

ANNOTATION  
dissertation work  
MAGZHAN KAKARMANOVICH TILEMISSOV  
on the topic: "Medical-social foundations of health management of workers in ore  
processing"  
for the degree of Doctor of Philosophy (PhD) in specialty 6D 110200 "Public  
Health"

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#### Relevance

President Kassym-Jomart Tokaev in his message gave instructions to the Government to adopt the Concept of Safe Labor by 2030. This Concept should be aimed at preventing and eliminating professional risks at workplaces [Message from the President of the Republic of Kazakhstan, 2022].

According to official statistical data, in 2022 the number of people employed in harmful and (or) dangerous working conditions increased by 5% and amounted to more than 386.3 thousand workers [National Bureau of Statistics of the Republic of Kazakhstan, 2022].

One of the most important directions for healthcare development is improving approaches to preserving workers' health [Bukhtiyarov I.V., 2021]. To achieve this goal, measures are being taken to prevent the development of occupational diseases [Otarov E.Zh., 2023], ensuring proper quality and availability of medical care, as well as staffing medical organizations [Morozova T.V., 2019].

Special attention is paid to preventive measures, forming among the working population a culture of a healthy lifestyle and its promotion, early detection of signs of occupational diseases [Bukhtiyarov I.V., 2022]. Despite measures taken to increase production safety, an objective assessment and management of occupational danger based on uniform methods is required [Somova G.A., 2023]. This includes developing technologies for reducing labor conditions with the aim of preserving professional health, assessing health status risks, improving work efficiency, improving quality of life [Zheglova A.V., 2022].

Currently, there is a positive trend in the modernization of mining and beneficiation enterprises with the introduction of modern equipment, as well as the application of new environmental and energy-saving technologies. However, despite all the measures taken, the prevention of the negative impact of production environment factors on the health of workers remains relevant and necessary [Sukhova A.V., 2017].

Summing up the above information, it should be noted that researching worker's health, morbidity indicators and working conditions at industrial enterprises is a relevant problem and forms not only an assessment of a working

person's health but also social methods (models) for protecting the health of the working population. Therefore, studying medical-social factors affecting workers' health is a crucial task to preserve professional longevity of the working population.

In this regard, the relevance of research aimed at identifying risk, studying morbidity and developing medical-social programs for prevention and management of risk factors affecting the health of the working population is increasing.

**Research aim:** To study the medical-social factors affecting the health of workers in ore processing and develop a program to prevent worker morbidity.

**Research objectives:**

1. To identify risk factors affecting the occupational health of workers engaged in ore processing.
2. To study the temporary disability of workers from various professional groups involved in the ore processing.
3. To provide a medical-social description of existing social protection measures for workers involved in ore processing.
4. To develop a medical-social program to prevent morbidity among workers engaged in ore processing.

**Research novelty**

For the first time, socio-medical factors affecting the health of workers engaged in ore processing have been identified. A modern socio-medical characterization of the applied measures of social protection for workers has been provided. Subjective assessments of workers' health were conducted, with a comparison to objective data on morbidity and occupational diseases, along with a comparative study of risk factors. A medical-social program for managing the health of workers in ore processing has been developed and implemented.

**Practical value of the research**

The medical and social program for preventing illness among workers engaged in ore processing (implementation act of "Kostanai Minerals" dated November 9, 2023; implementation act of "Medical Center Zhezkazgan" dated December 25, 2023), based on continuous monitoring of workers' health conditions, risk group identification, working conditions, and social protection measures, will enhance the practical effectiveness of managing risk factors affecting the health of workers in hazardous industrial enterprises.

**Main positions defended:**

1. The leading risk factors affecting the health of workers in ore processing are air pollution in the work area, industrial noise, and the strenuousness of the labor process, which do not comply with sanitary and hygienic standards.

2. The highest levels of occupational hazards for workers in ore processing are found in the groups "working up to 9 years," with subsequent decreases as work experience increases.

3. The leading factors of medical and social support for workers in ore processing include fair financial compensation for work, unhindered access to paid leave, opportunities for professional development, and awareness of hazards and risks in the workplace.

### **Work approval**

Publication of research results:

- Material of the Plenum of the Scientific Council of Russian Federation on Human Ecology and Environmental Hygiene (Moscow, 2015)

- Collection I International Scientific-Practical Conference "Modern Medicine: Traditions and Innovations" (Turkestan, 2018)

- Materials VII International Scientific-Practical Conference "Current Issues in Medicine" and "Satellite Forum on Public Health and Healthcare Policy" (Baku, 2018)

-9th international congress on Occupational Safety and Health (Istanbul, 2018)

- Materials scientific-practical conference with international participation "Occupational Medicine in XXI century: problems of preserving working population health" (Karaganda, 2022)

- International Scientific and Practical Conference dedicated to the 65th Anniversary of the Institute of Public Health and Occupational Health "Prospects for the Development of Occupational Medicine and Medical Ecology" (Karaganda, 2023).

### **Publications**

There are 17 scientific works on the topic of the dissertation, including: publications in an international scientific journal indexed in the Scopus database with a CiteScore percentile of no less than 25 - 2; publications in scientific journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan - 4; publications in foreign scientific journals - 1; proceedings of international and republican conferences - 9; certificate of state registration of copyright - 1.

### **Materials and methods of the research work**

The following professional groups of workers in ore processing complexes have been identified as research subjects:

- the first group - workers of the "Kostanai Minerals," located in the city of Zhitikara, Kostanai region;

- the second group - workers of the Zhezkazgan Beneficiation Plant of "Corporation Kazakhmys" Zhezkazgan, located in the city of Zhezkazgan, Ulytau region.

Comparing the studied beneficiation productions from scientific and socio-medical perspectives is a complex task that requires in-depth research and expertise. The comparative study of working conditions, morbidity rates, and socio-medical factors of the production environment for workers in mineral ore processing has the following justifications:

- Work in the conditions of copper and chrysotile beneficiation complexes involves numerous technical aspects related to the uniform features of equipment, chemical and physical processes at workplaces, which affect the health of workers;
- The efficiency of each processing complex can be optimized using scientific and scientific-practical principles;
- Scientific research can be conducted to assess the effectiveness of both processing entities, their technical parameters, and their impact on workers' health;
- Ore processing at both enterprises are associated with hazardous and dangerous working conditions such as industrial noise, vibration, microclimate parameters, high levels of air pollution in the work area, and the strenuousness of the labor process;
- Optimization of occupational safety and health measures is required for both entities to reduce the risk of occupational diseases and accidents in production;
- The preventive measures and protection against harmful production factors affecting workers' health do not differ depending on the specificity of each process;
- Both productions pay special attention to the employer's social responsibility, the social status of workers, and provide social support measures.

Table. Main course, form, volume of the research

Course	Methods	Volume	
		1 <sup>st</sup> group	2 <sup>nd</sup> group
Hygienic characterization of working conditions	Assessment of harmful and hazardous factors in the working environment	3780 measurements	3958 measurements
Incidence of temporary disability among workers of various occupational groups	Study of cases, days, affected individuals, nosologies per 100 round-the-year workers	4039 round-the-year workers	4867 round-the-year workers
Medical-social characterization of measures of workers' social protection	Sociological study (Certificate No. 2605 dated August 10, 2018)	253 participants	292 participants

The research was conducted using socio-hygienic, sociological, and statistical methods.

Hygienic studies included an examination of the levels of adverse production factors and the determination of their sources of origin, in accordance with the Order of the Chairman of the Committee for Sanitary and Epidemiological Control of the Ministry of Health of the Republic of Kazakhstan dated December 31, 2020, No. 24,

methodological recommendations "Hygienic criteria and classification of labor conditions assessment according to the parameters of harmfulness and danger of factors of the production environment, severity and intensity of the labor process." A comprehensive assessment of working conditions was conducted at the studied workplaces to determine the degree of harmfulness and danger, severity, and intensity of the labor process of workers in accordance with current regulatory acts.

The assessment of workers' morbidity was conducted using databases of sick leave records from enterprises. Qualitative indicators of morbidity were studied according to E.L. Notkin. The prevalence of disease classes, individual groups of diseases, and nosological forms was analyzed. The distribution of occupational diseases by gender, age, and length of service during the study period was analyzed. The practically healthy contingent of workers was determined, taking into account the studied factors.

Socio-hygienic research was conducted using a specially designed "Questionnaire for studying socio-hygienic factors of health and assessing the social protection of workers," registered with the Ministry of Justice of the Republic of Kazakhstan under No. 2605 dated August 10, 2018.

The mathematical-statistical method of processing the results was carried out using the IBM SPSS Statistics V.28.0 statistical processing program. Descriptive statistical processing for the overall sample and for groups was performed separately: mean values (M), standard errors of the mean (m), standard deviation (SD), median (Me). The normality of the distribution was determined using the Shapiro-Wilk criterion. Analysis of differences between mean values was conducted using Pearson's chi-square ( $\chi^2$ ) test. Correlation analysis using the Kendall tau coefficient was used to test statistical hypotheses of association.

## **Conclusions**

1) Risk factors affecting the health of workers in ore processing include industrial noise, dust, and the strenuousness of work. High levels of working conditions in the chrysotile beneficiation complex are classified as Class 3, Grade 2, while the conditions in the copper beneficiation complex are classified as Class 3, Grade 3.

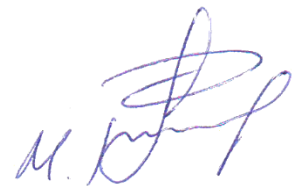
2) When studying age-related peculiarities of occupational diseases, it was found that in the chrysotile processing complex, as age increases, there is an increase in morbidity rates among workers, with the lowest levels observed in the age group "up to 29 years" and the highest in the age group "50 and over." In the copper processing complex, morbidity rates in length of service groups are higher, with the highest rates observed in the age group "30-39 years." As the length of service increases, morbidity rates decrease in both complexes. Female workers had slightly lower morbidity rates than male workers at both enterprises, with respiratory diseases being dominant among workers in both production units.

3) Social support for workers is implemented in both enterprises. However, it was noted that 28.8% of workers in the copper processing complex and 5.5% in the chrysotile processing complex reported not feeling such support from the company.

Significant socio-medical measures of social protection of workers in ore processing were identified, including unhindered access to paid leave, correlation between employment and satisfaction with monthly income, compliance of wages with length of service and profession, opportunities for skills enhancement, and awareness of workplace hazards and risks.

4) As a result of the study, a medical-social program for managing the health of workers in ore processing has been developed and implemented. This program is based on monitoring risk factors affecting health, morbidity rates, and significant socio-medical measures of social protection of workers, aimed at preventing and managing workers' health.

Applicant Tilemissov M. K.

A handwritten signature in blue ink, appearing to read 'M. K. Tilemissov', is located in the lower right quadrant of the page. The signature is stylized and cursive.