

MIODRAG MILENOVIĆ¹
SNEŽANA ŽIVKOVIĆ²
MILAN VELJKOVIĆ³

¹University of Niš,
Faculty of Philosophy in Niš

²University of Niš,
Faculty of Occupational Safety

³University of Niš,
Faculty of Occupational Safety

¹ mbmilenovic@gmail.com

² snezana.zivkovic@znrfak.ni.ac.rs

³ milan.veljkovic@znrfak.ni.ac.rs

SOCIO-DEMOGRAPHIC CHARACTERISTICS AND OCCUPATIONAL INJURIES IN MINERS

Abstract: Mining is a branch of industry with a high number of occupational injuries, including light, heavy and fatal injuries. In this study, we examined whether socio-demographic characteristics of employees have impact on the type of occupational injuries. The survey was conducted on a sample of 108 employees at the mine "Lece", who differed in terms of their age, the overall length of service, work experience in the mine, the level of education and the position. The results demonstrated that the group of factors such as the age, the overall length of service, and work experience in the mine, showed significant differences when it comes to occupational to injuries, unlike the factors such as education level and the position (workplace).

Keywords: miners, socio-demographic characteristics, occupational injuries.

INTRODUCTION

Mining is one of the industry branches with a large number of high-risk job positions. Each workday in the mine is different from the previous one and is a danger itself. Moving through cave rooms could be extremely dangerous, and despite comprehensive measures for safe work, in some situations, there is an increased risk for miners. In addition to objective risks, which can cause injuries to employees, such as the non-usage of personal protective equipment, explosive natural gases, the collapsed corridors in the pits, etc., there are many risks related to subjective factors. These risks could be classified into several categories. In this research, we introduced the category of socio-demographic factors, in an attempt to determine their association with occupational injuries. Our sample included the employees in the "Lece" mine in southern Serbia.

Occupational injuries among miners

Mining, in comparison to other industrial branches, has a high incidence of injury, including the one with the most severe outcome [1]. The record of injuries at work, especially injury statistics, is the basis for forming the necessary occupational safety measures, based on the available data [2].

Significant facts that provide information on occupational injury are: time, place and mode of occurrence, injured workers (length of service, education, occupation, age and gender), the number of injured and the injured part of the body, the nature, origin and cause of injury, and the frequency of the events of occupational injuries in individuals [3].

The most important information in mining and coal mining is the number of injuries per year and the number

of injuries per month, although the place where ore can be found and the presence of methane in the pits are also very significant.

According to the report of the company "Rudnik" and the float "Rudnik doo", based on the records of occupational safety and health, the most frequent types of injuries are: negligence in the workplace, failure to comply with protective measures, irrational and unsafe work. According to the localization of injuries, the most common types are hand, arm, leg, finger and foot injuries, mainly due to the non-usage of protective equipment. The greatest number of injuries happened in the positions of mining assistant, locomotive driver, drill miner and anchor miner.

The highest number of injuries happens on Tuesdays. Also, injuries often occur at the end of winter and in early spring, mainly due to the lack of concentration as a consequence of seasonal variations in the psychophysical state of the human body [4].

Gosh et al. [5], investigating the causes of injuries, concluded that miners who were very satisfied with the existing working conditions had a lower risk of injuries in the workplace. It was also confirmed that employees with no injuries had a positive opinion about the physical environment and always take the necessary precautions. In addition, the same authors concluded that elderly workers, emotional instability, poor perception of working conditions, stress at work and poor performance of procedures that are considered safe, play an important role in employee injuries.

The causes of injuries at work are complex and involve various factors. Risks of occupational injuries in mining can occur due to improper use of tools and machines, negligent behavior of employees, due to failure to comply with protective measures when moving around the machines, passing between the wagons, standing under suspended loads, passing over tread on the move,

or not wearing a helmet [6]. Environmental factors include physical working environment, i.e. illumination, noise and thermal conditions. Slight brightness leads to fatigue and prolongation of reaction time, and consequently to injury.

When the temperature of the working environment is too low, the injuries can happen due to psychomotor disorders or fine finger motions, while the higher temperature causes thrombosis and drowsiness which are the first signs of fatigue. In a noisy environment, employees in the mine fail to notice danger signals, while on the other hand, noise triggers fatigue, reduced attention and mental tension. In addition to these factors, accidents can also occur due to fire on equipment, electric shock, and surface water penetration, complete or partial demolition of individual cave rooms, incidental rotating parts, and improper position while drilling.

The organization of work activities is also closely related to the occurrence of an accident. Inadequate working hours, working overtime and heavy work reduces labor productivity and increases the number of injuries at work. On the other hand, socio-economic factors are an indispensable component in the emergence of injuries. This includes living standards, education, family status, the place of residence [4].

A stressful work or increased intensity of professional stressors can increase the risk of occupational injuries [7]. Some researchers believe that management can affect the health status and safety of employees and increase the risk of accidents [8]. Work in underground mines can sometimes be stressful. This stress creates frustrations that can alter psychomotor reactions, which as a consequence could become disorganized or exaggerated. In addition, employees with reduced emotional instability and elderly workers should be employed in less demanding jobs [5].

RESEARCH PROBLEM AND PURPOSE

The basic problem of the research was to determine the relationship between occupational injuries and socio-demographic characteristics of the employees in the "Lece" mine, which were operationalized through the following variables: age, the overall length of service, work experience in the mine, the level of education and the position (workplace).

METHODOLOGY

A tendency towards occupational injuries was assessed through the Work Safety Scale [9]. The answers were classified into four categories. The questionnaire was intended to provide a qualitative analysis of the answers, by involving the respondents who have experienced one or more injuries to describe them. Also, a questionnaire on socio-demographic variables has been given. Testing involved a homogeneous sample that consisted of 108 miners. The sample distribution by categories of socio-demographic characteristics of the respondents is given in the table below.

RESULTS

Using the H-square test, we tested the hypothesis that there is a statistically significant difference in terms of socio-demographic variables (age, the overall length of service, work experience in the mine, level of education, the position/workplace) and occupational injuries.

Table 1: The results of H-square test for regular occupational injuries in relation to socio-demographic variables

Variable	Categories variables	N	Average ranking	Hi-square	p
Age	Younger age (under 30)	19	24,82	28,412	0,000**
	Middle age (31-50 years of age)	57	55,66		
	Older age (over 50)	32	70,06		
Total length of service	up to 10 years	38	32,05	37,418	0,000**
	from 11 to 20 years	27	58,69		
	more than 20 years	43	71,71		
Work experience in the mine	up to 5 years	37	31,20	48,615	0,000**
	from 6 to 10 years	37	54,45		
	more than 10 years	34	79,91		
Level of education	Secondary school (3 years)	19	58,13	9,292	0,098
	Secondary school (4 years)	12	63,08		
	Vocational school	5	34,50		
	College	55	57,95		
	Graduate studies	10	42,00		
	Post-graduate studies	7	34,93		
Position (workplace)	Deep-pit	61	55,80	2,482	0,289
	Open-pit	19	45,08		
	Deep and open pit	28	58,07		

There are significant differences within the age variable categories, the overall length of service and the work experience in the mine ($p < 0.001$), while there is no difference in the variability in terms of education level and position (workplace).

DISCUSSION AND CONCLUSION

Working in the mine requires great effort when it comes to safety and associated risks.

If an individual is not mentally and physically fit for mining activities, if work conditions are poor, the protective equipment is obsolete and the employees have not undergone any education in terms of the use of the equipment and behavior in dangerous situations, there is a high probability of accident occurrence.

The overall aim of this study was to determine whether there are significant differences within some relevant socio-demographic characteristics of employees and injuries at work.

Based on the goal, we established a hypothesis which was partially confirmed. When it comes to respondents' age, the results of the survey show that the respondents over 50 years of age or older are more prone to injuries, whereas the incidence of injuries decreases in the case of respondents under 30. Younger workers, although not having enough experience, do not suffer so many injuries as their elderly colleagues do. The reason why the group of elderly workers is more at risk may be explained by a decline in psycho-physical properties, especially to speed and the response time.

The classification of work-related injuries by age is extremely important for a better distribution of jobs. Providing better training for younger workers, and if necessary, not distributing those tasks to elderly workers which could jeopardize their safety. Table 1 shows that the highest tendency towards injuries appears among workers with more than 20 years of service, followed by the employees who have up to 10 years of service.

This can be explained by the fact that workers with many years of experience have been working under stress for long periods. Consequently, they suffer from a lack of concentration, psychological and emotional exhaustion, which increases the possibility of injuries. The research conducted by [10] showed that the length of service has a significant impact on the level of stress and burnout syndrome at work.

Statistically significant differences in injuries in terms of work experience in the mine show that the employees with more than 10 years of experience are more prone to injuries. Those with the lowest risk of injuries are the employees who have up to 5 years of service in the mine. Commonly, employees with less work experience are less likely to be engaged in routine work, as their attention is focused on the proper performance and execution of tasks. When it comes to the level of education and the position (workplace), the results showed that there are no statistically significant differences in terms of injuries. This result is in favor of those theories which claim that workers with longer years of service in the same position are more likely to get injured, since they perform operations as a routine which, again, increases the injury risk - individual, i.e. subjective, than objective factors - the theory of predisposition, conditional reflexes or theories of domains [11, 12]. In addition, a qualitative analysis showed that 88% of injuries occurred due to failures in

the procedure, improper handling of work equipment, and lack of attention and concentration. Finally, bearing in mind that the research has been done on a limited number of participants, the results obtained should be checked on a larger sample of employees in another type of mines, with different types of exploitation.

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BIOGRAPHY

Miodrag Milenovic is an associate professor of the Faculty of Philosophy – Department of Psychology in Niš, Republic of Serbia. He teaches the courses in Sensory Processes, Motivation and Emotions, Psychophysiology of Work and Psychology of



Stress for students at undergraduate and master studies. His main research interests include psychophysiology of senses, the psychology of motivation and emotions, and the treatment of stress-related disorders.

SOCIODEMOGRAFSKE KARAKTERISTIKE I POVREĐIVANJE NA RADU KOD RUDARA

Miodrag Milenović, Snežana Živković, Milan Veljković

Rezime: Rudarstvo je grana privrede sa velikim brojem povreda na radu, bilo da se radi o lakšim, težim ili o povredama sa smrtnim ishodom. U ovom istraživanju ispitivano je da li postoji razlika u povređivanju na radu u odnosu na neke relevantne sociodemografske karakteristike zaposlenih. Istraživanje je sprovedeno na uzorku od 108 zaposlenih u rudniku „Lece” koji su se razlikovali s obzirom na: starost, ukupan radni staž, radni staž u rudniku, stepen stručne spreme i vrstu radnog mesta. Rezultati su pokazali da unutar faktora, kao što su godine starosti, ukupni radni staž i radni staž u rudniku, postoje značajne razlike u odnosu na povređivanje na radu, dok kod stepena stručne spreme i vrste radnog mesta to nije slučaj.

Ključne reči: rudari, sociodemografske karakteristike, povređivanje na radu