The ILO/WHO Global Programme for the Elimination of Silicosis

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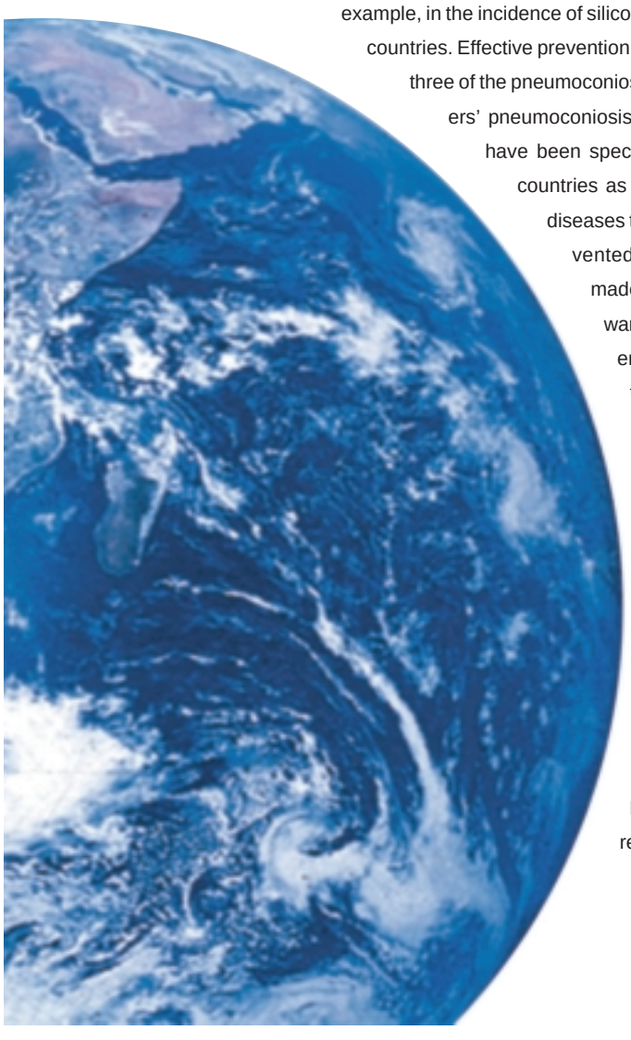

I. Context of the problem

Silicosis is a well-known fibrogenic lung disease. The occupational origin of silicosis was recognized far back in Hippocratic times. It is probably the most ancient occupational illness. Despite all efforts to prevent it, this incurable disease is still widely persistent, affecting tens of millions of workers engaged in hazardous dusty occupations in many countries. In 1997, the International Agency for Research on Cancer (IARC) classified crystalline silica from occupational exposure as a carcinogen to humans (Group 1)[1]. With its potential to cause progressive physical disability, silicosis continues to be one of the most important occupational health illnesses in the world.

Where prevention has been successful, the incidence rate of silicosis is decreasing. Decrease is observed, for example, in the incidence of silicosis in many industrialized countries. Effective prevention has made it possible that three of the pneumoconioses – silicosis, coal-workers' pneumoconiosis (CWP), and asbestosis have been specifically targeted in many countries as occupational respiratory diseases that can and must be prevented. Some countries have made significant progress towards their elimination. Nevertheless, in most parts of the world silicosis is widely spread and millions of workers continue to be exposed to noxious dusts without proper protection, running an unacceptably high risk of developing the disease.

II. Global situation

Due to the limitations in reporting systems and data collection, global statistics on the incidence and prevalence of silicosis are not available today. Countries report their own national statistics which, despite the limitations related to under-diagnosis and under-reporting, show the trend of the disease.

In industrialized countries, there is evidence that dust suppression and medical surveillance of the workforce have resulted in a substantial reduction in the prevalence of silicosis and CWP during the last 40 years. New cases continue to occur however even in those industrialized countries, where the dust suppression has been continuously practised for many years. Estimates in the USA suggest that 1,7 million workers across the country are exposed to silica dusts and about 10% of them are at risk of developing silicosis. About 3500 new cases of silicosis were notified yearly in Germany in the 1990s. Twenty-five years after the inclusion of silicosis on the list of occupational diseases in France, 300 new cases of silicosis continue to be notified every year. Japan reports about 1000 new cases of silicosis yearly. Studies on the prediction of silicosis in the Australian workforce (1992) showed that approximately 1010 (range 380–2410) new silicosis cases were predicted for the next 40 years. During 2002 in the UK 1162 new cases of silicosis and CWP were registered.

Although hazardous exposure occurs everywhere, the situation is particularly serious *in developing countries*, where millions of workers are at risk of developing silicosis.

In China, 59 773 new cases of pneumoconiosis have been reported from a 5-year period 1991–95, of which 29 274 were new cases of silicosis. The prevalence of silicosis was 542 041 by the end of 1998. More than 10 million workers are exposed to silica dusts in the country today. On average, about 15–40 000 new cases are diagnosed each year and there are around 5000 who die from it yearly. In India, 5 million workers are exposed to silica-containing dusts in the organized sector alone. A 55% prevalence rate of silicosis was found in India among workers engaged in the quarrying of shale sedimentary rocks. Brazil estimates that 6,6 million of its workers are exposed to silica dusts; about 1,8 million workers are exposed in Colombia. Studies

in Latin America revealed 37% prevalence of silicosis among miners and 50% prevalence of silicosis among miners who are over 50 years old. A 30–50% prevalence rate is not rare in high risk sectors in South Africa and there are 600 000 accumulated cases silicosis and CWP among former miners in the country. Up to 30–50% of workers in developing countries employed in high risk sectors may suffer from dust-related occupational diseases.

The prevalence rates of silicosis, depending on various levels and lengths of exposure, were reported by some countries in Asia, Africa and Latin America. These data shown in Table 1 were collected through epidemiological studies carried out in various economic sectors where exposure to crystalline silica is usually present.

All these figures of high incidence and prevalence of silicosis indicate that: (i) the dust-control measures applied are inadequate; (ii) the concentrations of respirable dusts are high; and (iii) workers' health surveillance is not effectively organized. The under-reporting of silicosis is a serious problem everywhere affecting the accuracy of published statistical data and should be particularly targeted. Large numbers of workers exposed to silica-containing dusts are employed in small-scale industries and, especially in developing countries, are often out of reach of preventive efforts. It is evident that in order to prevent silicosis successfully it is necessary to establish comprehensive national action programs and implement them efficiently.

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III. Possibility of elimination

Experiences of some countries have convincingly demonstrated that it is possible to significantly reduce the incidence rate of silicosis with well-organized silicosis prevention programs (Australia, Belgium, Canada, Finland, France, Germany, Switzerland, Sweden, United Kingdom and the United States). In the absence of effective specific treatment of silicosis, the only approach towards the protection of workers' health is the control of exposure to crystalline silica dusts. The effectiveness of prevention largely depends on a range of preventive measures.

At the national level, enforcement of laws and regulations; establishment of occupational exposure limits and technical standards; governmental advisory services; an effective system of inspection; a well-organized reporting system; and a national action program involving governmental agencies, industry and trade unions – are the necessary elements of a sound infrastructure which is required to prevent silicosis successfully.

At the enterprise level, application of appropriate technologies to avoid the formation of silica-containing dust; use of engineering methods of dust control; compliance with prescribed exposure limits and technical standards; surveillance of the work environment to assess effectiveness of preventive measures; surveillance of workers' health for early detection of silicosis; use of personal protective equipment (as a temporary measure); health education, information and training are all necessary for successful prevention.

Technical knowledge, professional expertise, qualified personnel trained in using appropriate technologies and methods of dust control, as well as access to technical information are needed for everyday activities to prevent silicosis. The use of improved ventilation and local exhaust, process enclosure, wet techniques, personal protection and, where possible, industrial substitution of less hazardous agents for silica – all these measures do reduce exposure. The responsibilities of governmental institutions include the development and enforcement of relevant legislation; establishment of exposure limits and technical standards; evaluation of technologies and methods of dust control; assessment of the efficiency of preventive programs in the country and recommendation of effective preventive strategies and safe work practices.

Silicosis prevention in Switzerland – success story

In Switzerland, the use of technical measures against silica dust started in 1948 when wet drilling was made compulsory, initially in the underground mines. The introduction in the course of time of new technologies and methods of dust control were factors which greatly contributed to limiting exposures to crystalline silica dusts. The use of quartz

sand to clean metal surfaces (sandblasting) was forbidden in 1960 or exceptionally authorized for very specific cases. Today, sandblasting is carried out with substitute materials.

The Swiss National Insurance Fund was created in 1911 to enforce the Swiss Occupational Accidents and Diseases Act. It functions as the national inspection body and the national social security institution. It is estimated, that two-thirds of the Swiss workers are insured with the Fund. The Fund has full responsibility for the introduction of preventive measures of dust control, the performance of occupational hygiene monitoring of dangerous workplaces and the organization of workers' health surveillance and prevention campaigns.

The application over the years of all these measures aimed at the reduction of exposures to crystalline silica dusts resulted in successful prevention of silicosis.

IV. Definition of the programme

The ILO/WHO Global Programme for the Elimination of Silicosis (GPES) was established following the recommendation of the 12th Session of Joint ILO/WHO Committee on Occupational Health in 1995. The Committee identified the global elimination of silicosis as a priority area for action in occupational health, inviting countries to place it high on their technical agendas. The experts believed that the experience gained would provide a prevention model for other pneumoconioses and a proven system to manage exposure to mineral dusts. This goal was recently reaffirmed by the 13th Session of the ILO/WHO Joint Committee on Occupational Health (Dec. 2003), which strongly recommended that "special attention should be paid to the elimination of silicosis and asbestos-related diseases in future ILO/WHO co-operation".

The ILO/WHO GPES is an international technical cooperation programme designed to assist countries in their action to combat silicosis and eliminate it as an occupational health problem in the world.

The purpose of the ILO/WHO GPES is to offer countries a framework for a wide international cooperation on elimination of silicosis and contribute to its global elimination as an occupational health problem worldwide.

The immediate objective of the ILO/WHO GPES is to promote the establishment by countries of National Programmes for the Elimination of Silicosis (NPES) and to reduce significantly the incidence rate of silicosis by the year 2015.

The development objective of the ILO/WHO GPES is to establish long-term wide international cooperation on global elimination of silicosis and to eliminate it worldwide as an occupational health problem by the year 2030.

The principal means of action of the ILO/WHO GPES are:

(i) catalyzing long-term efficient cooperation between developed countries, developing countries and international organizations aiming at the global elimination of silicosis;
(ii) promoting the establishment of National Programmes for the Elimination of Silicosis;
(iii) providing technical assistance to countries in developing models of NPES and national action plans and supporting their implementation.

With due attention paid to the local conditions, a *National Programme for the Elimination of Silicosis (NPES)* should comprise the following main elements:

(i) magnitude of the problem;
(ii) national silicosis profile;
(iii) definition of prevention strategy;
(iv) institutional framework and principal partners;
(v) programme implementation;
(vi) monitoring and evaluation of NPES;
(vii) national standards and international linkages;
(viii) relationship with the protection of the general environment.

The ILO/WHO GPES is targeting countries that have determined the elimination of silicosis among priority actions in occupational health and are willing to join it by establishing their national action programmes. To date, Brazil, China, India, Thailand, Vietnam, and South Africa have established their National Programmes for the Elimination of Silicosis and take an active part in the ILO/WHO GPES. Twenty-two countries have shown strong interest in participating in it and there are 47 major national projects being implemented within its framework.

V. Concluding remarks

Despite many obstacles, the idea of global elimination of silicosis is technically feasible. Positive experience gained by many countries shows that it is possible to significantly reduce the incidence rate of silicosis by using appropriate technologies and methods of dust control. The use of these technologies and methods has proved to be effective and economically affordable. Assistance provided within the framework of the ILO/WHO GPES will contribute to the upgrading of national capacities to prevent silicosis. Countries will need to ensure that all necessary measures for the prevention of silicosis be taken at the national and enterprise levels. Among others, these should include the enforcement of exposure limits and safety standards, use of adequate engineering controls and safe work practices, organization of the surveillance of the working environment to assess the effectiveness of preventive measures, medical

Table 1. Prevalence of pneumoconiosis in some developing countries

Country	Disease	Exposed population	Prevalence rate %	Notes
Bolivia	Silicosis	Tin miners	7,6	(1986)
Brazil	Silicosis	Phosphate rock workers	27,0	(1988)
	CWP*	Coal miners	5,6	(1988)
Chile	CWP	Coal miners	14,1	(1988)
Colombia	CWP	Coal miners	15,0	(1986)
Egypt	Silicosis	Miners	9,1	(1986)
India	Silicosis	Slate pencil workers	54,6	(1985)
	Silicosis	Stone cutters	35,2	(1982)
	Silicosis	Agate workers	18,5	(1988)
	CWP	Coal miners	18,8	(1986)
Vietnam	Silicosis	Mining quarrying	18,0	(1998)
Thailand	Silicosis	Stone mortar workers	21,0	(1988)
		Refractory brick workers	9,3	(1988)
Zimbabwe	Silicosis	Metal miners	20,0	(1988)
	CWP	Coal miners	20,0	(1988)

*CWP = Coal-workers' Pneumoconiosis

surveillance of workers at risk for early detection of the disease, performance of epidemiological evaluations, and organization of training and health education. It is strongly believed, that the global elimination of silicosis is a realistic goal that can be achieved through a very broad international collaboration supporting the implementation of national action programmes. The multi-disciplinary efforts of occupational safety and health professionals, co-operation between the employers and workers, as well as support from all economic sectors concerned are critical for the success.

References

1. Fedotov I. Global Elimination of Silicosis: the ILO/WHO International Program. *Asian-Pacific Newsletter on Occupational Health and Safety*, 1997; 4(2).
2. International Agency for Research on Cancer. Silica, Some Silicates, Coal Dust and para-Aramid Fibres. IARC, WHO, 1997; 68.
3. Respiratory System. In David A, Wagner G, editors. ILO Encyclopaedia of Occupational Health and Safety Vol 1. 4th ed. Geneva: ILO; 1997.
4. Chiyotani K, Hosoda Y, Aizawa Y, editors. Advances in the Prevention of Occupational Respiratory Diseases. Proceedings of the 9th International Conference on Occupational Respiratory Diseases, Kyoto, Japan, 13-16 October 1997. Excerpta Medica International Congress Series 1153, ELSEVIER; 1998. p.1256.
5. WHO. Hazard Prevention and Control in the Work Environment: Airborne Dust. Occupational and Environmental Health Series, WHO/SDE/OEH/99.14. Geneva: WHO; 1999.
6. Department of Health and Human Services. Work-related Lung Disease Surveillance Report. USA: NIOSH, CDC; 2002.
7. Department of Health and Human Services. Health Effects of Occupational Exposure to Respirable Crystalline Silica. USA: NIOSH Hazard Review, CDC; 2002.
8. ILO. Thirteenth Session of the Joint ILO/WHO Committee on Occupational Health. Report of the Committee, JCOH/XIII/D.4. Geneva: ILO; 2003.