow-wave sleep (SWS) is a key marker of homeostatic sleep drive or process S. Slow-wave sleep – best during the early sleep period when the desire for sleep is highest, it decreases as sleep begins. For example, taking a nap during the day can decrease levels of deep sleep. Therefore, slow-wave sleep activity and its measurement are important markers of homeostatic processes.

According to Bittencourt et al. (2005) and Chandika et al. (2024) explained that benzodiazepine drugs can increase sleep time and increase daytime sleepiness. Hypnotics cause excessive sleepiness. Narcotics (morphine or Demerol) can suppress REM sleep and increase daytime sleepiness. Singh (2023) stated that the effects of caffeine and nicotine on the central nervous system can make it difficult for someone to start sleeping and affect sleep patterns. The effects of caffeine before bedtime on someone with an abnormal circadian phase such as night shift workers have poor consequences on their sleep quality than coffee consumption before bedtime on someone with a normal circadian phase.

The combination of age, type of work shift, and education level can provide a clearer picture of the potential for sleep disturbance experienced by shift workers. Older workers, who work night shifts and have low education levels, may face more severe sleep disturbances compared to younger workers, who work day shifts and have high education levels. Therefore, it is important to consider these three factors in designing policies or programs that can minimize the negative impacts of shift work systems on workers' sleep quality and health.

Conclusion

In conclusion, there is a strong relationship between sleep quality and the incidence of Shift Work Sleep Disorder (SWSD) in field workers in the engineering service sector of PT PLN ULP Pancur Batu. Night shift workers have a higher risk of experiencing sleep disorders due to changes in circadian rhythms26, which can have an impact on health, fatigue, and work safety. Age and gender factors also play a role in determining the level of susceptibility to Shift Work Sleep Disorder SWSD. Therefore, better work schedule arrangements, education about healthy sleep patterns27, and supporting facilities are needed to improve workers' sleep quality and reduce the risk of sleep disorders due to shift work.

To reduce the negative impact of sleep disorders on shift workers, PT. PLN ULP Pancur Batu can consider several solutions. One of them is the implementation of a more regular shift schedule, providing sufficient rest time between shifts, and creating a work environment that supports better sleep quality.

It is important for companies to evaluate the shift work system and provide appropriate interventions to improve sleep quality and worker well-being. The relationship between sleep quality and the incidence of Shift Work Sleep Disorder (SWSD) in field workers at PT. PLN ULP Pancur Batu shows the importance of attention to sleep management in improving worker well-being. This study provides insight into factors that affect sleep quality and provides useful recommendations to reduce the negative impacts of the shift work system.

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