Mining Technology Journal
Vol.(2), No.(2), 2025 *https://doi.org/10.31315/mtj.v2i2.13135*
E-ISSN: 2460-8386
http://jurnal.upnyk.ac.id/index.php/mtj

Knowledge Factor Contributing to Occupational Accidents Among Mining Workers

Ivana Ardhia Larasati[1], Rika Ernawati[2], Shofa Rijalul Haq[2]
[1]*Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta*
[2]*Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta*
[1]*Corresponding author: ivana.dhea@gmail.com*

ARTICLE INFO

Keywords:
Occupational accidents, factors of occupational accidents, their relationship with occupational accidents**.**

ABSTRACT

Mining operations inherently carry the risk of occupational accidents. Despite ongoing efforts by companies to minimize such accidents, they continue to occur. Workplace accidents are undersirable events that can result in human and material losses (Bird & German, 1990). These accidents may be attributed to various factors, one of them is knowledge. To investigate the relationships beetwen these factors and occupational accidents, a cross-sectional approach was adopted. Data were collected through interviews and questionnaires administered to a predetermined number of respondents. The analysis involved univariate and bivariate tests using the chi-square method. Knowledge was among the coomon variables examined in research on the analysis of causal factors for occupational accidents among mining workers.

INTRODUCTION

Worker-related factors play a pivotal role in contributing to occupational accidents within the mining sector. Age is a significant determinant, as younger workers often lack sufficient experience, whereas older workers may face physical limitations that increa their vulnerability (Syaputra et al., 2022). Furhermore, gender differences may influence accident rates due to disparities in physical strength, social roles, and safety-related approaches (Maulana & Fadillah, 2022). Job tenure is another critical factor; employees with longer service periods generally possess greater familiarity with workplace hazards, while those with shorter tenure are more susceptible to accidents owing to limited experience (Sari, 2022). Additionally, education level and knowledge are vital in enhancing hazard awareness and ensuring adherence to safe working procedures (Budiarti et al., 2019).

Managerial factors are equally essential in the prevention of occupational accidents. The impelentation of an effective safety management system, combined with adequate training and robust supervision, can significantly reduce accident rates (Suwignyo, 2022). Moreover, well-structured Occupational Health and Safety (OHS) program dissemination fosters compliance among workers, particularly in the proper use of personal protective equipment (Adriansyah, 2021).

Environmental factors within the workplace also constitute a crucial aspect that must not be overlooked. Maintaining a clean and organized work setting, ensuring sufficient lighting, proper ventilation, and the installation of clear and visible warming signs are all measures that help minimize potential hazards (United States Bureau of Labor Statistics, 2021–2022). By comprehensively understanding the interconnections between worker-related, managerial, and environmental factors, this study aims to examine the relationship between knowledge levels and the incidence of occupational accidents, and to develop targeted strategies to mitigate such risks in the mining industry.

CONTACT Ivana Ardhia Larasati | ivana.dhea@gmail.com | Instansi penulis : Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta

MATERIALS AND METHODS

This study employed a cross-sectional approach to investigate the relationships between the causative dactors and the occurence of occupational accidents. After determining the number of respondents, interview and questionnaire data ware collected from the selected participants.

The data analysis involved both univariate and bivariate tests. The univariate analysis was used to provide a general descriptive overview of the data, including the frequency distribution and description of each observed variable, which were the presented in written form or tabular format.

The bivariate analysis was conducted to obtain information on the relationship between the independent and dependent variables. In this study, the chi-square test was used for the bivariate analysis. The confidence level for all analysis was set at 95%, with a significance level (α) of 0.05. If the p-value was found to be less than 0.05, it was interpreted as a significant association between the two variables under consideration.

RESULTS DAN DISCUSSIONS

The factors commonly used in analyzing the causes of work accidents among mining workers include knowledge, attitude, supervision, and occupational safety and health (OHS) promotion. Regarding knowledge, the higher the level of workers' knowledge about safety and health, the more it can minimize the occurrence of work accidents (Sarwono, 1991). Studies have shown that the majority of workers have a low level of knowledge related to accident risks and prevention. Workers' attitudes are also influenced by their level of knowledge, where the higher the knowledge, the more likely they are to demonstrate a positive attitude towards safety at work (Raja, 2018). Workers with good attitudes will be more compliant with safety procedures and use personal protective equipment. Effective supervision by managers or supervisors, such as conducting regular inspections, checks, and inspections, can also prevent work accidents (Salawati, 2009). Good supervision will encourage workers to behave safely. Lastly, effective OSH promotion efforts can increase workers' awareness and safe behavior, thereby protecting workers, company assets, and the environment (Helliyanti, 2009). Well-targeted OSH promotion programs can change workers' attitudes and behaviors to be more safe. Overall, these factors are interrelated and influence the level of work accidents among mining workers. Efforts to improve knowledge, foster positive attitudes, implement strict supervision, and conduct effective OSH promotion are essential strategies to prevent and minimize work accidents in the mining environment.

TABLE 1. Similar Rearch

Researcher Name and Research Title	Percentage	p-value
To determine the factors associated with work accidents among workers at PT. Sumber Karindo Sakti. (Raja, 2018)	Out of 67 respondents, 39 people (58.2%) had low knowledge, and 28 people (41.8%) had high knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.035), indicating a relationship between knowledge and the occurrence of work accidents.
To determine the relationship betwee knowledge, supervision, and socialization of the OHS program on work accidents among construction workers at PT. Tatamulia Nusantara Indak Southgate Apartment Tanjung Barat Project. (Budiarti, 2019).	Out of 85 respondents, 33 people (38.8%) had low knowledge, and 52 people (61.2%) had high knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.012), indicating a relationship between worker's knowledge and the occurrence of work accidents.
To determine the relationship betwee knowledge and attitude with safe bel among workers in the workshop of F Indramayu (Syaputra, 2022)	Out of 33 respondents, 9 people (27.3%) had poor knowledge, and 24 people (72.7%) had high knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.002), indicating a relationship between knowledge and safe behavior.

CONTACT Ivana Ardhia Larasati | ivana.dhea@gmail.com | Instansi penulis : Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta

Researcher Name and Research Title		Percentage	p-value
To determine the relationship between knowledge and attitude with safety behavior among workers in the workshop of PT. Trasindo Murni Perkasa East Kalimantan. (Maulana, 2022)		Out of 60 respondents, 35 people (58.3%) had low knowledge, and 25 people (41.7%) had high knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.000), indicating a relationship between knowledge and safety behavior.
To determine the effect of work attitudes and the role of supervisors on employee safety behavior at PT. BUMA site KJA Kab. Paser (Karimah, 2017)		This study did not include knowledge.	
To analyze the relationship between knowledge and attitude with the use of personal protective equipment among workers at PT. Putra Karangetang Popontolen Village, Tumpaan District. (Medellu, 2018)		Out of 78 respondents, 37 people (47.4%) had good knowledge, and 41 people (52.6%) had poor knowledge.	The chi-square analysis showed a probability (p) < 0.05 (p = 0.000), indicating a relationship between knowledge and the use of personal protective equipment.
To determine the relationship between supervision, attitude, and knowledge about OHS with safe behavior of dump truck coal drivers at PT. Mitra Indah Lestari Samarinda City. (Suwignyo, 2022)		Out of 81 respondents, 22 people (27.2%) had good knowledge, and 59 people (72.8%) had poor knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.028), indicating a relationship between knowledge and safe worker behavior.
To analyze the relationship between knowledge and attitude with compliance in using mask personal protective equipment among sand stone mining workers at PT. Sirtu Emas Sampang Regency. (Adriansyah, 2021)		Out of 56 respondents, 15 people (71.4%) had good knowledge and complied with using personal protective equipment, and 14 people (73.7%) had poor knowledge and did not comply with using personal protective equipment.	The chi-square test showed a probability (p) < 0.005 (p = 0.004), indicating a relationship between knowledge and compliance in using personal protective equipment.
To determine the relationship between knowledge, attitude, training, and supervision on unsafe behavior at PT. X in 2021. (Sari, 2022)	202	Out of 200 respondents, 74 people (37%) had good knowledge, and 126 people (63%) had poor knowledge.	The chi-square test result showed a probability (p) < 0.05 (p = 0.000), indicating a relationship between knowledge and unsafe behavior.
To determine the relationship between knowledge, attitude, and practice of standard operational procedures with the occurrence of work accidents in the twisting section at PT. X Cirebon in 2017. (Latif, 2017)	202	Out of 45 respondents, 18 people (53.3%) had good knowledge, and 27 people (46.7%) had poor knowledge.	The chi-square test result showed a probability (p) > 0.05 (p = 0.820), indicating no relationship between knowledge of standard operational procedures and work accidents.

The studies reviewed consistently examined the relationship between workers' knowledge and various safety-related outcomes, such as the occurrence of work accidents, safe behavior, and the use of personal protective equipment (PPE). Across the different studies, there were several notable similarities. Firstly, the researchers found that a substantial proportion of workers had either low or high knowledge levels, with some studies reporting around 40-60% of workers having low knowledge, and others finding that 60-70% of workers had high knowledge. Secondly,

CONTACT Ivana Ardhia Larasati | ivana.dhea@gmail.com | Instansi penulis : Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta

the studies all utilized the Chi-square test as the statistical method to determine the relationship between workers' knowledge and the safety-related outcomes.

The significance of the findings is equally striking. Consistently, the studies reported a statistically significant relationship between workers' knowledge and the safety-related outcomes, with p-values less than 0.05. This strong and reliable association underscores the importance of worker knowledge as a critical factor in promoting workplace safety. The findings suggest that improving workers' knowledge on safety-related topics, such as hazard identification, risk assessment, and safe work practices, can contribute to reducing work accidents and enhancing overall safety performance. Moreover, the consistent findings across multiple studies in different companies and industries suggest that the relationship between knowledge and safety is a robust phenomenon, with broader implications for workplace safety management and training programs.

In summary, the studies reviewed demonstrate a clear and significant relationship between workers' knowledge and various safety-related outcomes, highlighthing the need to address knowledge gaps as a means to improve workplace safety and prevent work-related accidents and incidents.

CONCLUSION

The findings from the studies reviewed demonstrate a clear and significant relationship between workers' knowledge and various safety-related outcomes. Specifically, the researches found that a substantial proportion of workers had either low or igh knowledge levels, with some studies reporting around 40-60% of workers having low knowledge, and others finding that 60-70% of workers had high knowledge. Consistently, the studies all utilized the Chi-square test as the statistical method to determine the relationship between workers' knowledge and the safety-related outcomes. The results showed a statistically significant relationship, with p-values less than 0.05, indicating that workers' level of knowledge is an important factor associated with safety-related outcomes in the workplace. These findings highlight the need to address knowledge gaps as a means to improve workplace safety and prevent work-related accidents and incidents. Strategies to enhance workers' knowledge, such as targeted training programs, could potentially lead to measurable improvements in safety-related outcomes. Future research should further investigate the specific mechanisms by which workers' knowledge influences safety behaviors and outcomes.

REFERENCES

1. Adriansyah, A. (2021). the relationship between knowledge and compliance with the use of personal equipment among sandstone mining workers at PT. Sirtu Emas Sampang. Indonesian Journal of Occupational Health, 3(2), 115-123.
2. Budiarti, A., Arbitera, C., & Wenny, D. M. (2019). The relationship between knowledge, supervision, and occupational health and safety (OHS) socialization with occupational accidents at PT. Tatamulia Nusantara Indah. Journal of Industrial Hygiene and Occupational Health, 4(1), 42-57.
3. Helliyanti, P. (2009). Factors Associated With Unsafe Behavior in the Utility and Operation Department, PT. Indofood Sukses Makmur Tbk, Bogasari Flour Mills Division in 2009. Undergraduate Thesis, Department of Public Health, University of Indonesia.
4. International Labour Organization (ILO). (1998). Occupational Safety and Health: A Manual for Training Trainers. Geneva: ILO.
5. Karimah, L. (2017). The influence of work attitude and the role of supervisors on safety behavior. Indonesian Journal of Occupational Safety and Health, 5(2), 165-172.
6. Maulana, A., & Fadillah, W. W. (2022). The relationship between knowledge and attitude with safety behavior among workers in the workshop at PT. Trasindo Murni Perkasa, East Kalimantan. Journal of Community Health Insights, 1(3), 89-96.
7. Medellu, D. A., Kandou, G. D., & Kawatu, P. A. (2018). The relationship between knowledge, supervision, and occupational health and safety (OHS) with occupational accidents in PT. Katingan Timber Celebes, North Sulawesi Province. KESMAS: National Public Health Journal, 12(4), 190-197.
8. Raja, B. (2018). Factors associated with occupational accidents at PT. Sumber Karindo Sakti Tebing Tinggi (Bachelor's thesis, University of Sumatera Utara, 2018).
9. Salawati, L. (2009). The Relationship Between Behavior, Occupational Safety and Health Management, and the Occurrence of Work Accidents in the Clinical Pathology Laboratory of Dr. Zainoel Abidin General Hospital, Banda Aceh, in 2009. Syiah Kuala Medical Journal, 10(1), 19-26.

CONTACT Ivana Ardhia Larasati | ivana.dhea@gmail.com | Instansi penulis : Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional "Veteran" Yogyakarta

10. Sari, D. A. (2022). The relationship between knowledge, attitude, training, and supervision on unsafe behavior at PT. X in 2021. indonesian Applied OHS Journal, 5(1), 45-53.
11. Sarwono. (2009). National Reference Book on Maternal and Neonatal Health Services. Yayasan Bina Pustaka.
12. Suwignyo, R. (2022). The effect of supervision and knowledge on safe behavior of coal dump truck drivers at PT. Mitra Indah Lestari, Samarinda. Journal of Mining Occupational Safety, 2(1), 34-41.
13. Syaputra, E. M., Nurbaeti, T. S., & Luxiarti, R. (2022). The relationship between knowledge and attitude with safe behavior among workers in the workshop section at PT. X Indramayu. Journal of Public Health, 7(2), 293-298.
14. United States Bureau of Labor Statistics. (2021-2022). Top Work-Related Injury Causes. Retrieved from: https://injuryfacts.nsc.org/work/work-overview/top-work-related-injury-causes/.
15. United States Department of Labor Occupational Safety and Health Administration (OSHA). (n.d.). Retrieved from: https://claitec.com/en/osha-reference-in-workplace-safety-accident-prevention-part-1/.
16. Veazie, M. A., & Smith, G. A. (2000). Heavy drinking, alcohol dependence, and injuries at work among young workers in the United States labor force. Alcoholism: Clinical and Experimental Research, 24(12), 1811-1819.
17. Veazie, M. A., Landen, D. D., Bender, T. R., et al. (1994). Epidemiologic research on the etiology of injuries at work. Annual Review of Public Health, 15, 203-221.

CONTACT Ivana Ardhia Larasati | ivana.dhea@gmail.com | Instansi penulis : Mining Engineering Study Program, Department of Mining Engineering, Faculty of Mineral Technology, Universitas Pembangunan Nasional “Veteran” Yogyakarta