



COAL IN THEIR LUNGS

By José Alejandro González T.
Photos Public Health Research Group
Milagro Castro

Pneumoconiosis is a chronic illness whose symptoms almost always appear only when it is irreversible. A study in the coal mines of Boyacá, Cundinamarca, and Norte de Santander has raised the alarm about this major problem.

Workers in Colombia's coal mines are at high risk of suffering from pneumoconiosis, a chronic, silent, irreversible illness that can already be mortal by the time it is spotted. This is the conclusion revealed in research by several universities and state organizations in Boyacá, Cundinamarca, and Norte de Santander. The results indicate that one in three miners taking part in the study already had this condition, which appears some ten years after exposure to the dust that rises in the pits they mine. The project has been publicized by the Colombian National Health Institute, the Universidad del Rosario, the Universidad de los Andes, a prominent Occupational Hazard Administration body, and the health secretaries of these departments.

"We found a prevalence of 33.8%, a tremendously high result. What it means is that a great many workers are affected by a pathology of a chronic and irreversible kind. We witnessed a direct relation here between those people working as 'hewers' and the development of pneumoconiosis. The hewers are those who cut the rock and start the extraction of the coal," comments Marcela Varona, professor and researcher of the Public Health Research Group of the School of Medicine and Health Sciences at the Universidad del Rosario.

In broad terms, Pneumoconiosis is a group of pulmonary diseases that are produced due to exposure to various different agents present in workplace atmospheres, such as dust, fibres, or smoke, among others. This group includes 'coal workers' pneumoconiosis', which is generated specifically by the minute dust this mineral releases when rocks are pulverized in coal mines.



← The affected miners are on the point of retiring when they get ill, and this is because they are then in a very bad state, says Leonardo Briceño, professor at the School of Medicine and Health Sciences of the Universidad del Rosario.

According to Varona, this class of pneumoconiosis is a chronic disease that occurs many years after worker's permanent exposure, and for which no effective treatment currently exists. "The symptoms of the illness generally appear ten years after the person has been exposed to the coal dust. When it is detectable, it already has irreversible effects," she says.

The alarm symptoms for the presence of this condition include a cough, breathing difficulties, and heaviness in the chest. "They are miners who begin to feel bad around the time they are retiring or later on. And, in fact, the moment they become ill they are already in a very bad state. When they notice breathing difficulties it is because their lungs have been invaded with the material," points out Leonardo Briceño, professor and researcher with the Public Health Research Group of the School of Medicine and Health Sciences at the Universidad del Rosario.

The specialists agree in underlining that the best way to tackle this illness is by limiting exposure to coal dust and carrying out early diagnosis, thus being able to avoid complications associated with the condition. This, however, is a complex task since determining its appearance requires two tests to be run that are very expensive for miners: a spirometry test and a chest x-ray, and these are run to specific criteria laid down by the International Labour Organization.

On top of this, workers at small companies tend to be exposed to coal dust longer than is recommended, owing to ignorance of the illness and the production processes they carry out. In small mines, for example, they are paid by the hour or by what they produce: the more they extract, the more they earn.



Times and levels of exposition are imprecise and depend on each miner and company. In fact, miners are easily able to get round their recommended hours by remaining in the mine from the early hours of the morning until past nightfall.

A FAR-REACHING STUDY

The research revealed by different universities, firms, and government organizations is one of the first projects to deal with the subject from a multidisciplinary perspective. It set out to find the prevalence of "coal miners' pneumoconiosis" and the associated factors generated by the pathology.

The researchers' work involved tests on 476 randomly-selected workers at 31 different firms in Boyacá, Cundinamarca, and Norte de Santander. Initially, the participants had to answer a questionnaire that established certain sociodemographic variables (age, sex, time worked in the mine, precise trade, and total exposure time), while they also underwent a medical examination, spirometry test, and chest x-ray.

Armed with this information, the researchers decided to take into account only those people with more than ten years of experience working in coal mines. "In this way, we were able to actually determine whether there was an indication of the illness. The mean age of the sample was between 45 and 46-years-old, although there were workers from 20 to 76," recalls Varona.

The study also included genetic testing of those selected, in order to analyze their susceptibility to suffering from pneu-

moconiosis from working with coal dust. The group also evaluated the genetic polymorphisms of several enzymes important to the development of this disease.

Among other findings, the study also found that there is a direct relation between the development of the illness and the time of exposure to coal dust. "The older the person, the more prevalence we saw of this pathology."

As well as looking at workers, the research group also made a detailed evaluation of firms in order to discover coal dust risk levels and analyze conditions of exposure. "Coal workers are "multi-exposed" and vulnerable—in addition to dust—in facing very complex safety and accident conditions, with explosions and cave-ins," explains Leonardo Briceño.

Working conditions offered by companies were also evaluated, including their internal health services, the use of protection tools, hygiene in facilities, and the environmental conditions faced by their workers. "We found companies that were very organized, as well as others that were tremendously casual. The bigger mines tend to bring better protection elements and offer training on their use," explains Varona.

Basic protection for preventing this illness involves the use of the correct masks. Researchers found mines where the workers use cleaning cloths or handkerchiefs which, apart

→ Marcela Varona, member of the Public Health Research Group of the School of Medicine and Health Sciences at the Universidad del Rosario.



from being completely useless, give them a false sense of security. In this case, Briceño explains that dust masks use the same principle as coffee filters: "If it is used many times, it becomes saturated and lets impurities go through. You must change them in line with the required regularity, which can be daily."

When it comes to hygiene measures, researchers found certain small mines where workers were eating their food in the pit to save time by not moving from place to place, while in other workplaces they went home without showering and in the same clothing they used during their shift.

It should be noted that the project was carried out over five years, a period covering the planning, field work, and the writing of articles. Thanks to the involvement of different organizations, a very thorough interdisciplinary and collaborative job was carried out. "While some have very specialized genetic laboratories, our team has great experience in occupational and environmental assessment. And there is plenty of experience at the Institute in evaluating environmental pollutants," adds Briceño.

Also helping in this research were master's degree students from participating universities, and these have now published nine different theses on occupational health aspects. The project received funding from Colciencias, thanks to which it managed to cover the high costs of carrying out specialized examinations and measurements. ■

THE RESEARCH FOUND A PREVALENCE OF 33.8%, A HIGH OUTCOME. WHAT IT MEANS IS THAT A GREAT MANY WORKERS ARE AFFECTED BY A PATHOLOGY OF A CHRONIC AND IRREVERSIBLE KIND.