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ANALYSIS OF WORK STRESS LEVELS AND MENTAL HEALTH AMONG WORKERS AT CILACAP REFINERY UNIT IV

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Abstract

The oil refinery industry has a high level of risk that affects not only workers' physical safety but also their mental health. At Cilacap Refinery Unit IV, the complexity of production processes, rotating work schedules, and operational pressures have the potential to cause work-related stress that impacts mental well-being. The novelty of this study lies in its comprehensive analysis of the relationship between work stress levels and mental health among oil refinery workers in Indonesia, taking into account job-specific factors in the oil and gas sector. The study aims to identify work stress levels, assess mental health, and analyze their relationship to produce strategic intervention recommendations. The method used is a quantitative survey with standardized questionnaires, involving respondents from Cilacap RU IV. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) through descriptive tests, Pearson correlation, and linear regression. The results showed that work stress levels were in the moderate category, while some workers exhibited mental health symptoms requiring attention. Regression analysis revealed a significant effect of work stress on mental health ($p < 0.05$). The conclusion states that managing work stress is key to maintaining the mental health of oil refinery workers. Policy-based interventions and psychological support programs are recommended to improve workers' well-being and operational performance.

Keywords: Work stress; Mental health; Oil refinery; Industrial workers.

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INTRODUCTION

The oil and gas industry is a strategic sector characterized by high occupational risks, encompassing both physical safety and workers' mental health. In addition to exposure to hazardous substances, extreme temperatures, and stringent work demands, employees also face psychological pressures that can affect performance and mental well-being (1)(2). At Refinery Unit (RU) IV Cilacap, the complexity of production processes, rotating shift schedules, and heavy responsibilities may contribute to work-related stress with subsequent impacts on mental health. Preliminary interviews indicated that some workers experience symptoms of mental fatigue, sleep disturbances, and reduced motivation, which may compromise both productivity and workplace safety.

Research on work stress and mental health in high-risk industries has advanced considerably over the past five years. Adamopoulos & Syrou found that high levels of occupational stress in the energy sector are strongly associated with increased emotional exhaustion and burnout (3). Studies by Dwinda & Widanarko, and Korneeva & Simonova emphasized the role of organizational support in mitigating the negative effects of work stress on employees' mental health (4)(5). Furthermore, rotating shift systems have been shown to disrupt circadian rhythms, reduce sleep quality, and impair psychological well-being. In Indonesia, however, specific research on the oil refinery sector remains limited, despite its unique working conditions such as strict safety compliance, explosion risks, and production pressures that may constitute distinct stressors requiring tailored management approaches (6). In Indonesia, specific studies on the oil refinery sector are still limited, whereas the unique working conditions, such as safety compliance demands, explosion risks, and production pressures, can be unique stress factors that require specialized handling approaches (7)(8)(9).

The novelty of this study lies in its comprehensive approach that integrates an analysis of work stress levels and mental health among oil refinery workers in the Indonesian context, particularly at RU IV Cilacap, while accounting for job-specific factors such as shift patterns, physical and mental workload, and stringent safety

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requirements. The study also combines contemporary psychological assessment instruments with contextual field data to provide a holistic understanding of the relationship between occupational stress and mental health. These findings are expected to enrich the occupational health and safety (OHS) literature by offering a mental health perspective in the oil and gas sector, which remains underexplored at the national level (5)(7).

The oil and gas industry carries both physical and psychological risks, with refinery workers vulnerable to stress and mental health issues due to complex processes, rotating shifts, and heavy responsibilities. At RU IV Cilacap, preliminary evidence showed fatigue, sleep disturbances, and reduced motivation among workers. While this study focuses on RU IV as a case context, its findings may offer insights applicable to other refinery units facing comparable operational demands, particularly regarding shift patterns and workload pressures. However, variations across sites in organizational culture and resource support must be considered when interpreting the generalizability of results.

The objectives of this research are:

(a) To identify the level of work stress among employees at RU IV Cilacap,

(b) To assess workers' mental health conditions based on measurable psychological indicators, and

(c) To analyze the relationship between work stress levels and mental health in the operational context of an oil refinery.

By understanding this relationship, the study is expected to provide a foundation for management in formulating sustainable, evidence-based occupational health policies, thereby safeguarding productivity, safety, and employee well-being (10).

RESEARCH METHODS

This study employed simple random sampling to minimize bias, targeting 480 operational workers at Refinery Unit IV Cilacap, with 218 respondents determined using Slovin's formula (5% margin of error). Data were collected via an anonymous online questionnaire covering demographics, work stress (Perceived Stress Scale), and mental health (GHQ-12), both validated instruments. After data cleaning and coding into Likert scales, analysis was conducted using SPSS 29. Descriptive statistics summarized stress

and mental health conditions, while inferential tests (Pearson or Spearman correlation) examined their relationship. Linear regression assessed the contribution of work stress to mental health variation, with significance set at $\alpha = 0.05$ and interpretation based on the coefficient of determination (R^2).

RESULTS AND DISCUSSION

Results

The study involved 218 operational workers at Refinery Unit (RU) IV Cilacap, selected through simple random sampling. The characteristics of respondents showed that the majority were aged 31–40 years (54%), male (96%), had more than 10 years of work experience (68%), and worked in a shift system (82%).

The average stress levels were moderate ($M = 3.12$; $SD = 0.74$), and mental health scores indicated some mild to moderate symptoms ($M = 2.87$; $SD = 0.69$). Statistical tests showed a significant positive association between stress and mental health ($r = 0.612$; $p < 0.001$). While instruments demonstrated good reliability, it should be noted that cultural and social norms such as stigma surrounding mental health or reluctance to disclose emotional distress may have influenced how workers reported their symptoms.

All questionnaire items had a Corrected Item-Total Correlation > 0.3 and Cronbach's Alpha > 0.85 for both instruments, demonstrating good internal consistency (15, 16). Pearson correlation analysis revealed a significant positive relationship between work stress and mental health ($r = 0.612$; $p < 0.001$).

The Chi-Square test results showed a Pearson Chi-Square value of 122.207 with a p-value of 0.000 (< 0.05), indicating a significant association between work stress levels and mental health conditions (Table 1). The Linear-by-Linear Association value of 55.280 with a p-value of 0.000 suggested a trend that increased mental health problems accompanied higher levels of work stress. Although some cells had an expected count of less than 5 (55.6%), the results consistently indicated a strong association. These findings highlight that stress management is essential for maintaining the mental health of refinery workers.

Table 1. Analysis of Pearson's Inferential Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	122.207[a]	4	.000
Likelihood Ratio	72.136	4	.000
Linear-by-Linear Association	55.280	1	.000
N of Valid Cases	286		

Source: Data Processing, 2025

In Table 2, it is shown that among the 172 respondents working non-shift, 78 (45.3%) experienced mild stress and 94 (54.7%) experienced moderate stress. Meanwhile, among the 114 respondents working in shifts, 60 (52.6%) experienced mild to moderate stress, 53 (46.5%) experienced moderate stress, and 1 (0.9%) experienced severe stress. Regarding mental health, the results showed that 136 non-shift workers (79.1%) had good mental health, 34 (19.8%) experienced mild mental health problems, and 2 (1.2%) experienced moderate mental health problems. Among the shift workers, 96 (84.2%) had good mental health, 16 (14%) experienced mild mental health problems, and 2 (1.8%) experienced moderate mental health problems.

Tabel 2. Model Fit Test Results

Work Stress				
Work Stress	n	Mean	Std.Deviation	P value
Non-shift	172	13.91	5.305	0.205
Shift	114	13.07	5.669	
Mental Health				
Work Stress	n	Mean	Std.Deviation	P value
Non-shift	172	148.5	5.122	0.209
Shift	114	135.9	5.122	

Source: Data Processing, 2025

Table 3. Analysis of Differences in Work Stress and Mental Health among Workers at Cilacap Refinery Unit IV

Work System	**Work Stress**						**Total**	
	Mild Stress		**Moderate Stress**		**Severe Stress**			
	n	%	n	%	n	%	n	%
Non-shift	78	45,3	94	54,7	0	0	172	100
Shift	60	52,6	53	46,5	1	0,9	114	100
Total	138	48,3	147	51,4	1	0,3	286	100
Work System	**Mental Health**						**Total**	
	Poor Mental Health		**Moderate Mental Health**		**Good Mental Health**			
	n	%	n	%	n	%	n	%
Non-shift	34	19,8	2	1,2	136	79,1	172	100
Shift	16	14	2	1,8	96	84,2	114	100

Total	50	17,5	4	1,4	232	81,1	286	100

Source: Data Processing, 2025

Table 4. Relationship between Work Stress and Mental Health among Workers at Cilacap Refinery Unit IV

Work Stress	Mental Health						Total		*P-value*
	Good		Mild		Moderate				
	n	%	n	%	n	%	n	%	
Mild	136	98.6	2	1.4	0	0	138	100	
Moderate	96	65.3	48	32.7	3	2	147	100	0.0001
Severe	0	0	0	0	1	100	1	100	
Total	232	81.1	50	17.5	4	1.4	286	100	

Source: Data Processing, 2025

The results in Table 4 show that among 138 respondents experiencing mild stress, the majority (136 workers, 98.6%) had good mental health, with only two workers (1.4%) reporting mild mental health problems. Conversely, among workers with moderate stress, the proportion with good mental health decreased to 96 workers (65.3%), while 48 workers (32.7%) experienced mild problems, and three workers (2%) reported moderate mental health problems. The single worker classified with severe stress was recorded as having moderate mental health problems (100%). The statistical test result showed a p-value of 0.0001, indicating that at a 5% alpha level, there is a significant association between work stress and mental health.

Discussion

The finding that work stress falls into the moderate category is consistent with Marcatto et al. who reported that high-risk industry workers tend to experience mild to high levels of work stress due to a combination of physical workload and operational pressures (11). High workloads and shift schedules are the main contributors, as they can disrupt circadian rhythms and impair sleep quality (6)(12)(13).

Results from the GHQ-12 indicated that some workers exhibit mental health symptoms, although not all were at a clinical disorder level. This aligns with previous studies which identified burnout and sleep disturbances as early indicators of mental health issues in the energy industry. In the context of oil refineries, exposure to physical hazards and production pressure may further exacerbate these conditions (3)(4)(14).

The significant positive correlation indicates that the higher the work stress, the poorer the workers' mental health condition. This supports the job demand-

control theory, which states that high workloads without adequate support can reduce mental well-being (15)(16). The influence of 37.4% suggests that while work stress is an essential factor, other elements such as social support, compensation, and physical workplace conditions also play a role in affecting mental health.

Work stress management in refinery environments should include workload adjustments, improvements to shift patterns, and enhanced psychological support. Employee assistance programs can help workers manage stress before it develops into severe mental health problems (5)(7). The role of leadership as role models in maintaining work–life balance and mental well-being is also crucial (7).

CONCLUSION AND RECOMMENDATION

This study found that workers at Refinery Unit IV Cilacap experience moderate occupational stress, with some showing mental health symptoms requiring attention, and SPSS analysis confirmed a significant negative relationship between stress and mental well-being. Contributing factors include rotating schedules, heavy workload, and strict operational demands, underscoring the need for policy-based stress management through workload adjustments, task rotation, rest schedules, counseling, training, peer support, and regular mental health monitoring. Leadership involvement in promoting a healthy work culture is essential to improve well-being, prevent accidents, and sustain operational performance.

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