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Analysis of Demographic Factors Affecting Mental Health Among Workers at PT X Mining Company in 2023

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ABSTRACT
The mining industry is closely related to high-risk health and safety, including mental health. This study aims to investigate the association of demographic variables (age, length of service, gender, education level, employment status, and work location), on mental health symptoms in workers in mining companies PT X. The DASS-21 instrumentation was used to determine mental health symptoms based on levels of depression, anxiety, and stress. The number of respondents in this study was 764 employees were participated and it was found that 71.2% of respondents did not experience mental health problems, 15.3% experienced mild mental health symptoms, 10.4% moderate, and 3.1% severe mental health symptoms. There is a significant relationship between the age variable and the level of depression (p-value 0.04), the significant relationship between age, education level, length of service, gender, and the level of anxiety (p-value 0.04; 0.005; 0.000; dan 0.007), as well as the relationship between age and level of education and stress in workers (p-value 0.000; dan 0.016). From the research, it can be concluded that the older the worker, the lower the level of depression, anxiety, and work stress. Male employees have lower levels of anxiety and stress than women, and a higher level of education plays a role in increasing anxiety and stress in workers.

1. Introduction

The business processes of mining represent one of the highest-risk work sectors compared to other business activities worldwide and require substantial funding (Saleh & Wahyu, 2019). This aligns with a series of high-load work conditions characterized by high-risk working environments and generally remote work areas, high production targets, shift work schedules, and job tension related to complex regulations and work processes (Tubis et al., 2020). Consequently, the mining business processes can adversely impact workers' safety and health, leading to illnesses, disabilities, and even workplace fatalities. Technological advancements, impacting work process developments without adequate preparation for physical, technical, or mental competence, can result in workplace diseases or accidents. In other words, industrialization is a double-edged sword; it aids in economic, health, and welfare improvements but also causes disabilities or deaths (Matamala Pizarro & Aguayo Fuenzalida, 2021).

Mental health is a state of well-being in which an individual realizes their abilities, can manage stress, work productively, and contribute to their community. Good mental health is a condition when

a person's inner self is in a state of peace and calm, allowing them to enjoy daily life and appreciate the people around them. According to research conducted by Firoozi in 2015, depression and stress rank as the second most common health disorders among workers after heart disease in the workplace (Firoozi chahak et al., 2015). This is more evident in developing countries, where there is often excessive work pressure to increase production without adhering to occupational safety regulations such as work procedures, working hours, worker training, proper use of personal protective equipment, and the lack of occupational health service systems compared to developed countries. Data from WHO in 2019 shows that around 300 million people worldwide have experienced depression. In Asia, mental health issues are the second-largest contributor to years lost due to disability. This is marked by the increasing number of adults diagnosed with mental illnesses each year: from 4% reported in Singapore to 20% in other countries such as Vietnam, Thailand, New Zealand, and Australia. In China, India, Japan, South Korea, Thailand, and Malaysia, the prevalence of mental health disorders is also rising. Meanwhile, data indicates 15.6 million diagnosed cases of mental health issues in Indonesia. Other data from the Ministry of Health of the Republic of Indonesia in 2023 shows that 6.1% of Indonesians aged 15 and older experience mental health disorders (Ayuningtyas et al., 2018).

The mining industry in Indonesia is currently experiencing a phase of high production demands to support national development. Studies indicate several accidents and occupational diseases in mining operational areas related to workers' mental health issues. Data from various studies show that 25.8% of miners in a subject study reported injuries in the past year. This results in an incidence rate equivalent to 19.67 injuries per 200,000 work hours and almost 26.9% to 35.8% of moderate to severe absenteeism cases. Additionally, there is an indication of increased symptoms of low back pain (LBP), estimated to cause 805 lost workday cases due to LBP in a year, reducing company productivity by USD 209,300 and national annual productivity by USD 200 million (Matamala Pizarro & Aguayo Fuenzalida, 2021).

Demographic factors are the factors within the population structure of an area and its development, such as gender, age group, education level, type of job, marital status, and so on (Hanum, 2018). Demographic conditions are associated with disparities in mental health status, such as education status contributing to determining job type (Fiori et al., 2016). Other factors, such as gender, length of employment, and age group, also play roles in determining mental health, especially related to mining work where seniority and male workers significantly influence job priorities and status (Liu et al., 2015). Therefore, the author conducted this study to determine the mental health levels of mining industry workers and the demographic factors affecting mental health among PT X mining workers.

2. Materials and Methods

This study is cross-sectional research with a quantitative analysis method to examine the relationship between workers' demographic factors and the levels of depression, anxiety, and stress among operational and non-operational division workers at PT X mining company. The research uses the 21-item Depression Anxiety and Stress Scales (DASS-21) questionnaire, which has been translated into Indonesian and administered through the MS Forms application. The questionnaire assesses three types of mental health disorders: depression (dysphoria, hopelessness, devaluation of life, self-criticism, lack of interest/involvement, anhedonia, and inertia); anxiety (autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect); and stress (difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive, and impatient). There are five rating scales: normal, mild, moderate, severe, and extremely severe (see Table 1).

The relationship between mental health disorders and demographic factors (age, education level, work location, gender, length of employment, and employment status) is analyzed using the chi-

square test. To determine the variables most affecting the respondents' mental health, linear regression analysis is used. A p-value <0.05 indicates a relationship between variables, while the sign in the regression test indicates the influence of demographic factors on mental health disorders. The r-square value indicates the extent of the influence of each demographic variable on mental health symptoms.

This study was conducted from February 1 to February 28, 2023, with the population comprising all permanent employees of PT X mining company working in Mimika Regency. PT X mining company had a population of 29,439 employees during the study period. Most of the workers are contractors, accounting for 75% of the total worker population, and the work locations are divided into two major areas: highlands and lowlands. The research sample was determined using simple random sampling with a 95% confidence level and a 5% margin of error. The minimum sample size calculated was 380 workers.

Table 1 Recommended Severity Rankings for DASS21 Sub-scales in Indonesia

	Depresion	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Middle	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Very Severe	28+	20+	34+

3. Result and Discussion

Respondent Characteristics

The data collection resulted in 764 total respondents who completed and validly submitted the online questionnaire. Each sample represented the work location, with 466 respondents working in the highland areas and 298 respondents working in the lowland areas. The average age distribution of the respondents was 38 ± 9.03 years. The variable of respondents' work tenure ranged from 9.8 ± 7.6 years, indicating a diverse range of work experience from under 5 years to over 30 years.

Based on the education level category, 32% of the respondents were high school graduates or below, while 68% were higher education graduates. The distribution of work locations showed that 61% of respondents worked in highland areas and 39% in lowland areas. In terms of gender, 71% of the respondents were male, and 29% were female, reflecting the physical demands of mining work, which is predominantly male-dominated. Regarding employment status, 37% of the respondents were permanent employees of PT X, while 63% were contractors from PT X.

Table 2 Frequency of Depression, Anxiety, and Stress Among Study Respondents

Mental Health Symptoms	**Frekuency (N=764)**											
	Normal		**Mild**		**Middle**		**Severe**		**Very Severe**		**Total Mental Health Symptoms**	
	n	%	n	%	n	%	n	%	n	%	n	%

Depresion	606	79.32%	80	10.47%	63	8.25%	15	1.96%	0	0	158	20.68%
Anxiety	509	66.62%	74	9.69%	134	17.54%	47	6.15%	0	0	255	33.38%
Stress	517	67.67%	197	25.79%	41	5.37%	9	1.18%	0	0	247	32.33%

Prevalence of Depression, Anxiety, and Stress among PT X Workers

The study found a 20.68% prevalence of depression among PT X workers, with 10.47% experiencing mild depression, 8.25% moderate depression, and 2% severe depression; no respondents experienced extremely severe depression. Regarding age, 8.23% of respondents in early adulthood (18-40 years) and 9.82% in middle adulthood (41-60 years) experienced depression. Regarding education level, 5.75% of respondents with high school education or below experienced depression, and 14.92% of respondents with higher education experienced depression symptoms.

In terms of gender, 14.53% of the respondents experiencing depression were male, and 6.16% were female. Regarding work location, 14.14% of respondents working in the highlands experienced anxiety, and 6.54% of employees working in the lowlands experienced anxiety. Based on work tenure, 5.63% of respondents with less than 5 years of service, 7.45% with 5-10 years, and 7.6% with more than 10 years of service experienced depression. The depression rate was 8.38% among permanent employees, while 12.3% of the respondents experiencing depression were contractors.

Table 3 Descriptive Indicators of Depression Based on Demographic Data

Demographic Characteristics		Depression Level								p-value
		Not depressed		Mild		Middle		High		
		No	%	No	%	No	%	No	%	
Age	Early Adulthood	235	30.76%	34	4.45%	22	2.88%	7	0.92%	**0.040**
	Middle Adulthood	359	46.99%	46	6.02%	22	2.88%	7	0.92%	
	Late Adulthood	12	1.57%	0	0.00%	0	0.00%	0	0.00%	
Education	High School or Below	197	25.79%	26	3.40%	15	1.96%	3	0.39%	0.218
	Diploma	44	5.76%	6	0.79%	4	0.52%	0	0.00%	
	Bachelor's Degree	313	40.97%	43	5.63%	36	4.71%	11	1.44%	
	Master's Degree	52	6.81%	5	0.65%	8	1.05%	1	0.13%	
Worl Locat	Highlands	358	46.86%	54	7.07%	44	5.76%	10	1.31%	0.469
	Lowlands	248	32.46%	26	3.40%	19	2.49%	5	0.65%	
Gender	Male	463	60.60%	60	7.85%	42	5.50%	9	1.18%	0.311
	Female	143	18.72%	20	2.62%	21	2.75%	6	0.79%	
Years of Service	Less than 5 years	191	25.00%	21	2.75%	18	2.36%	4	0.52%	0.767
	5 - 10 Years	156	20.42%	27	3.53%	26	3.40%	4	0.52%	

	11 - 20 Years	191	25.00%	24	3.14%	17	2.23%	4	0.52%	
	More than 20 years	68	8.90%	8	1.05%	2	0.26%	3	0.39%	
Employment Status	Permanent Employee	218	28.53%	25	3.27%	30	3.93%	9	1.18%	0.092
	Contractor	388	50.79%	55	7.20%	33	4.32%	6	0.79%	

The study found a 33.38% prevalence of anxiety among PT X workers, with 9.69% experiencing mild anxiety, 17.54% moderate anxiety, 6.15% severe anxiety, and no extremely severe anxiety detected. Regarding age, 18.32% of respondents in early adulthood (18-40 years) experienced anxiety, 14.53% in middle adulthood (41-60 years), and 1.57% in late adulthood (above 60 years). Regarding education level, 7.98% of respondents with high school education or below experienced anxiety, while 25.4% with higher education experienced anxiety symptoms.

In terms of gender, 21.72% of the respondents experiencing anxiety were male, and 11.66% were female. Regarding work location, 22.51% of respondents working in the highlands experienced anxiety, and 10.87% of employees working in the lowlands experienced anxiety. Based on work tenure, 11.12% of respondents with less than 5 years of service, 10.61% with 5-10 years, and 11.11% with more than 10 years of service experienced anxiety. The anxiety rate was 12.96% among permanent employees, while 20.24% of the respondents experiencing anxiety were contractors.

Table 4 Descriptive Indicators of Anxiety Based on Demographic Data

Demographic Characteristics		Anxiety Level								p-value
		Not depressed		Mild		Middle		High		
		No	%	No	%	No	%	No	%	
Age	Early Adulthood	178	23.30%	38	4.97%	68	8.90%	34	4.45%	**0.040**
	Middle Adulthood	319	41.75%	36	4.71%	66	8.64%	9	1.18%	
	Late Adulthood	12	1.57%	0	0.00%	0	0.00%	0	0.00%	
Education	High School or Below	180	23.56%	15	1.96%	35	4.58%	11	1.44%	**0.005**
	Diploma	39	5.10%	7	0.92%	5	0.65%	3	0.39%	
	Bachelor's Degree	247	32.33%	49	6.41%	78	10.21%	29	3.80%	
	Master's Degree	43	5.63%	5	0.65%	14	1.83%	4	0.52%	
Worl Locat	Highlands	294	38.48%	48	6.28%	90	11.78%	34	4.45%	0.079
	Lowlands	215	28.14%	26	3.40%	44	5.76%	13	1.70%	
Gender	Male	408	53.40%	49	6.41%	91	11.91%	26	3.40%	**0.000**

	Female	101	13.22%	25	3.27%	43	5.63%	21	2.75%	
Years of Service	Less than 5 years	149	19.50%	27	3.53%	37	4.84%	21	2.75%	**0.007**
	5 - 10 Years	132	17.28%	20	2.62%	44	5.76%	17	2.23%	
	11 - 20 Years	165	21.60%	21	2.75%	44	5.76%	6	0.79%	
	More than 20 years	63	8.25%	6	0.79%	9	1.18%	3	0.39%	
Employment Status	Permanent Employee	183	23.95%	31	4.06%	52	6.81%	16	2.09%	0.807
	Contractor	326	42.67%	43	5.63%	82	10.73%	31	4.06%	

Prevalence of Stress Among PT X Workers

The research results show that the prevalence of stress among PT X workers is 32.33%, with 25.79% experiencing mild stress, 5.73% moderate stress, 1.18% severe stress, and no cases of extremely severe stress detected. Based on age, 14.53% of respondents in early adulthood (18–40 years) experienced stress, 17.54% in midlife (41–60 years), and 0.26% in late adulthood (over 60 years). Based on education level, 8.64% of respondents with high school education or lower experienced stress, while 23.7% of those with higher education experienced stress symptoms.

Classification of anxiety based on gender: 22.12% of respondents experiencing anxiety are male, and 10.20% of respondents are female. Based on work location: 20.02% of respondents working in highland areas experience anxiety, while 11.91% of employees working in lowland areas experience anxiety. Based on years of service: 7.72% of respondents with less than 5 years of service experience anxiety, 10.46% of respondents with 5-10 years of service experience anxiety, and 14.26% of respondents with more than 10 years of service experience anxiety. The level of anxiety is 12.96% among permanent employees, while 19.38% of the anxiety level is from respondents who are contractor employees.

Table 5 Descriptive Indicators of Work Stress Based on Demographic Data

Demographic Characteristics		**Stress Level**								**p-value**
		Not depressed		**Mild**		**Middle**		**High**		
		No	**%**	**No**	**%**	**No**	**%**	**No**	**%**	
Age	Early Adulthood	207	27.09%	83	10.86%	21	2.75%	7	0.92%	**0.000**
	Middle Adulthood	300	39.27%	112	14.66%	20	2.62%	2	0.26%	
	Late Adulthood	10	1.31%	2	0.26%	0	0.00%	0	0.00%	
Education	High School or Below	175	22.91%	51	6.68%	12	1.57%	3	0.39%	0.711

	Diploma	38	4.97%	14	1.83%	2	0.26%	0	0.00%	
	Bachelor's Degree	258	33.77%	118	15.45%	21	2.75%	6	0.79%	
	Master's Degree	46	6.02%	14	1.83%	6	0.79%	0	0.00%	
Worl Locat	Highlands	312	40.84%	117	15.31%	31	4.06%	5	0.65%	0.281
	Lowlands	205	26.83%	80	10.47%	9	1.18%	2	0.26%	
Gender	Male	405	53.01%	136	17.80%	27	3.53%	6	0.79%	**0.016**
	Female	112	14.66%	61	7.98%	14	1.83%	3	0.39%	
Years of Service	Less than 5 years	175	22.91%	47	6.15%	9	1.18%	3	0.39%	0.834
	5 - 10 Years	133	17.41%	61	7.98%	15	1.96%	4	0.52%	
	11 - 20 Years	146	19.11%	75	9.82%	14	1.83%	1	0.13%	
	More than 20 years	63	8.25%	14	1.83%	4	0.52%	1	0.13%	
Employment Status	Permanent Employee	183	23.95%	79	10.34%	17	2.23%	3	0.39%	0.987
	Contractor	334	43.72%	118	15.45%	24	3.14%	6	0.79%	

Relationship Between Demographic Factors and Mental Health

Table 3 shows the relationship between demographic variables and depression levels among respondents. Only age shows a significant relationship with depression levels (p=0.04). Other demographic variables, including education level, work location, gender, work duration, and employment status, do not show a significant relationship in statistical analysis.

Table 4 shows the relationship between demographic variables and anxiety levels among respondents. Age, education level, gender, and work duration variables show a significant relationship with anxiety levels ($p \leq 0.05$). Work location and employment status variables do not show a significant relationship in statistical analysis.

Table 5 shows the relationship between demographic variables and stress levels among respondents. Age and gender variables show a significant relationship with stress levels ($p \leq 0.05$). Education level, work location, work duration, and employment status variables do not show a significant relationship in statistical analysis.

Table 6 shows the results of the multivariate analysis of demographic variables of workers with mental health symptoms. The variable of age (sig = 0.000) is the only variable that has an influence on increasing the occurrence of depression in workers by 1.5%. Other variables such as education, work location, gender, years of service, and employment status do not have an influence on causing an increase in depression in the workplace. In the multivariate analysis related to the influence on anxiety among workers, the variables of age, education, gender, and years of service

have an influence on increasing anxiety among workers (sig ≤ 0.05). Age has an influence on increasing anxiety by 3% in the population, followed by gender which can increase by 2.6%, education level has an influence of 1.2% on the anxiety levels of workers, and years of service have an influence of less than 1%. In the multivariate analysis related to stress levels among workers, the variables of age and gender (sig ≤ 0.05) have an influence of less than 1% related to the increase in work stress among workers.

Discussion

The results of this study show that, in general, the mental health condition of the workers in the study is normal, without mental health issues such as depression, anxiety, and stress. However, around 20.68% are indicated to have depression, 33.38% anxiety, and 32.33% stress with varying levels of mental disorder (low, moderate, and high). These results differ when compared to a study conducted on mine workers in remote areas of Australia, which showed higher levels of depression at 28.3%, and lower levels of anxiety and stress at 22.3% and 19.4%, respectively (Vojnovic & Bahn, 2015). Two studies conducted on mine workers in China showed depression rates of 62.8% and 26.5%, which are higher compared to this study (Joaquim et al., 2018; Liu et al., 2014). Another study on mine workers in southern Brazil showed that only 3.5% of respondents experienced depression and 13% experienced anxiety, which are lower compared to this study (Joaquim et al., 2018). Other studies by Velander (2010), Keown (2005), Bowers (2015), and Miller (2014) reported mental health issues among respondents ranging from 24.5% to 33%. From comparing this study with similar studies in the same industry, it can be concluded that the mental health symptoms level in this study is consistent with others. This consistency is due to similar demographic factors.

This study also identifies significant variables affecting the levels of depression, anxiety, and stress among workers in PT X mining company. The variable that directly affects all three aspects of mental health (depression, anxiety, and stress) is age. According to a study by Ferraro & Wilkinson (1992) in the Handbook of Sociology of Mental Health, mental health levels tend to increase from ages 18 to 40 and decrease above age 40. This study also aligns with the finding that as workers age, they exhibit better mental health symptoms (Ferraro & Wilkinson, 2013). This is due to life experience and a more mature level of maturity in solving problems (Spoorthy et al., 2020). Additionally, age is the demographic factor with the greatest influence on determining mental health levels, as older individuals tend to have improved cognitive and emotional control abilities (Höglund et al., 2020).

In this study, anxiety levels among workers are also influenced by gender and education levels. The study found that female workers have higher anxiety levels compared to male workers. According to research by Eaton (2011), women are more likely to internalize emotions compared to men (Eaton et al., 2012). This self-internalization leads women with mental health issues to withdraw, experience loneliness, and ruminate on their problems. This differs from male workers, who tend to be more aggressive, impulsive, and coercive, thus more easily expressing their pressures and coping with mental health issues (Ma et al., 2019). Another factor related to higher anxiety levels in female workers in the mining sector is the difficulty in adapting to living in remote areas away from their families (Eiter et al., 2023).

The education level variable also influences the occurrence of anxiety among workers in this study. The research shows that workers with higher education levels have higher anxiety levels compared to those with lower education levels. According to a literature review by Asare-Doku et al.

(2020), there is an influence of education level on mental health status; higher education levels are associated with higher positions and greater, more complex responsibilities, leading to increased work pressure as a cause of mental disorders among workers. In the context of the company where the study was conducted, the company is undergoing a transition where several new employees with higher education levels hold more complex positions and projects, resulting in higher anxiety levels. Furthermore, higher education levels are related to higher expectations of the work being done, leading to decreased mental health when reality does not meet expectations (Cohen et al., 2020).

The study also shows that age and education levels influence stress levels among workers. Groups with higher education levels tend to have higher work stress levels compared to groups with lower education levels. This is inconsistent with the study by Lunau in 2015, which found that workers with lower education levels have consistently higher work stress levels across various European studies. This is because education level is related to better skills and knowledge of work methods compared to workers with lower education levels (Lunau et al., 2015). In practice, workplace skills and knowledge are not only obtained through formal education but also through training and on-the-job practice, making workers more accustomed to meeting expected work standards. Additionally, there are common practices in companies to assign more analytical and novel tasks to younger workers with higher education levels, while senior workers are given more routine tasks, resulting in significant differences in work stress related to education level (Bhui et al., 2016).

Limitations of the Study

This study only considers the influence of a limited range of demographic factors, including age, education level, work location, gender, years of service, and employment status. Based on various references, other variables such as work shifts, employment level, and direct factors affecting mental health, such as disagreement and uncertainty, role clarity, supervisor support, workload, and work hours, should also be considered to identify the most significant influences on mental health symptoms among workers. Additionally, the cross-sectional nature of the study with a short timeframe and unbalanced sample proportion due to voluntary questionnaires means not all managerial levels and workers are covered, which provides an opportunity for improvement in future studies.

4. Conclusion

Workers at PT X are identified to have mental health issues, including depression, anxiety, and stress. Various demographic factors show a relationship with mental health complaints. Age is related to all three mental health issues, while gender affects anxiety and stress, and education level and years of service are related to anxiety. Recommendations to reduce mental health issues in the study location include raising worker awareness through mental health education programs. Education through socialization can increase workers' awareness of early mental health symptoms and seek medical help promptly. Additionally, increasing the number of psychiatrists as consultants for workers' mental health should be considered. The company should also create a comprehensive mental health management program involving worker participation, management, HR, medical personnel, and occupational health.

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