

**THE QUALITATIVE ANALYSIS OF THE WORKFORCE FROM THE  
PERSPECTIVE OF PROFESSIONAL DISEASE INCIDENCE IN THE  
PETROȘANI DEPRESSION**

**ANALIZA CALITATIVĂ A FORȚEI DE MUNCĂ DIN PERSPECTIVA  
INCIDENȚEI BOLILOR PROFESIONALE ÎN DEPRESIUNEA  
PETROȘANI**

Florentina-Cristina MERCIU (IANCU)<sup>1</sup>, Ilinca-Valentina STOICA<sup>1</sup>

**Abstract:** This paper is focused on the study of professional morbidity caused by risk factors from the mining sector in the Petroșani Depression but also on analysing its influence on the quality of the workforce. Professional diseases generated in the coal-extraction industry, belonging to the category of degenerative diseases, profoundly affect the miners' state of health, who still form a high proportion of the active population (40%). In this context, it is necessary to correctly identify the professional risks and to take measures to limit them, as well as to initiate actions to diagnose and to treat people ill with silicosis. At the same time, the high incidence of professional disease cases also impose a series of changes in the profile and distribution of the workforce.

**Keywords:** coal industry, risk factors, professional morbidity, the active population's state of health

**Cuvinte cheie:** industria minieră, factori de risc, morbiditate profesională, starea de sănătate a populației active

## 1. INTRODUCTION

The subject-matter of this paper is focused on describing the evolution of professional morbidity and the effects generated upon the quality of the workforce from the Petroșani Depression, as a consequence of the exposure to risk factors of people employed in the mining industry. At the same time, the changes in the profile and the distribution of the workforce against a background of professional disease have been highlighted.

The coal-extracting industry is among the most polluting economic activities, which can have direct effects on people's health, as a consequence of exposure to pollutant agents, or indirect ones, resulted from the above mentioned agents' action on water, soil and vegetation (Dumitrache L., 2004, p. 315-316).

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<sup>1</sup> University of Bucharest, The Interdisciplinary Center for Advanced Research on Territorial Dynamics (CICADIT)

Ensuring and maintaining the active population's state of health are among the current preoccupations of specialists from the field of health and work security, who act in order to identify the professional risk factors and to know their influence on the state of health by identifying professional diseases early on (Todea A., Ferencz A., 2001, p. 1).

## 2. CHARACTERISTICS OF PROFESSIONAL MORBIDITY IN THE PETROȘANI DEPRESSION

Given the special conditions of work underground, employees in the mining industry are inclined towards a series of professional diseases, among which one notices a high incidence of certain affections of the respiratory apparatus, such as tuberculosis, pulmonary fibrosis (which represents an incipient stage of silicosis), silicosis, silico-tuberculosis (a complication of silicosis) and professional bronchial asthma.

Silicosis is a pulmonary disease caused by the presence of free-floating silicon dioxide dust inside the lungs, which triggers an inflammatory process and stimulates the progressive accumulation of collagen fibers around the silicon particles, which in turn leads to the forming of silicotic nodules whose growth in time compresses adjoining alveolae and affects the normal activity of the right ventricle, an affection known under the name of chronic pulmonary heart (Todea A., 2000, p. 12).

The causes of these diseases are multiple, as they are conditioned both by the work environment underground and on the surface (deficiencies in ventilation, exploitation technologies which cause the emergence of risk factors). These are compounded by the pollution of industrial towns in the depression, the moisture in the atmosphere, the ignorance of the real danger of contamination by people predisposed to professional diseases (the willful avoidance of periodic medical check-ups), but also a protective sanitary network equipped under the required level (in the depression there is only one section for diagnosing and treating professional diseases in the Vulcan hospital, in which only one specialist doctor is active). The pneumology section from Petroșani hospital was discontinued because there was no specialist doctor to staff it (Dr. Liliana Dârlea, medical doctor at Salvamin, *Zori noi, cotidian de opinii și informații al Văii Jiului*, nr. 878, 1993, p. 4). The lack of interest of medical doctors specialised in the medicine of work in practicing in the depression causes the municipal hospital from Lupeni to be unable to have a pneumology section.

The situation of the evolution of professional disease cases in the depression was analysed on a rather large interval of time (fifty years), in order to take a causal perspective on the complexity of the phenomenon, also taking into account the tradition of the mining activity in the depression's history for two centuries.

Thus, between 1955 and 1967, the new cases of professional disease grew slowly, there being recorded a maximum in 1965 due on the one hand to the law passed in that period according to which any medical doctor had the right to diagnose silicosis, and on the other hand to the existence of different criteria for

diagnosing presilicosis stages. Subsequently, the decreasing tendency of recorded silicosis cases can be explained by the establishment of a convention among university centers on the diagnosis criteria in the conference on work medicine from 1967, but also by the existence of the Minister of Health's order according to which the factor of illness by professional disease affected the medical doctors' salaries. This period also coincides with perfecting equipment used for work underground (the introduction of wet perforation, a method which largely decreased the amount of dust in the work place) (Liliana Dârlea, 1993, p. 4).

According to statistical data, in the 1960s, the area of Hunedoara recorded the highest index of professional morbidity nation-wide, having almost 25% of the sum total of illnesses, against the background of a profoundly industrial type of economy, most cases of professional diseases being identified in the mining units of the Petroșani Depression (Sanitary and Demographic Statistic, Ministry of Health, p. 14). The big picture of professional morbidity was dominated by silicosis (86%), most cases being recorded in the mines of Petrila and Lupeni. Calculating the morbidity index of economic enterprises per thousand inhabitants yields there are high values: e.g. E.M. Aninoasa 2,320.9, E.M. 1,666.7, E.M. Vulcan 635.4, E.M. Uricani 1,697.0, E.M. Petrila 2,722.9 (Maxut Gh., p. 13-17). In the interval 1967-1980, the number of people diagnosed with it decreases gradually.

**Table no. 1**  
**The dynamics of professional morbidity cases in Petroșani Depression (1966)**

Mining unit	Silico-tuberculosis	Silicosis suspect	1 <sup>st</sup> -degree silicosis	2 <sup>nd</sup> -degree silicosis	3 <sup>rd</sup> -degree silicosis	Other professional diseases
E.M. Aninoasa	1	4	44	19	-	Pulmonary fibrosis (1)
E.M. Lupeni	5	4	68	33	1	-
E.M. Lonea	1	-	14	2	-	-
E.M. Dâlja	1	-	8	5	-	Pulmonary reticulosis (5)
I.S. "Vâscoza" Lupeni	-	-	-	-	-	Carbon sulfur intoxication (1)
I.M. Vulcan	3	-	15	5	-	-
E.M. Uricani	2	-	17	10	-	-
E.M. Petrila	4	4	69	39		Pulmonary fibrosis (1)
Bănița Quarry*	1	-	-	-	-	-

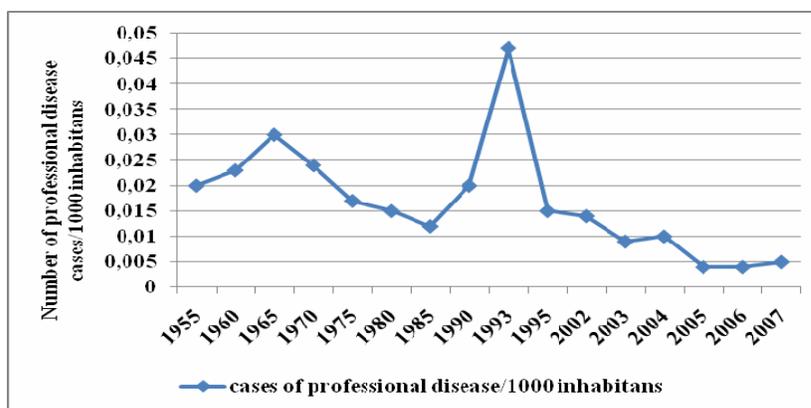
Source: Sanitary and Demographic Statistic, Ministry of Health

\*Limestone used to be extracted from Bănița Quarry

According to the data provided by the Pneumoscopia Laboratory in the interval 1980-1990, on average, there were discovered twelve new silicosis cases every year, and in the interval 1990-1993 there were diagnosed between 20-25 new silicosis cases per year. Also considering the fact that every year there were detected excesses of the free-floating silicon dioxide dust, one can positively state

the existence of a real risk of silicosis among the miners in the coal-extraction area of Petroșani.

In 1993, there were recorded the highest values of professional morbidity cases in the area under study, which is explained by the Radiology Service's initiation of the operation of examining the 17,962 employees of the Coal Autonomous Authority within the periodical medical check-up (Vali Locota, "Matinal, Cotidian al Văii Jiului", nr. 1061, p. 8, 1994). On this occasion there were detected 134 pulmonary fibroses to keep under surveillance (the pre-silicogenous stage) and 47 silicoses. The most numerous cases of silicosis were discovered in the mines of Petrila and Lupeni, and the lowest incidence was recorded in the mine of Paroșeni (\*\*\*)The Statistic Department of Hunedoara Public Health Authority).



**Fig. 1. The evolution of the professional morbidity index in Petroșani Depression**  
 Source: *Work Medicine within the Petroșani Center for Preventive Medicine, Bucharest Center for Sanitary Statistic and Medical Documentation*

The most recent statistical data regarding the types of professional diseases generated by the underground work environment in the depression reflect that the highest incidence is to be found in patients who have bronchopneumopathy (the number of patients reported in 2005 is 11.6% higher than in 2004 – Table no. 2).

**Table no. 2**  
**Professional diseases in the Petroșani Depression and in Hunedoara County (2004-2005)**

Disease type	Petroșani Depression		Hunedoara County	
	2004	2005	2004	2005
Chronic bronchopneumopathy	2456	2778	8589	9241
Pulmonary tuberculosis	198	185	679	580
Professional bronchial asthma	80	150	440	291

Source: *The Statistic Department of Hunedoara Public Health Authority*

The percentage of patients diagnosed with pulmonary tuberculosis manifested a slight decrease in 2005 due to the low number of beds in the pneumophysiology section of Vulcan town, but also to the poor communication between the population inclined towards professional diseases and the sanitary services.

Professional bronchial asthma featured a patient increase of about 46% compared to the previous year. The significant increase of professional bronchial asthma cases in the towns of the depression is due to the high number of employees in the mining industry, given that their long-time exposure to the damp environment of coal mines affects their respiratory ways; however, there is a high incidence of cases when asthma can occur as a secondary effect of silicosis (Todea, A., 2000, p. 34).

A comparative analysis of new cases of silicosis and silico-tuberculosis was performed by comparing the distribution of professional disease cases per mining unit within the depression to the number of cases recorded within the county and nation-wide, bearing in mind that out of the sum-total of new silicosis cases nation-wide only the cases triggered by the coal-extraction industry were taken into consideration, as there are other economic activities whose work environment favours the occurrence and evolution of silicosis among the employees. On the basis of the data obtained in the interval 2002-2007, one can state that the recording of new silicosis and silico-tuberculosis cases in the depression are the only cases reported nation-wide due to the coal-extraction industry, and within the county they represent 95% of the total number of silicosis cases (Table no. 3, Fig. 2). The highest incidence of these diseases is still in the cases of E.M. Petrila and Lupeni. Nevertheless, statistical data do not reflect the real situation, since numerous employees in the mining sector do not turn up at periodic check-ups for disease detection (where the case may be) or for indications concerning the stage of their illness. In the mining units from the upper Jiu Valley, the most numerous cases of silicosis were recorded in the mines of Petrila, Lonea, Livezeni, Lupeni, and cases of disease complication were recorded in Lupeni and Vulcan: 1<sup>st</sup> degree silicosis and tuberculosis, at E.M. Dâlja Petroșani 3<sup>rd</sup> degree silicosis and tuberculosis (\*\*Bucharest Center for Sanitary Statistics and Medical Documentation, "A Study of Professional Morbidity in Romania", statistical yearbook 2007, p. 8-9).

The maintenance of high rates of respiratory apparatus disease is to be noticed, due both to the perfectioning of diagnosis methods and to the increasing wear and tear on the work tools.

The difficulties in evaluating illness risks are inherent, due to the workforce fluctuation (people who leave the mine in incipient stages of pulmonary fibrosis, clinical signs of illness appear late, even 15-20 years after exposure, so that people involved are already at retirement age, given that in the mining industry retirement age is considerably lower, more specifically 45, due to heavy work conditions), but also to the workers' missing the regular medical check-ups in 65% of the cases.

Table no. 3

## Distribution of new cases of silicosis and silico-tuberculosis (2002-2007)

Year	Petrosani Depression (number of cases)	Hunedoara County (number of cases)	Romania* (number of cases)
2002	E.M. Uricani 1		
	I.M. Paroşeni 1		
	I.M. Petrila 12		
<b>Total</b>	<b>14</b>	<b>16</b>	<b>14</b>
2003	E.M. Paroşeni Vulcan 1		
	E.M. Livezeni 3		
	E.M. Petrila 1		
	E.M. Lonea 4		
<b>Total</b>	<b>9</b>	<b>10</b>	<b>9</b>
2004	E.M. Vulcan 1		
	E.M. Livezeni 1		
	E.M. Petrila 5		
	E.M. Lonea 3		
<b>Total</b>	<b>10</b>	<b>12</b>	<b>10</b>
2005	E.M. Aninoasa 1		
	E.M. Livezeni 1		
	E.M. Lupeni 1		
	E.M. Petrila 1		
<b>Total</b>	<b>4</b>	<b>7</b>	<b>5</b>
2006	E.M. Petrila 2		
	E.M. Vulcan 1		
	S.E. Paroşeni ** 1		
<b>Total</b>	<b>4</b>	<b>5</b>	<b>4</b>
2007	E.M. Dâlja Petroşani 1		
	E.M. Livezeni 1		
	E.M. Lupeni 2		
	E.M. Vulcan 1		
<b>Total</b>	<b>5</b>	<b>5</b>	<b>8</b>

Source: The Bucharest Center for Sanitary Statistics and Medical Documentation

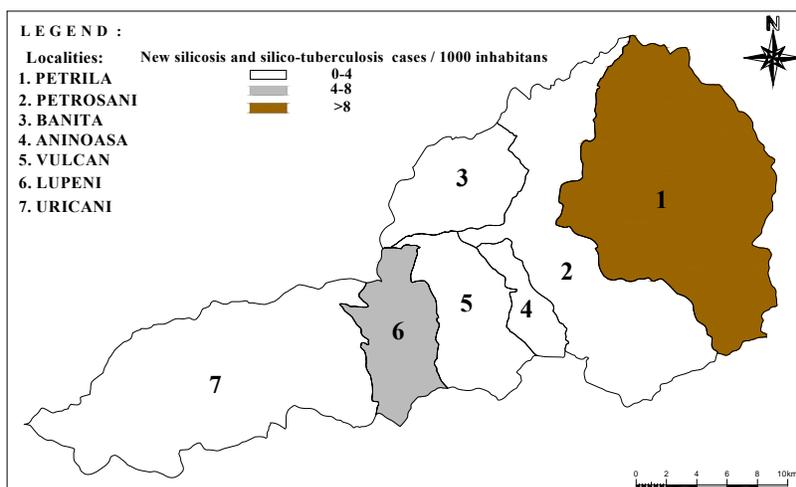
\* nation-wide there are represented only the silicosis cases triggered by the coal-extraction industry.

\*\* The Power Plant Subdivision

The cause of absence from medical check-ups is the fear of being diagnosed with serious professional diseases, which would determine, as the case may be, the patient's retirement or sending the employees in other sub-sectors of activity, where payment is inferior.

Statistical data indicate that Hunedoara is among the counties with yearly records of late silicosis cases (on average, 5-6 cases a year, except for the years 2003 and 2007, when one notices a redoubling of advanced silicosis cases which

generate other diseases as well) (\*\*\*)Bucharest Center for Sanitary Statistics and Medical Documentation, “A Study of Professional Morbidity in Romania”, statistical yearbooks: 2002 (p.35), 2003 (p. 30), 2004 (p. 28-29), 2005 (p. 33), 2006 (p.8, p. 30), 2007 (p. 8-9, p. 37).



**Fig. 2. A graphic representation of new silicosis and silico-tuberculosis cases in towns from Petroșani Depression (2007)**

The individual illness risk is 1 in 5, higher for employees who have been longer on the job, for personnel working in sterile areas, as well as for people who smoke and drink alcohol.

Acute professional intoxications represent another segment of the phenomenon of professional morbidity in the depression. In the mining units of the coal basin of Petroșani, professional intoxications have as causing agents methane gas and carbon monoxide.

In the mines of the upper Jiu Valley, there occur frequent intoxications with methane gas accumulations. In 1991, in Lupeni mine, there were recorded 57 cases of methane gas accumulations in excess of 2%, but all of them were short-term and quickly dispersed; in Uricani mine, in 1992, there were recorded 162 cases of methane gas accumulations in excess of 2%, which led to the temporary suspension of work (Ion Mustață, Viorel Străuț, “Zori de zi”, nr. 832, p. 2, 1993).

The exploitable reserve of Paroșeni mine has strong methane gas emissions. Ventilation is permanently assured within normal parameters; however there were recorded 76 methane gas accumulations in 1992, yet none was so serious as to determine long-term interruption of activity. The causes of methane gas accumulations in dangerous concentrations were accidental interruptions in the electric power network (Ion Mustață, Viorel Străuț, 1993, p.3).

Lupeni mine has a laboratory where they measure the parameters of the main gas accumulations, but lack of chemical reagents leads to the impossibility to perform measurements (Ion Mustață, Viorel Străuț, 1993, p. 3). In the cases of

carbon monoxide intoxications, some were so intense as to cause death (e. g. I.M. Vulcan, out of a total of 16 cases, there were 10 deaths, I.M. Petrila with a total of 7 cases registered one death (\*\*\*)Bucharest Center for Sanitary Statistics and Medical Documentation, "A Study of Professional Morbidity in Romania", statistical yearbook 2002, p. 14).

Excessive exposure for a long time to risk factors such as the noise of machinery, devices, tools or vehicles determines the occurrence of professional diseases such as deafness and hypoacusis.

**Table no. 4**  
**Distribution of new cases of professional disease triggered by noise within economic agents**

Year	Economic agent	Diagnosis	Causing agent	Total
2002	I.M. Paroşeni	Hypoacusis	Noise	4
	I.M. Vulcan	Hypoacusis	Noise	1
	I.M. Vulcan	Deafness	Noise	2
	E.M. Aninoasa	Hypoacusis	Noise	1
	E.M. Livezeni	Hypoacusis	Noise	2
	I.M.Petrila	Hypoacusis	Noise	1
	I.M. Petrila	Deafness	Noise	3
	I.M.Lonea	Hypoacusis	Noise	5
	Coal Preparation Expl. Coroeşti	Hypoacusis	Noise	1
	Power Plant Subdivision Paroşeni	Hypoacusis	Noise	4

*Source: Bucharest Center for Sanitary Statistics and Medical Documentation, 2002*

Professional hypoacusis and deafness represent the most frequent professional diseases caused by noise in the mining units of the upper Jiu basin, as well as in the sections of coal preparation and in the power plant subdivision of Paroşeni, where the noise intensity is very high (table 4).

### 3. CONSEQUENCES OF PROFESSIONAL MORBIDITY ON THE WORKFORCE QUALITY

A series of serious professional diseases from the big picture of morbidity in Petroşani Depression, such as silicosis or its complications, silico-tuberculosis, impose an evaluation of the employees' work capacity, which supposes not only the clinical, functional diagnosis, but also the work estimation evaluated within the context of biological and social factors. Recommendations are made according to the stage of the disease and according to the remaining work capacity, indicating accessible work forms, by exerting which the organism's functional levels can be increased or maintained (Todea, 2000, p. 37).

In the case of late silicosis diagnosis (stage 2 or 3), even if the patients do not feature respiratory functional difficulty and complications, they are to be taken out of the environment with a silicon risk and are to be redistributed to other subsectors of the mine in which risk factors have a limited or even inexistent action, which also attracts a lower income. This fact leads most employees into purposefully avoiding regular medical check-ups out of necessity to maintain high wages, even more so if in the depression, miners' families are large (they have 2-3

children, as a rule, and most of the female population is jobless, the main limiting cause in finding a job being the largely mining profile of the local economy, which justifies the higher percentage of male population in the total of job-holding population). In the case in which cases of silicoses are diagnosed in the patients who feature serious respiratory deficiency, or in the cases of silicosis with complications, employees can be recorded as having varying degrees of invalidity (Todea A., 2000, p. 37-38).

In the mining industry, maybe more so than in the other industrial sectors, due to the underground working conditions, the noise made by various power tools and machinery represents a more acute danger with effects both on hearing and on the entire organism. Sometimes, the level of noise in a mine is so high that some acoustic signals, especially the ones announcing danger, can be completely drowned out, which can lead to much more serious effects such as work accidents (Todea A., 2000, p. 65).

Noise directly reduces work capacity by reducing the possibilities for intellectual concentration, a reduction of movement precision and efficiency, a reduction or distraction of attention, an increase in energy expenditure for performing physical effort (Vlăduțescu Șt., 2004, p. 68). Noise generates extra tiredness, due to the organism's efforts to perceive verbal information, and especially due to cerebral overdrive (Todea A., 2000, p. 66).

#### 4. PROGRAMS FOR PREVENTING AND LIMITING CASES OF PROFESSIONAL ILLNESS

Preoccupations regarding the reduction of professional morbidity cases are top-priority European directives manifested in the development and application of the concept of health and security in work, which should be applied in the Romanian legislation as well. The concept of health and security in work supposes several interconnected actions: estimating the professional risk of exposure to risk factors, training and informing both the employers and the employees about the professional risk, as well as protection of the environment in the economic unit vicinity (Todea A., Ferencz A., 2001, p. 2). These actions would allow the reduction of professional disease causes, as well as monitoring people diagnosed in order to ensure the limitation of disease evolution and in order to allow the diseased people continuation of their lucrative activity. Actions performed nationwide concerning the limiting of professional morbidity cases must be distributed correctly and rapidly throughout the territory so that the efforts would have the desired effect.

The legislative priorities that impose themselves are connected with harmonizing legislation and ensuring its coherence in all European states according to Framework-Directive 89/391 as well as ensuring work protection to the employees in similar conditions throughout Europe. In this respect, modifications would be necessary in the legislation concerning exposure to physical pollutants (revision of the directive from 1986 regarding professional noise), establishing

capstone limits for chemical pollutants in the workplace, etc. (Todea A., Ferencz A., 2001, p. 2).

The Health Ministry launched in 2006 a national campaign of information and communication for health and security at work, an action within the framework of the PHARE Project EuropeAid/119644/DSV/RO -“Improving the efficiency of the Romanian system of work medicine, of supervision and control of professional diseases, of profession-related diseases and of accidents due to professional risk”, organized under the slogan “Partnership for the employees' health” which had as main objectives raising the awareness both of employers and of employees concerning health and security in the work place, promoting the role of medical doctors in Work Medicine ([www.ms.ro/comunicate-de-presã.php?com=1098](http://www.ms.ro/comunicate-de-presã.php?com=1098)) and so on.

Such actions must be doubled by the introduction and development of projects that necessitate ample activity, both medical (diagnosing, monitoring people who suffer from professional diseases, modernizing sanitary inventory) and ecological (reduction of the actions of risk factors: e. g. taking measures to reduce the formation and settling of free silicon, which represents the main cause of professional morbidity in the Jiu Valley mining basin).

## 5. CONCLUSIONS

The cases of professional morbidity in the mining sector in Petroșani Depression, categorized as degenerative diseases, seriously affect the state of health and implicitly the work capacity of employees. The importance of the actions that will be performed to limit the cases of professional disease, as well as to reduce the risk factors, results from the high percentage of employees in the mining industry (40% of the active population in the depression still depends on the coal-extraction industry). These actions must be implemented even more given that at present, when the government wants to keep the mines profitable as well as to implement in future a project to use to a higher degree the mining sector in order to reduce Romania's dependence on imported natural gas, will involve a high volume of workforce for a long interval of time, geological estimations regarding the degree of use of coal resources in upper Jiu Valley being of approximately 80-100 years. In the depression, the level of sanitary infrastructure and the presence of medical doctors are reduced as compared to the population's number and to the medical necessities. In this context, the attention paid to the cases of professional morbidity must become a priority as a result of the high frequency of cases of illness caused by the extraction industry. This situation is alarming in the perspective of correlation between the number of illnesses and the sanitary infrastructure, which reflects a huge discrepancy, even more so given that the cases of late silicosis associated with other diseases are frequent in all the towns in the depression.

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