Towards a National Silicosis Elimination Programme in South Africa

Working Paper 1 of The Inter-Departmental Silicosis Working Group

Co-ordinated by the Department of Labour

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Abbreviations

ACOHS - Advisory Council for Occupational Health and Safety
COIDA – Compensation for Occupational Injury and Diseases Act
DoE – Department of Education
DEAT – Department of Environment and Tourism
DoH – Department of Health
DoL – Department of Labour
DME – Department of Minerals and Energy
IARC - International Agency for Research on Cancer
ILO – International Labour Organisation
MBOD – Medical Bureau for Occupational Disease
MHSA – Mine Health and Safety Act
NCOH – National Centre for Occupational Health (Now NIOH)
NIOH - National Institute for Occupational Health
ODMWA – Occupational Diseases in Mines and Works Act of 1973
PPE – Personal Protective Equipment
NUM – National Union of Mineworkers
UCT – University of Cape Town
WHO – World Health Organisation

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1. Background

The Department of Labour, advised by the Advisory Council for Occupational Health and Safety (ACOHS) has, from among different role-players, coordinated the establishment of a Silicosis Working Group. The Working Group, under the leadership of the Department of Labour, is facilitating the process of working towards the establishment of a South African National Programme for the Elimination of Silicosis. Within the framework of the National Programme there will be an National Action Plan to which different role-players will contribute. It is foreseen that this National Programme and Action Plan will interact and collaborate with the ILO/WHO Global Programme for the Elimination of Silicosis.

2. Silicosis

Silicosis is entirely preventable and there is no cure for it. It is a respiratory disease caused by exposure to inhaled particles of silica dust, which leads to inflammation and eventually scarring of the lungs. Silicosis risk factors include work exposure to silica dust in industrial settings such as mining, rock drilling stone cutting, sandblasting, glass working, road construction, construction, quarry work, tunneling, pottery and ceramic works. Depending on dust levels, it can take a decade or more before silicosis develops.

In spite of being a preventable disease, tens of thousands of workers throughout the world are exposed to silica dust and thousands of new cases of silicosis are diagnosed each year.

The presence of silica dust in the lungs predisposes workers to the development of pulmonary tuberculosis. Concerted efforts to control silica dust adequately will therefore reduce the number of workers developing silicosis and pulmonary tuberculosis. Positive practical developments in several countries with elimination programmes have confirmed this.[1] [2]

3. The ILO/WHO Global Programme on Elimination of Silicosis[3]

In 1995 the ILO/WHO Joint Committee on Occupational Health launched a Global Programme on the Elimination of Silicosis from the world by 2030. In spite of many obstacles, the global elimination of silicosis is considered to be technically feasible. Positive experience gained by many countries shows that it is possible to significantly reduce the incidence of silicosis by using appropriate technologies and methods of dust control. The use of these technologies and methods proved to be effective and economically affordable. Countries will need to ensure that all necessary measures for the prevention of the disease be taken at the national and enterprise levels. It is strongly believed, that the goal of the global elimination of silicosis is realistic and can

be achieved through dedicated national action programmes, through multi-disciplinary efforts of occupational safety and health professionals, through raising public awareness and through international collaboration.

In 2001,the WHO Occupational Health Collaborating Centre Network established a Taskforce on the elimination of silicosis. The objectives of the Taskforce is to update the developments on the topic, to promote the development of national programmes and to provide a knowledge base for countries that wish to launch their own programmes. The ILO participates in the implementation of this Task Force.[4]

3.1 It is possible to eliminate silicosis – international experience

In the absence of a cure for silicosis, the only workable approach for the protection of the health workers' health is the control of exposure to silica-containing dusts. Experience gained by several countries has convincingly demonstrated that it is possible to significantly reduce the incidence of silicosis with well-organized prevention programmes. Countries with prevention programmes in place include Australia, Belgium, Canada, Finland, France, Germany, Japan, Switzerland, Sweden, United Kingdom, and the United States. The success of the prevention of silicosis results from a range of important preventive measures. Countries such as Sweden where they have eliminated silicosis stresses the central importance of adequate dust control and training of personnel and not a reliance on surveillance programmes only.[5] Experience gained indicate that countries with successful programmes considered the following aspects:

3.1.1 At the national level these include:

- laws and regulations and their enforcement
- adoption of occupational exposure limits and relevant technical standards
- governmental advisory services
- an effective inspection system
- a well-organized reporting system
- a national action programme involving governmental institutions, industry and trade unions
- Accredited laboratories
- Best practice monitoring procedures

3.1.2 At the enterprise level these include:

- application of appropriate technologies to avoid the formation of silica-containing dust
- use of engineering methods of dust control, specifically at the source
- compliance with prescribed exposure limits and technical standards
- surveillance of work environments to assess effectiveness of preventive measures

- surveillance of workers' health to detect early development of silicosis
- use of modern personal protective equipment (as a temporary measure)
- health and safety education and training
- co-operation between the employers and employees
- evaluation of effectiveness of prevention programmes
- epidemiological studies and research to assess trends and further need for intervention

3.2 Purpose of the ILO/WHO Programme

The purpose of the Programme is to offer countries a framework for broad international collaboration and to contribute to the elimination of silicosis as an occupational health problem worldwide.

The immediate objective of the ILO/WHO Global Programme is to promote the development, by countries, of National Programmes on Elimination of Silicosis and to significantly reduce the incidence of silicosis by the year 2015.

The development objective of the ILO/WHO Global Programme is to establish wide international co-operation on global elimination of silicosis and eliminate it as an occupational health problem by the year 2030.

3.5 Programme development

A National Programme on Elimination of Silicosis should comprise the following main elements:

(i) socio-economic context of the problem of silicosis in the country
(ii) economic incentives for the prevention of silicosis
(iii) identification of target groups of workers at risk
(iv) definition of a prevention strategy
(v) involvement of principal partners in the implementation of the program
(vi) tripartite consultation and co-operation
(vii) institutional framework required for the program implementation
(viii) mechanism for monitoring and evaluation
(ix) national standards and link with international standards
(x) relationship with the protection of the general environment
(X) identification of appropriate remedial action plans
(X1) training and awareness programmes

The National Action Plan on the Elimination of Silicosis can accompany the National Programme and be prepared as a more detailed document in the form of a compilation of required actions necessary to achieve targets set up by the National Programme. Among others, it should indicate actions to be taken to mobilize resources, contributions in kind, exchange of technical information and expertise, institutional framework and co-operation, as well

as the establishment of partnerships necessary for the successful programme implementation.

4. The Importance of a National Silicosis Elimination Programme in South Africa

Silica exposure and silicosis have re-emerged as very serious public health issues in Southern Africa because:

- Dust control is inadequate in both the mining and non-mining sectors [6, 7,8] and the development of small mines throughout the region is likely to expose more workers to more silica dust
- There is a large burden of undetected lung disease in former silica exposed miners now living in labour-sending areas[9, 10]
- Silicosis is common in industrial workers and in gold miners and the attendant tuberculosis risk is high.[11,12,13] Recent research has found that silica dust, independent of silicosis, increases the risk of tuberculsis[14].

Inadequate dust control is widespread in the region. For example, only 24% of South African foundries responding to a postal questionnaire actually measured dust, and an uncontrolled dust hazard was evident in **all** foundries surveyed by the National Centre for Occupational Health, South Africa, between 1983 and 1992. The late 1990's only 8 of 48 gold mines[15] had all estimated quartz concentrations below the widely used reference level of 0.1 $mg/m^{3.}$

Silicosis rates in former gold miners now living in labour-sending areas illustrate the importance of silicosis in the region. Steen and co-workers[4] found a silicosis prevalence of 26 to 31% in former miners living in Thamanga village, Botswana, and Trapido et al. 22-37% in Libode, Eastern Cape, South Africa[6]. Generalising these rates to an estimated two million former miners living in Southern Africa produces an astonishing 480 000 cases of pneumoconiosis[16]. If silicosis were an innocuous disease these high rates would not be of great concern, but the strong association between silicosis and tuberculosis in South Africa combined with the HIV epidemic, makes the situation alarming. Cowie found an increasing incidence of tuberculosis with increasing severity of silicosis in South African gold miners: 1% per annum in men without silicosis; 2.2% in men with mild silicosis; 2.9% with moderate silicosis; and 6.3% with advanced silicosis. Cowie suggested that one quarter of his subjects with silicosis would have developed tuberculosis by 60 years of age. This was before the surge in the HIV epidemic. In addtion, the International Agency for Research on Cancer (IARC) has classified silica dust as a cancer causing agent in humans.

Recent studies have found that it is not only silicosis but silica dust itself that confers an increased risk of tuberculosis and that this risk persists even after silica dust exposure ends, probably for life; a finding with profound

implications for public health policy including surveillance of workers and workers' compensation.

Combined with significant levels of migrant labour and the high HIV infection rate, the interactions between inadequate silica dust control, high rates of silicosis, HIV infection and tuberculosis, including the multi-drug resistant forms, present major challenges for occupational and general public health and safety services in the region.

4.1 Proposed agenda for action

Because dust control technologies are generally well known and silicosis is wholly preventable, successful remedial action is possible. Important actions are:

4.1.1 Creating the platform for intervention

It is received wisdom in many sectors of industry, among health care providers, workers and management, that silicosis is an innocuous disease and that dust control is, therefore, relatively unimportant. Increased awareness that silica dust and silicosis are serious is a necessary (although not sufficient) requirement for a change in attitude to eliminating the silica hazard.

Activities to achieve increased awareness would include:

- **The development of core information materials.**
  The participatory development of **appropriate** information materials through consultation. This activity would include message development and testing of information materials for employees, employers, workers and occupational health practitioners to define core information materials.

- **The development of methods to assist in the use of core materials**. Once the core materials were developed methods to disseminate and present the materials would have to be developed. Strategies to present the materials to workers with different levels of literacy at enterprise level would be important. Presentation materials with "instructors manuals " and presentation guides would be needed.

- **Dissemination nationally**
  Once refined through use and evaluation, this template would be replicated with appropriate modification and translation for the entire country.

4.1.2 Creating the knowledge base for dust reduction

In enterprises
Particularly in smaller enterprises technical know how may be inadequate to cost-effectively control dust. An effective method of increasing knowledge is sector-based (e.g. foundries) participatory seminars and workshops supported by local and international scientists to compile and publicise an inventory of practical, tested solutions. Subsequent dissemination of solutions (e.g. using industry newsletters) and consultant support (e.g. telephonically or electronically from a resource complex) is needed to promote implementation.

In the inspectorates
As important, occupational health and safety inspectors ("mine and factory inspectors") need to be able to identify dusty workplaces by inspection and measurement, suggest practical solutions and have sufficient confidence to take any appropriate action against persistent offenders, which could include proscecution. Consequently inspectors would need additional training in dust measurement and dust control solutions to develop knowledge and confidence.

4.1.3 Quantifying the need for dust control

It is necessary to have accessible capacity to quantify the extent of employee exposures and for the determination of the quartz content of dusts because:

A very wide range of minerals are mined in South Africa – from andalucite to zinc- and the quartz content of many dusts, particularly in smaller mines, is not known. Inspectorates need to be able to quantify the risk in order for any appropriate action to be taken, including possible prosecution. Enterprises need to be persuaded of the risk to spend money, and the efficacy of solutions needs to be evaluated.

Among the means of establishing this capacity is a regional quality- controlled occupational hygiene laboratory able to curate (and calibrate) dust measurement equipment for lending, support measurers and quantify quartz.

4.1.4 Occupational health and safety training of Workers and Management

Dissemination of information on silicosis and its prevention is fundamental for the protection of the health of the workforce. The informed and active participation of workers and management in dust control programmes is considered to be amongst the most important factors in the success of the Swedish and Finnish Silicosis Elimination programmes.[17]

4.1.5 Case finding and preventive therapy

Key scientific questions are unanswered and impede the development of policy on case finding and the value of preventive therapy:

- Which industrial sectors are generating new cases of silicosis in the country? Sentinel case surveillance, for example based on the South African surveillance programme (SORDSA [18]), would be valuable in targeting intervention e.g. by inspectorates.

- Are the regulated quartz standards for workplace air protective against tuberculosis (irrespective of the silicosis protective factor)? Data to answer this question are unlikely to be available but this could be confirmed by the expert-group review (4.1 above) and research methodology formulated (for example, determining tuberculosis rates in workers exposed to quartz but below current standards in relation to quartz-unexposed appropriate reference groups).

- Active and passive workplace-based tuberculosis case-finding strategies need critical review (e.g. taking account of the very high incidence of the disease and hence regional differences in cost-effectiveness and test effectiveness – e.g. positive predictive value). Again, the starting point would be an expert-group review of the evidence.

- Should workers with silicosis be offered preventive (chemoprophylatic) anti-tuberculosis therapy to reduce the risk of developing the disease? If so, for which workers, for how long and with what pharmacological agents? A 1996 study of southern African gold miners concluded that a multi-drug short course chemoprophylaxis regimen failed to prevent tuberculosis in miners with silicosis [19]. However, compliance with the chemoprophylaxis may have been unsatisfactory[20]. This matter is important given the very substantial tuberculosis epidemic in the region and the likely contribution to the epidemic by silicosis associated incident cases. The first step in addressing this issue is an expert group meeting to review evidence and propose evidence-based policy or define research needs or both. A clinical trial attending to compliance with chemoprophylaxis is likely to be necessary.

4.1.6 Creating an enabling policy environment

A range of activities would be necessary to create an empathetic environment for the programme including involvement of government departments housing the inspectorates.

Incentives for dust control are necessary to drive implementation at enterprise level. Among these incentives is purposeful application of regulation by inspectorates and compensation for afflicted workers that is linked to offending enterprises. In the silica and tuberculosis context, a policy

on the scheduling of tuberculosis as a compensable disease in silica exposed workers for their lifetime should be considered.

4.1.7 Expected Outcomes

The activities outlined above would contribute to:

- The eradication of silicosis as an occupational disease in South Africa.
- Increased motivation and capacity to control dust in key industries.
- Improved capacity to detect and prevent tuberculosis in silica exposed workers.
- Capacity building and skills development in dealing with the problem of silica dust exposure and silicosis
- A strengthening of occupational health services at the enterprise level (dust control and case finding activities are likely to generate more general infrastructure for services).
- A contribution to controlling the tuberculosis epidemic in South Africa
- A strengthening of inspectorates and the resource complex
- Health information systems which can track trends in dust levels and silicosis and TB incidence
- A contribution to the international programme on the Global Elimination of Silicosis

Gerhardsson.The end of silicosis in Sweden - a triumph for occupational hygiene engineering

Gideon Gerhardsson

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