

# Professional stress in miners depending on the education and period of service in mining

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**Abstract.** Stress is one of the many potential determinants of health. It is not a new phenomenon and it accompanies people from the very beginning of their lives. One special place where many stimuli (stressors) causing stress conditions in humans occur, is the work environment. In the study, a questionnaire was used regarding the professional stress among the employees of one of the coal mines [1]. It comprised of three parts encompassing the following problem areas: the physical properties of the work environment, the social factors of the work environment and stress-inducing factors caused by poor organization of work. In the study of questionnaires filled by the respondents in one of the coal mines, it was found that the stressors are located both in the physical and social environment of work and their occurrence is in relation to the errors in the organization of the plant and managing human resources. The basic step preceding the proper prophylactic activities should be noticing the stress as a problem concerning both the individual employees as well as the entire plant. One should thus identify and eliminate the professional stressors occurring in the mining plant. It is necessary to design working conditions with a limited potential of inducing stress.

## 1. Introduction

Stress is one of the many potential determinants of health. It is not a new phenomenon and it accompanies people from the very beginning of their lives. It is often defined as a certain mental condition of a human being, being the result of reaction to environmental conditions. One special place where many stimuli (stressors) causing stress conditions in humans occur, is the work environment. The direct relation of the work process with stress conditions and the simultaneous impact of stress on actual health problems of employees is the basis for the detailed analysis of that problem. Stress may be a cause of health conditions and suffering of people both at work and in home. It may also lead to non-observance of safety rules at workplace and contribute to other health problems related to work [2, 3]. Stress induced by work has an impact on the functioning of the entire working place. The employees and the management experiencing excessive stress are physically and mentally exhausted and often experience health ailments. For these reasons [4]:

- the effectiveness and efficiency of their work is reduced,
- unintended errors and mistakes are made more often,
- reluctance for changes in work occurs,
- sick leaves and days-off are more common,
- provisions, safety rules and orders of superiors are being omitted,
- occupational accidents are more common,
- loss of interest in work and engagement in performing professional duties occurs,
- in extreme cases, employees resign from work.



Excessive stress in workplace is thus an indirect cause of financial and organizational problems of the employer. These problems may translate both into the image and the position of the company in the market [4, 5].

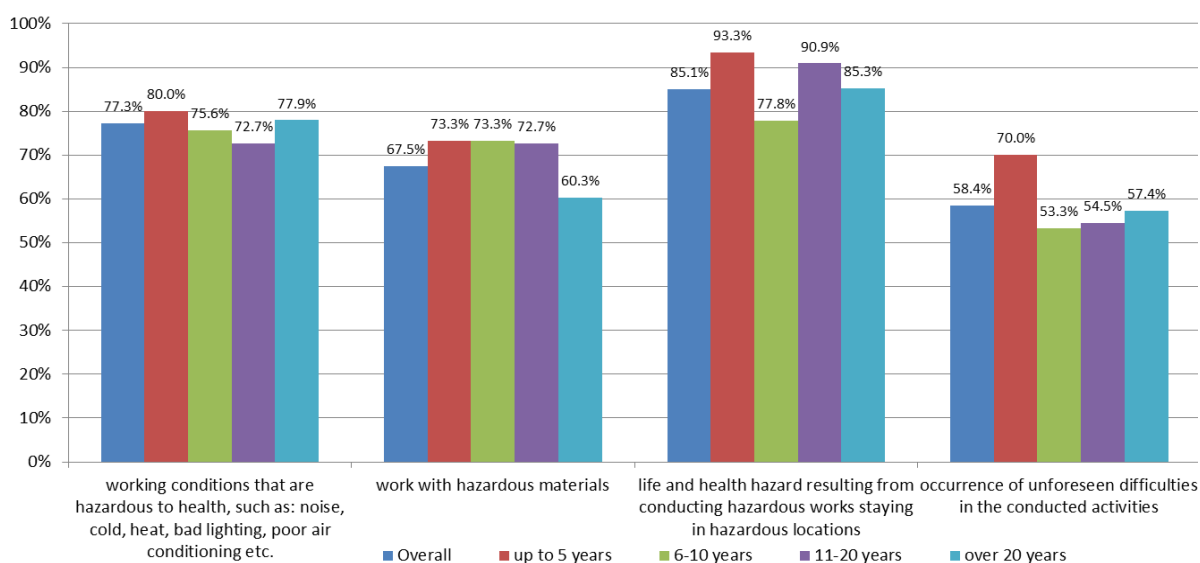
## 2. Materials and methods

In the study, a questionnaire was used regarding the professional stress among the employees of one of the coal mines [1]. It comprised of three parts encompassing the following problem areas: the physical properties of the work environment, the social factors of the work environment and stress-inducing factors caused by poor organization of work. The questionnaire was open and was anonymous. The respondents could select one or several answers among the provided ones or could express their own opinion. The study encompassed a representative, randomly selected group of people employed at underground positions of the coal mine in concern (154 persons) and were conducted during the periodical OHS trainings. The age of the respondents was within 21 to 54 years. The period of service of the respondents varied from 2 to 36 years (including from 2 to 30 years in mining industry itself). 62.3% of respondents had professional education, 33.1% secondary education, 3.9% higher education and 0.6% elementary education.

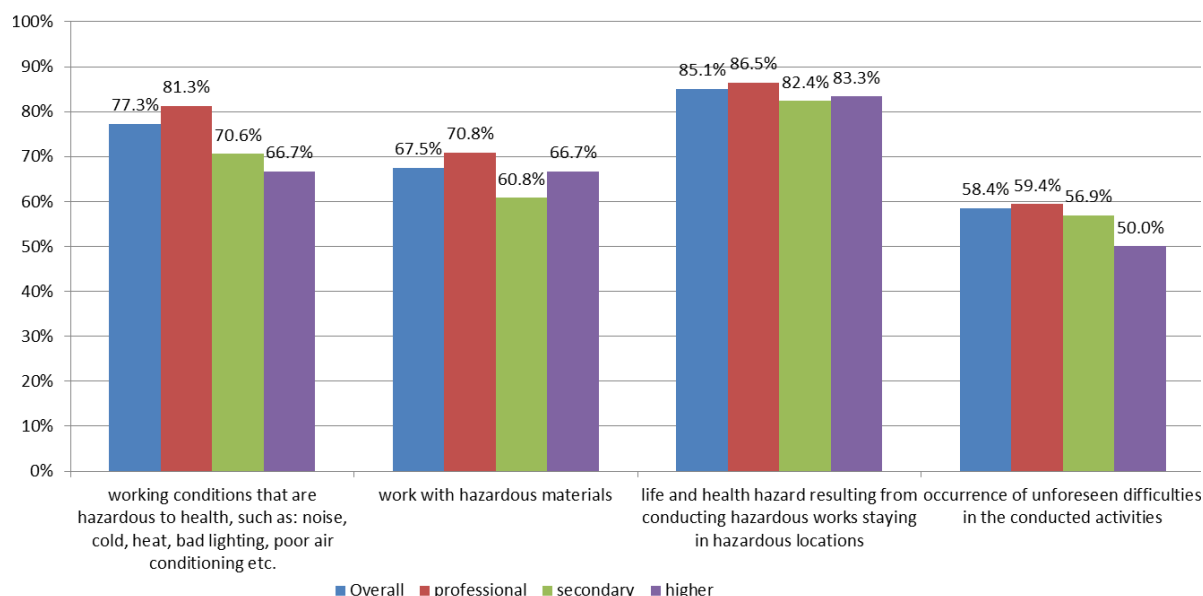
## 3. Results and conclusions

### 3.1. Physical properties of the work environment inducing stress with the service period and education of employees in mind

According to the respondents, the main factors of the working environment inducing occupational stress, with the period of service in mining in mind, are: life and health hazard resulting from conducting hazardous works staying in hazardous locations (over 90% in groups up to 5 years and 11-20 years of service in mining, while in the service group of 6-10 years, the value was 77%, in the range over 85%), working conditions that are hazardous to health, such as: noise, cold, heat, bad lighting, poor air conditioning etc. (over 70% in all service groups), occurrence of unforeseen difficulties in the conducted activities (indicated by over 50% of respondents and – in the 5 years service group – even 70% of respondents) and work with hazardous materials (over 73% of respondents and as much as 60.3% in the group with over 20 years of service).



**Figure 1.** Stress inducing physical properties of work environment with division into the period of service in mining.

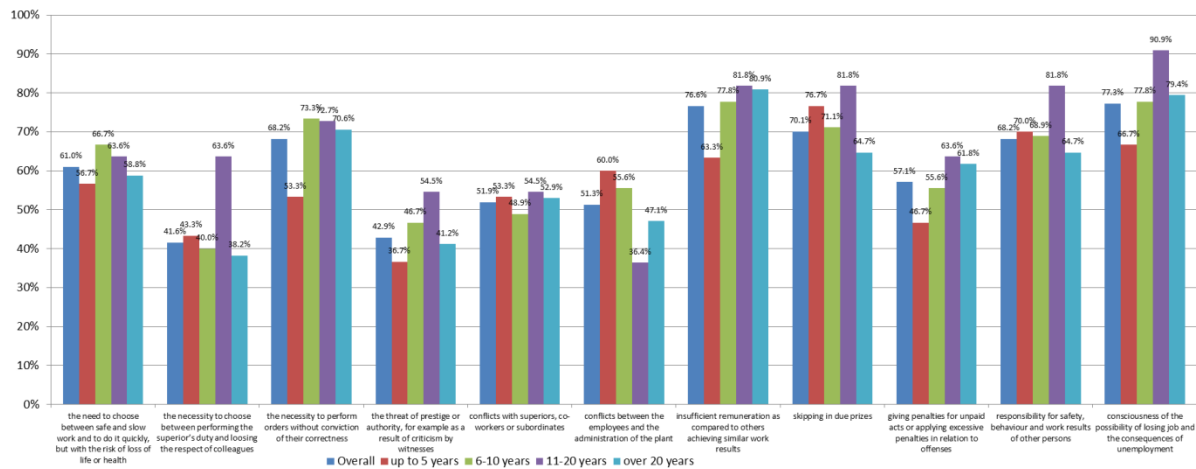


**Figure 2.** Physical properties of the work environment inducing stress with the education of employees in mind.

The main factors of the working environment inducing occupational stress, with the education of the employees in mind, are: life and health hazard resulting from conducting hazardous works staying in hazardous locations (over 80% in all groups irrespective of the education), working conditions hazardous to health such as: noise, cold, heat, bad lighting, poor air conditioning etc. (indicated by 70.6% of respondents with secondary education, 80% in case of persons with professional education and 66.7% of respondents with higher education), work with hazardous materials (over 60% of respondents and over 70% in case of persons with professional education) and occurrence of unforeseen difficulties in the conducted activities (over 50%, irrespective of the education).

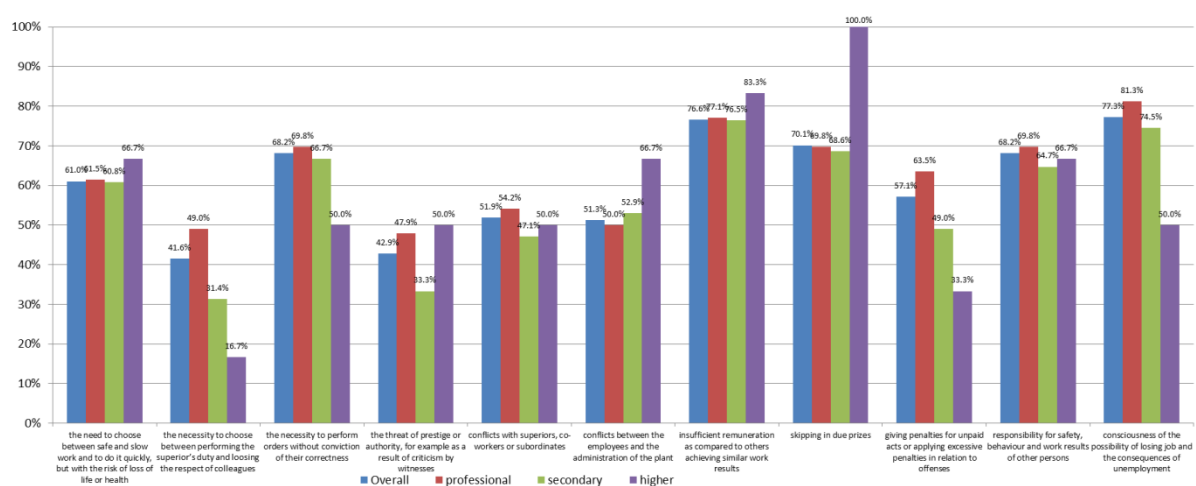
### 3.2. Social properties of the work environment inducing stress with the service period and education of employees in mind

According to the respondents, the following social factors causing occupational stress may be indicated with the period of service in mining in mind: the necessity to choose between performing the superior's duty and losing the respect of colleagues (indicated by over 63% of respondents in the 11-20 years of service group, in remaining groups it was 40%), the necessity to perform orders without conviction of their correctness (over 70% of respondents, with the exception of the group with the service of up to 5 years - 53%), conflicts between the employees and the administration of the plant (over 60% of respondents with service period up to 5 and 6-10 years, 40% in remaining groups), insufficient remuneration as compared to others achieving similar work results (indicated by over 80% of respondents with the exception of the group with the service period up to 5 years - 63%), responsibility for safety, behaviour and work results of other persons (81.8% of employees with service period of 11-20 years, 68% in case of remaining groups) as well as the consciousness of the possibility of losing job and the consequences of unemployment (90% in case of the group between 11 and 20 years, 70% in case of younger employees). The remaining stress-inducing social factors of the working environment, irrespective of the service time in mining are at a similar level.



**Figure 3.** Social factors of the work environment inducing stress in view of the service period of the employees.

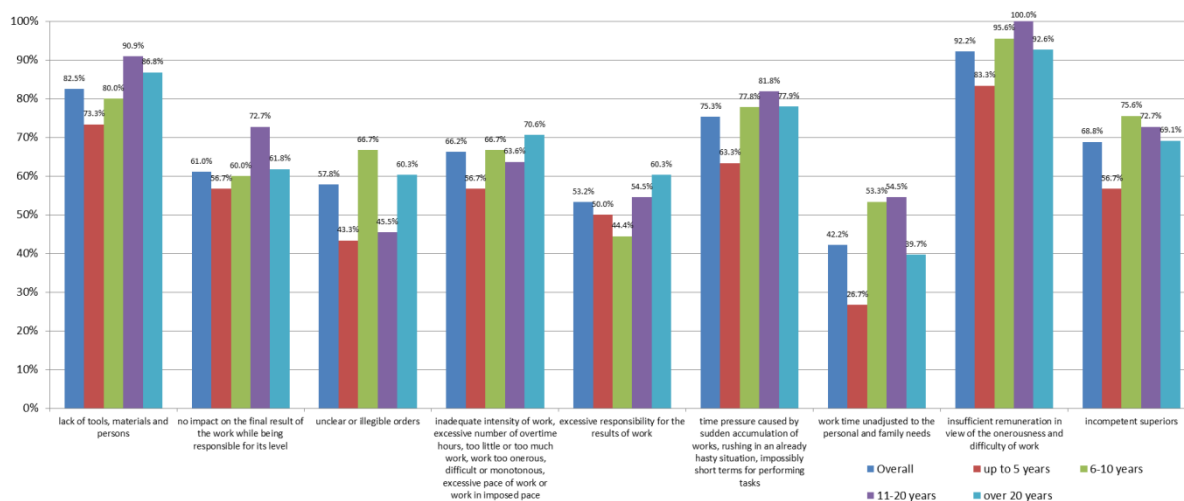
According to the respondents, the following social factors causing occupational stress may be indicated with the education in mind: the necessity to choose between performing the superior's duty and losing the respect of colleagues (indicated by over 49% of respondents with professional education, 31.4% with secondary education and 16.7% with higher education) conflicts between the employees and the administration of the plant (over 66% of respondents with higher education, remaining groups at a level of 50%), omission in case of due bonuses (100% in case of employees with higher education, remaining groups at a level of 70%), penalties for non committed acts or applying excessive penalties (over 63% of employees with professional education, only 33% with higher education and 49% with secondary education) as well as the consciousness of the possibility of losing job and the consequences of unemployment (81% in case of employees with professional education, 50% of employees with higher education). The remaining stress-inducing social factors of the working environment, irrespective of the education level are at a similar level.



**Figure 4.** Social properties of the work environment inducing stress in view of the education of the employees.

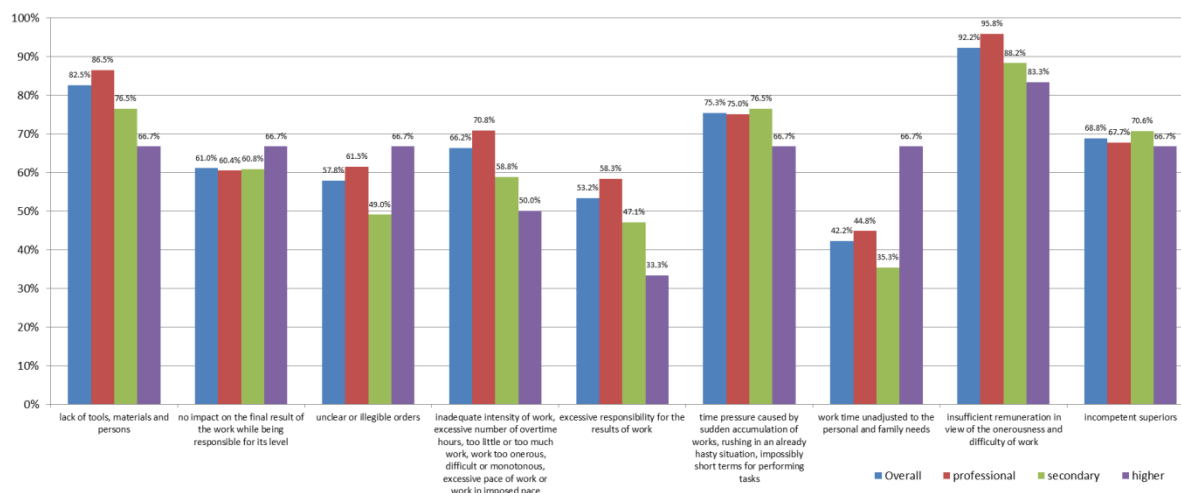
### 3.3. Stress-inducing factors related to poor organization of work with the service period in mining and the education of employees in mind

According to the respondents, the most commonly stress-inducing factors caused by poor organization of work, with the service time in mining, are: lack of tools, materials and persons (indicated by over 90% of respondents with service time of 11-20 years and by 73% of the group up to 5 years), unclear or illegible orders (over 60% of respondents with the service time in the range of 6-10 years and over 20 years, remaining groups – over 40%), excessive responsibility for the results of work (over 60% of respondents in the group with service time over 20 years, 44.4% in case of the youngest group), time pressure caused by sudden accumulation of works, rushing in an already hasty situation, impossibly short terms for performing tasks (over 81% of respondents with a service time of 11-20 years and only 63% in case of the group under 5 years), work time unadjusted to the personal and family needs (over 54% of respondents with the service time of 6-10 and 11-20 years and only 26.7% in case of the employees with service time up to 5 years), insufficient remuneration in view of the onerousness and difficulty of work (100% of respondents with service time of 11-20 years, remaining groups at a level of 90%). Other stress inducing factors related to poor organization of work, irrespective of the service time in mining are at a similar level.



**Figure 5.** Stress-inducing factors vs. service time in mining.

According to the respondents, the most stress-inducing factors, caused by poor organization of work, in view of the education of the employees, are: lack of tools, materials and persons (indicated by over 86% of respondents with professional education and over 60% of respondents with higher education), unclear or illegible orders (over 61% of respondents with professional and higher education and 40% in case of the remaining group), inadequate intensity of work, excessive number of overtime hours, too little or too much work, work too onerous, difficult or monotonous, excessive pace of work or work in imposed pace (indicated by over 71% of respondents with professional education and by 50% of respondents from remaining groups), excessive responsibility of the results of work (over 58% of respondents with professional education and by 33.3% of respondents with higher education), work time unadjusted to the personal and family needs (over 66% of respondents with higher education and only 35.3% respondents with secondary education) and remuneration too low in relation to the onerousness and difficulty of work (indicated by over 95% of respondents with professional education and by 80% of respondents from remaining groups). Other stress inducing factors related to poor organization of work, irrespective of the education, are at a similar level.



**Figure 6.** Stress-inducing factors vs. education of the employees.

The basic step preceding the proper prophylactic activities should be noticing the stress as a problem concerning both the individual employees as well as the entire plant. The actions reducing the stress levels should be concentrated at [5, 6]:

- the identification and elimination of occupational stressors occurring in the plant,
- designing working conditions with a limited potential of inducing stress,
- equipping the employees with knowledge and capability to cope with stress.

The identification of stressors may be conducted based on:

- talks or interviews regarding the professional matters or situations causing dissatisfaction, fear, anger or helplessness,
- conducting studies using checklists or special questionnaires.

The following actions may be conducted to design working conditions with a limited potential of inducing stress:

- maintaining the working conditions in line with the provisions,
- plan and organize the work in a correct manner,
- formulate the orders in such a way so as the employee knows what, how and why to perform them,
- avoid time pressure,
- apply understandable and acceptable criteria of assessment of work results, bonuses and penalties,
- improve the functioning of the plant's administration to eliminate the conflicts between the administrative employees and the workers.

The initiation and adjustment to changes is the condition of maintenance of an enterprise on a market. Changes usually cause tensions, fears and uncertainty with regards to their results. The employees must be aware that the changes are imminent and that it is necessary to learn and acquire new abilities to conduct changes or to adjust to the requirements imposed by these changes. This is why it is necessary to equip the employees with knowledge and capability to cope with stress.

#### 4. Summary

In the study of questionnaires filled by the respondents in one of the coal mines, it was found that the stressors are located both in the physical and social environment of work and their occurrence is in relation to the errors in the organization of the plant and managing human resources.

The basic step preceding the proper prophylactic activities should be noticing the stress as a problem concerning both the individual employees as well as the entire plant. One should thus identify

and eliminate the professional stressors occurring in the mining plant. It is necessary to design working conditions with a limited potential of inducing stress. The employees should also be equipped with knowledge and capability to cope with stress.

The necessity to fight stress actively has already been noted in the Polish mining. It is best exemplified by the fact of employing workplace psychologists in the mining plants.

## References

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