

Work Stress Levels and Safety Procedure Compliance among Traditional Gold Miners

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ABSTRACT

Work-related stress is an occupational health problem that can influence workers' behavior, including compliance with safety procedures. Traditional gold miners work in high-risk environments that may increase stress and reduce awareness of occupational safety practices. This study aimed to determine the relationship between work stress level and compliance with occupational safety procedures among traditional gold miners. This study used an analytical observational design with a cross-sectional approach. The sample consisted of 75 traditional gold miners selected using a total sampling technique based on inclusion and exclusion criteria. Data were collected using questionnaires consisting of respondent characteristics, work stress level, and compliance with occupational safety procedures. The data were analyzed using univariate analysis and bivariate analysis with the Chi-Square test. The results showed that most respondents experienced moderate work stress and most respondents were non-compliant with occupational safety procedures. The statistical analysis showed a significant relationship between work stress level and compliance with occupational safety procedures among traditional gold miners. Workers with higher stress levels tended to have lower compliance with safety procedures. Therefore, work stress management, occupational safety education, and regular supervision are needed to improve compliance with safety procedures among traditional gold miners.

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1. INTRODUCTION

Work-related stress is one of the occupational health problems that continues to receive attention in high-risk work sectors, including mining activities. Work stress may arise when workers experience pressure caused by heavy workloads, long working hours, unsafe working environments, time demands, and limited social or organizational support. In the occupational setting, stress does not only affect the physical and psychological condition of workers, but may also influence work behavior, especially compliance with occupational safety procedures (1).

The mining sector is known as one of the work sectors with a high potential for occupational accidents. Traditional gold miners often work in unstable environmental conditions, use equipment with limited safety standards, and may be exposed to hazardous materials during the mining process. These working conditions can increase physical and psychological pressure among miners. When stress is not properly managed, workers may experience fatigue, reduced concentration, decreased alertness, and lower awareness of workplace hazards (2).

Occupational health and safety programs are implemented to protect workers from the risk of accidents and occupational diseases. The main objective of occupational safety procedures is to create a safe, healthy, and productive work environment. However, the effectiveness of occupational safety programs depends not only on the availability of rules and facilities, but also on workers' compliance in applying safety procedures. This compliance includes the use of personal protective equipment, adherence to standard operating procedures, and the ability to maintain safe behavior during work activities (3).

Compliance with occupational safety procedures remains a major challenge in informal work sectors, including traditional mining. In many traditional mining areas, workers may not fully understand the importance of occupational safety, or they may consider safety procedures as less important than completing the work quickly. As a result, the use of personal protective equipment and the implementation of safe work procedures are often neglected. Low compliance with safety procedures may increase the possibility of occupational accidents and work-related health problems (4).

Work-related stress is considered an important factor that may affect workers' compliance with safety procedures. Workers who experience stress tend to have lower concentration, emotional instability, physical fatigue, and reduced motivation. These conditions may lead workers to ignore safety instructions, skip the use of protective equipment, or perform unsafe actions during work. Previous studies have shown that work stress is associated with unsafe behavior among workers, which may contribute to a higher risk of occupational accidents (5).

In addition, workers with higher levels of stress are more likely to neglect occupational safety procedures compared with workers who experience lower levels of stress. This condition indicates that work stress should not be viewed only as an individual psychological problem, but also as an important occupational health issue that can affect safety behavior in the workplace. Therefore, stress management and safety supervision are important components in efforts to improve compliance with occupational safety procedures (6).

The working area of Bongo II Public Health Center, Wonosari District, Boalemo Regency, is one of the areas with traditional gold mining activities. Based on field conditions, traditional gold miners in this area work in a high-risk environment, with heavy physical workloads and limited occupational safety protection. Such conditions may increase work-related stress and influence workers' compliance with occupational safety procedures.

Preliminary findings showed that most respondents experienced moderate work stress, while some workers were still non-compliant with occupational safety procedures. This situation indicates a possible relationship between work stress and compliance with occupational safety procedures among traditional gold miners. Although many studies have discussed work stress and occupational safety, studies that specifically examine the relationship between work stress level and compliance with safety procedures among traditional gold miners are still limited.

Based on this background, this study was conducted to analyze the relationship between work stress level and compliance with occupational safety procedures among traditional gold miners. The findings of this study are expected to provide useful information for health workers, mining managers, and related institutions in designing occupational health interventions, especially in stress management, safety education, and supervision of safety practices in traditional mining areas.

2. RESEARCH METHODS

This study used an analytical observational design with a cross-sectional approach. This design was selected because the independent variable, namely work stress level, and the dependent variable, namely compliance with occupational safety procedures, were measured at the same time. The study aimed to determine the relationship between work stress level and compliance with safety procedures among traditional gold miners.

The population in this study consisted of all traditional gold miners in the research area. The sample included 75 respondents who met the inclusion and exclusion criteria. The sampling technique used was non-probability sampling with a total sampling method, in which all members of the population who met the research criteria were included as respondents. The inclusion criteria were active traditional gold miners in the research area, willing to participate by signing an informed consent form, able to read and understand the questionnaire, and willing to complete the questionnaire. The exclusion criteria were respondents who did not complete the questionnaire, respondents who were ill or unable to participate during data collection, and respondents who withdrew from the study.

The variables in this study consisted of an independent variable and a dependent variable. The independent variable was work stress level, defined as the physical and psychological pressure experienced by traditional gold miners due to job demands. This variable was measured using a work stress questionnaire consisting of 16 items with a Likert scale. The total score was classified into three categories: low stress ≤ 21 , moderate stress 22–43, and high stress ≥ 44 . The dependent variable was compliance with occupational safety procedures, defined as miners' behavior in obeying safety rules, including the use of personal protective

equipment and adherence to work procedures. This variable was measured using an occupational safety compliance questionnaire consisting of 8 items with a Guttman scale. The total score was classified into two categories: compliant ≥ 5 and non-compliant < 5 .

The research instrument consisted of three parts. The first part contained respondent characteristics, including gender, age, educational level, length of work, working hours, knowledge of occupational safety, and history of occupational accidents. The second part measured work stress level using 16 items covering physiological, psychological, and behavioral symptoms. The third part measured compliance with occupational safety procedures using 8 items with yes or no responses. The instrument had been tested for validity and reliability before being used in data collection.

Data were collected using primary data obtained directly from respondents through questionnaires. Before data collection, the researcher obtained permission from the relevant institution and explained the objectives and benefits of the study to the respondents. Respondents who agreed to participate were asked to sign an informed consent form. After that, the questionnaires were distributed, completed independently by the respondents, and collected by the researcher.

The collected data were processed through editing, coding, data entry, and cleaning stages. Editing was conducted to check the completeness and clarity of the data. Coding was used to assign numerical codes to each respondent's answer. Data entry was conducted using the Statistical Package for the Social Sciences (SPSS), while cleaning was carried out to ensure that there were no errors or duplicate data.

Data analysis consisted of univariate and bivariate analysis. Univariate analysis was used to describe respondent characteristics and research variables in the form of frequency distributions and percentages. Bivariate analysis was used to determine the relationship between work stress level and compliance with occupational safety procedures. The statistical test used was the Chi-Square test with a significance level of 0.05. If the p-value was less than 0.05, the relationship between variables was considered statistically significant.

RESULTS

This study involved 75 respondents who were traditional gold miners in the research area. The respondents were selected based on predetermined inclusion and exclusion criteria. Data were collected using questionnaires that measured respondent characteristics, work stress level, and compliance with occupational safety procedures. The data were then processed and analyzed using the Statistical Package for the Social Sciences (SPSS).

Table 1. Distribution of Respondent Characteristics

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	72	96.0
Female	3	4.0
Education Level		
Elementary School	18	24.0
Junior High School	31	41.3
Senior High School	26	34.7
Length of Work		
< 1 year	29	38.7
≥ 1 year	46	61.3
Marital Status		
Married	63	84.0
Unmarried	12	16.0
Total	75	100

Data Source: Primary data processed by the researcher

Based on Table 1, most respondents were male, with 72 respondents (96.0%), while female respondents were 3 respondents (4.0%). Based on education level, most respondents had junior high school education, with 31 respondents (41.3%), followed by senior high school with 26 respondents (34.7%) and elementary school with 18 respondents (24.0%). In terms of length of work, most respondents had worked for ≥ 1 year, with 46 respondents (61.3%), while 29 respondents (38.7%) had worked for < 1 year. Based on marital status, most respondents were married, with 63 respondents (84.0%), while 12 respondents (16.0%) were unmarried.

Table 2. Descriptive Statistics of Respondents' Age

Variable	N	Mean	SD	Min	Max
Age	75	35.32	13.145	15	65

Data Source: Primary data processed by the researcher

Table 2 shows that the mean age of respondents was 35.32 years, with a standard deviation of 13.145. The youngest respondent was 15 years old, while the oldest respondent was 65 years old. These results indicate that the respondents had a wide age range.

Table 3. Distribution of Work Stress Level

Work Stress Level	Frequency (n)	Percentage (%)
Low	10	13.3
Moderate	52	69.3
High	13	17.3
Total	75	100

Data Source: Primary data processed by the researcher

Based on Table 3, most respondents experienced moderate work stress, with 52 respondents (69.3%). Meanwhile, 13 respondents (17.3%) experienced high work stress, and 10 respondents (13.3%) experienced low work stress. These results show that the majority of traditional gold miners in this study were in the moderate work stress category.

Table 4. Distribution of Compliance with Occupational Safety Procedures

Compliance	Frequency (n)	Percentage (%)
Non-compliant	43	57.3
Compliant	32	42.7
Total	75	100

Data Source: Primary data processed by the researcher

Based on Table 4, most respondents were non-compliant with occupational safety procedures, with 43 respondents (57.3%). Meanwhile, 32 respondents (42.7%) were compliant with occupational safety procedures. These results indicate that the level of compliance with occupational safety procedures among traditional gold miners was still low.

Table 5. Relationship between Work Stress Level and Compliance with Occupational Safety Procedures

Work Stress Level	Non-compliant	Compliant	Total
Low	3	7	10
Moderate	30	22	52
High	10	3	13
Total	43	32	75

Data Source: Primary data processed by the researcher

Based on Table 5, among respondents with low work stress, 7 respondents were compliant with occupational safety procedures, while 3 respondents were non-compliant. Among respondents with moderate work stress, 30 respondents were non-compliant, while 22 respondents were compliant. Furthermore, among respondents with high work stress, 10 respondents were non-compliant, while only 3 respondents were compliant.

The Chi-Square test showed a p-value of 0.021. Since the p-value was lower than 0.05, it can be concluded that there was a significant relationship between work stress level and compliance with occupational safety procedures among traditional gold miners. The results also show that respondents with higher work stress tended to have lower compliance with occupational safety procedures.

DISCUSSION

The results of this study showed that most respondents experienced moderate work stress, with 52 respondents (69.3%). This finding indicates that traditional gold miners experienced considerable work pressure during their mining activities. Work stress among miners may be influenced by the characteristics of mining work, such as heavy physical workload, unsafe working conditions, uncertain working hours, and exposure to occupational hazards. Traditional gold mining is generally carried out in work environments with limited safety protection, so workers may face both physical and psychological pressure during their daily activities.

In addition, traditional gold miners are often exposed to various risks, including unstable land conditions, the possibility of landslides, the use of hazardous materials, and unpredictable weather conditions. These conditions can increase fatigue, anxiety, and psychological tension among workers. Economic demands may also contribute to work stress, especially because traditional mining is part of the informal work sector, where income stability and social protection are often limited. Therefore, moderate to high work stress among miners should be considered an important occupational health issue.

The results also showed that most respondents were non-compliant with occupational safety procedures, with 43 respondents (57.3%). This finding indicates that the implementation of occupational safety procedures among traditional gold miners was still low. Non-compliance may occur due to several factors, such as limited knowledge of occupational safety, low educational background, lack of supervision,

limited availability of personal protective equipment, and work habits that have been practiced for a long time. In informal mining activities, workers may prioritize completing their work rather than following safety procedures.

On the other hand, 32 respondents (42.7%) were compliant with occupational safety procedures. This condition shows that some workers already had awareness of the importance of occupational safety. Compliance may be influenced by work experience, knowledge of workplace hazards, previous accident experience, and workers' perception of risk. Workers who understand the consequences of unsafe behavior are more likely to follow safety procedures, including the use of personal protective equipment and adherence to standard operating procedures.

The bivariate analysis showed that there was a significant relationship between work stress level and compliance with occupational safety procedures among traditional gold miners, with a p-value of 0.021. This result indicates that work stress level was associated with workers' compliance behavior in implementing occupational safety procedures. Descriptively, respondents with low work stress were more likely to be compliant, while respondents with high work stress were more likely to be non-compliant.

This finding suggests that higher work stress may reduce workers' ability to maintain safe behavior. Workers who experience high stress may have lower concentration, greater fatigue, emotional instability, and poorer decision-making ability. These conditions may cause workers to ignore safety procedures, skip the use of personal protective equipment, or perform unsafe actions during mining activities. In stressful situations, workers may focus more on completing tasks quickly than on maintaining occupational safety.

Work stress can also lead to careless behavior and reduced awareness of hazards in the workplace. When workers feel pressured by workload, economic demands, or unsafe working conditions, they may become less attentive to safety instructions. This condition may increase the possibility of occupational accidents, especially in traditional mining areas where supervision and safety facilities are often limited. Therefore, work stress should be considered one of the factors that can influence compliance with occupational safety procedures.

The findings of this study are in line with the concept that psychological conditions can influence work behavior, including compliance with workplace rules and safety procedures. Workers with lower stress levels tend to have better concentration and awareness, which may support safer work behavior. Conversely, workers with higher stress levels may have a greater tendency to perform unsafe behavior. Therefore, stress management is an important strategy in improving occupational safety compliance.

The results of this study have practical implications for occupational health programs in traditional mining areas. Efforts to reduce work stress are needed through better work arrangements, health education, counseling, and improvement of working conditions. In addition, compliance with occupational safety procedures should be improved through regular education, supervision, and the provision of adequate personal protective equipment. Public health centers, local authorities, and mining managers should work together to promote occupational safety and stress management among traditional gold miners.

3. CONCLUSION

This study concluded that most traditional gold miners experienced moderate work stress, with 52 respondents (69.3%). In addition, most respondents were non-compliant with occupational safety procedures, with 43 respondents (57.3%). The results of the Chi-Square test showed a p-value of 0.021, which means that there was a significant relationship between work stress level and compliance with occupational safety procedures among traditional gold miners. These findings indicate that the higher the level of work stress experienced by workers, the lower their compliance with occupational safety procedures.

4. SUGGESTION

Based on the results of this study, traditional gold miners are expected to increase their awareness of the importance of occupational safety by complying with established safety procedures, especially the use of personal protective equipment and adherence to work procedures. Workers also need to improve their ability to manage work stress so that they can maintain concentration and safe behavior during mining activities.

Public health centers and related institutions are expected to strengthen promotive and preventive efforts through regular education, counseling, and occupational safety training for traditional gold miners. These efforts should include information about work stress management, the importance of personal protective equipment, and the prevention of occupational accidents.

Mining managers or parties responsible for mining activities are also expected to improve supervision and provide a safer working environment. The availability of personal protective equipment, clear safety rules, and consistent monitoring are needed to support workers' compliance with occupational safety procedures.

For future researchers, it is recommended to conduct further studies by adding other variables that may influence compliance with occupational safety procedures, such as knowledge, attitude, availability of personal protective equipment, supervision, work experience, and safety culture. Further research with a larger sample size and different research locations is also expected to provide more comprehensive results.

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