

DETECTION OF SILICOSIS AMONG STONE MINE WORKERS FROM KARALI DISTRICT REPORT - II

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**DETECTION OF SILICOSIS AMONG STONE MINE WORKERS
FROM KARALI DISTRICT: REPORT - II**

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CERTIFICATE

This is to certify that this report on “Detection of Silicosis among Stone Mine Workers from Karauli District: Report - II” is based on the results and findings of evaluation of Chest Radiographs of stone mine workers from Karauli District of Rajasthan submitted to NIMH by Dang Vikas Sanstha an associate of Association for Rural Advancement through Voluntary Action & Local Involvement (ARAVALI), a Rajasthan State Government initiated NGO. The chest radiographs of workers have been evaluated as per the ILO Classification of Chest radiographs of Pneumoconiosis 2000 and other medical records as per the standard practice.

This report is in continuation to the report “Detection of Silicosis among Stone Mine Workers from Karauli District” prepared by the institute in November, 2011.

Date :

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Place : Nagpur

Director

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Executive Summary

National Institute of Miners' Health has detected cases of silicosis among stone mine workers of Karauli District in Rajasthan in collaboration with Dang Vikas Sansthan (DVS) an associate of ARAVALI (Association for Rural Advancement through Voluntary Action & Local Involvement), a non-government organization initiated by the Government of Rajasthan. It was observed that one of the main livelihood sources in the area is stone mining and a large number of persons engaged in mining activities were suffering from respiratory symptoms probably due to tuberculosis (TB). ARAVALI suspecting the persons might be suffering from silicosis instead of TB approached NIMH for guidance and suggestions on the issue. NIMH reviewed the medical records of 93 persons having history of employment in stone mines of Karauli district and detected 73 cases of silicosis. The detailed report was submitted to DGMS, District Collector, Ministry of Mines, Ministry of Labour and Employment and other agencies in Dec 2012. Meetings were held with district administration and other stake holders and a rehabilitation and relief programme has been initiated including ex-gratia payment by state government and treatment of affected workers.

Further, NIMH has received x-rays of 314 workers involved in stone mining activities in the same area from DVS. The x-rays were evaluated as per ILO classifications of radiographs for Pneumoconiosis, 2000. 16 x-rays were found to be of poor quality and hence are not been considered for evaluation.

The findings shows that out of the 298 x-rays evaluated, 149 (50%) had evidence of silicosis of which 20 (13.4 %) developed large opacities suggestive of Progressive Massive Fibrosis (PMF). X-rays of 114 (38.2%) persons were Normal and x-rays of 31 persons (10.4%) showed radiological evidence of Pulmonary Tuberculosis. Detailed analysis of result showed that the x-rays of the persons having work exposure of less than 10 yrs did not show evidence of silicosis. The prevalence of silicosis in persons having work exposure between 11 to 20 yrs, 21 to 30 years and more than 30 years showed increasing trend of 37 %, 61.5 % & 66.6 % respectively. Similar trend is seen with respect of PMF. It is inferred that occurrence and profusion of pneumoconiotic opacities due to silicosis and PMF are directly related to the number of years of work in stone

mines. Therefore, based on the evaluation of results of chest radiographs, it can be said that a large proportion of the persons working in stone mines of Karauli are suffering from silicosis and some with PMF with or without associated pulmonary tuberculosis.

There is immediate need for starting an intervention programme to provide treatment to the persons affected with silicosis and conducting a comprehensive study involving all persons engaged in stone mining to determine prevalence of silicosis in the area. There is also need to train local doctors in diagnosis of silicosis as large numbers of cases are misdiagnosed as cases of Pulmonary Tuberculosis. The mine owners and workers also need to be educated and made aware of health hazards of stone dust and preventive measures required to be taken.

DETECTION OF SILICOSIS AMONG STONE MINE WORKERS FROM KARALI DISTRICT: REPORT - II

1.0 BACKGROUND

ARAVALI (Association for Rural Advancement through Voluntary Action & Local Involvement), an Non-Governmental Organisation (NGO) while implementing its Family Livelihood Resource Centres (FLRC) Programme through Dang Vikas Sanstha, the local association in the area observed that families with history of employment in stone mines had very high prevalence of debilitating respiratory affected their family livelihood. The NGO suspected many persons affected by respiratory diseases with history of work in stone mines may be suffering from silicosis. They approached National Institute of Miners' Health (NIMH) for advice. The institute after preliminary enquiry in the area advised detailed medical examination of persons affected. ARAVALI conducted medical examination of 101 persons who had been suffering from various respiratory symptoms and had history of work in stone mines. The records of medical examination including chest radiographs were submitted to National Institute of Miners' Health for evaluation.

NIMH carried out detailed analysis of the medical records and the chest radiographs were evaluated in accordance with ILO Classification of Radiographs for Pneumoconiosis, 2000. Out of 101 subjects, radiographs of 93 subjects were considered for further analysis. The results of evaluation of medical records of 93 subjects with history of work in stone mines showed evidence of silicosis in 73 (78.5%) subjects and 16 (21.9%) of them had developed Progressive Massive Fibrosis. 53 (57%) of these had silicosis of category 2 or higher indicating advance stage of the disease. Since conduct of the study 15 persons have succumbed to the disease. The study confirmed that prevalence of advanced stage of silicosis and progressive massive fibrosis is high among manual stone mine worker in Karauli Area and prevalence being directly proportional to years of work in stone mines. Longer the duration of work, higher is the occurrence and advancement of silicosis and PMF.

The Report of study was sent to Directorate General of Mines Safety (DGMS), District Collector and other officials, Karauli, Ministry of Mines, GOI, Ministry of Labour and Employment, GOI, Secretary, National Human Right Commission,

Aravali and Dang Vikas Sanstha. DGMS conducted an enquiry into the matter. The District Administration initiated steps for rehabilitation and organized treatment camps for silicosis victims. Also Silicosis awareness programmes have been organized by Dang Vikas Sanstha and district administration. State government has set up medical boards for certification of silicosis. An ex-gratia of Rs 3 Lakhs each has been paid to families of 5 workers died of silicosis.

The Rajasthan Environment and Health Administration Board in its 6th meeting held on 30.05.2013 under chairmanship of Principal Secretary (Finance), has decided ex-gratia payment of Rs. 1.00 lakh for silicosis affected person and Rs.3.00 lakhs for family of person died of silicosis to be paid from Rehab Cess Fund. The Board has allocated Rs.100 Lakhs for the purpose. The State Government has identified 5 districts as priority area for detection of silicosis. Several meetings of stakeholders in Silicosis Prevention & Control Programme under the Chairmanship of the District Collector, Karauli have been held and a rehabilitation and relief Programme “KHULI SAANS” has been launched in 13 panchayats of Karauli area.

Since the first report on detection of silicosis in Karauli area and consequent action takes by district and state authorities, there has been increased awareness among workers and population in general. The institute is receiving requests for conducting detailed study on prevalence of silicosis in the area. The medical records of workers are also been referred for evaluation from different places. DVS has sent another set of 314 chest x-rays of stone mine workers from about 40 villages of Karauli District for evaluation for detection of Silicosis. ***The present study “Detection of Silicosis among stone mine workers from Karauli District: Report – II” is based on these 314 chest radiographs referred to NIMH for evaluation and opinion.***

2.0 INTRODUCTION

Stone quarrying and crushing are carried out in many parts of India and majority of these mines are located either in remote area or rural areas adjacent to the cities. A large number of persons are employed in unorganized small scale stone mines and crushing units. Most stone mines are seasonal and operated by small entrepreneurs with daily employment ranging from 5-20 workers though there are mines employing more than 100 persons. The working conditions in stone mines are far from satisfactory and rarely comply with health and safety standards. Stone quarrying and crushing operations give rise to large amount of fine dust containing free silica in the range of 20 -70% depending on the nature of stone. The workers are exposed to high levels of free silica which causes silicosis. Exposure to silica dust is also known to predispose to Pulmonary Tuberculosis, Chronic Airflow Limitation, Lung Cancer, Renal Diseases, etc. Many studies have been conducted in past to determine prevalence of silicosis amongst stone quarry workers in India, it may be stated from these studies that prevalence of silicosis among the stone quarry workers range from 12 % to 50%.

One such major stone mining area is Karauli district of Rajasthan. About 15 to 20 % of population is dependent on stone mining for their livelihood. There is a general lack of education and awareness about occupational diseases among workers, employers and even local medical practitioners. It is not uncommon that most cases of silicosis are treated with anti-tubercular drugs without much response as pulmonary tuberculosis is rampant in the area.

2.1 MINING ACTIVITY IN KARAULI

2.1.1 Geography of Karauli

Karauli is one of the southern Eastern districts of state of Rajasthan bordering Madhya Pradesh and is primarily a hilly area under Aravali hills. The geological formation is a pre Cambrian metamorphic rock which is rich in limestone, sandstone, silica sand, etc. The area is especially famous for pink coloured construction stone used for carving and other decorative material. Livelihood of the rural population of this district is mainly dependent on agriculture, animal rearing, and mining. The sandstone famously called Karauli stone is mined here mostly in unorganized sector.

15 to 20 % of population is dependent on mining for their livelihood. Due to the poverty the nutritional status of the population is below average.

The number of stone mines in Karauli area is approximately 1500-2000 with daily average employment of 5-20 workers. The mines are seasonal and operated by small entrepreneurs. Invariably whole family is involved in working of the mine and wages are based on amount of stone extracted. It is not uncommon to have persons employed in mines from childhood.

2.1.2 Method of Mining

Karauli stone occurs in form of layers (patti) at the depth of few feet. The working in mines is wholly manual with no mechanisation. After removal of overburden, the stone slabs are manually cut in blocks of stone by making holes with chisels and hammers (Fig-1). The block of stone so separated is then split into layer of various thicknesses depending on natural layers. The split stone layers (patti) are sold as such or cut in small square slabs depending on nature of stone and requirement. The stone patti and slabs are loaded into trucks and transported to market. Karauli stone patti is basically used for making roof of houses and floors.



Fig-1: Stone cutting in mine

The majority of mines employ less than 20 persons and do not use power or explosives; hence they are not covered by definition of mine under the Mines act, 1952. The mine owners as well as mine workers are ignorant of health and safety requirements and due to general lack of education, awareness about safety appliances and occurrence of diseases due to work conditions is minimal. Though, some medical practitioners are aware of the respiratory diseases occurring among workers, they are mostly treated as case of pulmonary tuberculosis. It is not uncommon that cases of respiratory disease are repeatedly treated with anti tubercular drugs without much response.

2.2 Family livelihood Resource Programme

ARAVALI (Association for Rural Advancement through Voluntary Action & Local Involvement) is a non-government organization initiated by the Government of Rajasthan. Since 1997 ARAVALI is engaged in building organizational and programme capacities of NGOs in the State of Rajasthan. The main objective of ARAVALI is establishing Family Livelihood Resource centres (FLRCs) is an innovative approach of ARAVALI to dynamically and systematically analyse livelihood issues of the identified families as well as build tools and skills amongst functionaries to address the emerging challenges with the aim of enabling the most vulnerable to come out of the poverty trap through sustainable measures. The objective of the FLRC is to develop and deliver a customised package of livelihood resources and support services, for sustainable income generation and enterprise promotion, of the poorest and the most vulnerable households in its area. Dang Vikas Sansthan (DVS), Karauli based voluntary organization, is one of the ARAVALI's field host organization for FLRC since 2008. DVS identified the poorest and the most vulnerable families affected by mining based livelihood in six gram panchayats of Karauli block.

3.0 STUDIES ON SILICOSIS

Many studies have been conducted in past to determine the prevalence of silicosis amongst the stone quarry workers in the country. Sikand and Pamra (1949) were probably the first to report cases of silicosis in surface workers in India. They recorded that 52.4% of stone cutters and 12.5% of stone breakers suffered from silicosis in stone mines and crushers near Delhi. They also reported higher incidence of tuberculosis among these workers.⁽¹⁾ A Study conducted in 1992-94 by Desert Medicine Research center, Jodhpur, to find out the pattern and predictors of mortality amongst sandstone workers showed that radiological opacities suggestive of silicosis were seen in 9.9% radiographs and radiological signs of pulmonary tuberculosis were seen in 15.6 % of radiographs. Prevalence of both conditions increased with duration of work.⁽²⁾

An environmental and epidemiological survey carried out in stone quarry workers by NIOH Ahmedabad, revealed evidence of silicosis in 22.4% workers. About 32% workers showed radiological evidence of tuberculosis. Majority of the cases of

silicosis were detected among workers who had worked for over 10 years. The mean total dust concentrations in two quarries were 3.38 and 3.72 mg/M³ and respirable dust concentrations in two quarries were 0.80 and 0.85 mg/M³ respectively. the free silica content in dust was estimated to be about 70%.⁽³⁾ In a review article “occupational health research in India” it is suggested that the prevalence of silicosis amongst stone quarry workers was 21% and that in stone crusher was 12%.⁽⁴⁾

An environmental and medical survey in sand stone mines located in lalitpur district of Uttar Pradesh revealed that the total and respirable dust concentration during the process of stone cutting were 22.4 mg/m³ and 1.6 mg/m³ respectively. Examination of 125 stone cutters showed that the prevalence of silicosis and tuberculosis were 22% and 48% respectively. The average duration of dust exposure for development of silicosis was 12 to 15 years. The total and respirable dust levels after installation of the control device, which operates on the principle of enclosure, were 3.4 mg/ m³ and 0.8 mg/ m³ respectively.⁽⁵⁾

A study by Gramin Vikas Vigyan Samiti (GRAVIS), Jodhpur in collaboration with Society for Participatory Research in Asia (PRIA), Delhi in 1994, found that about 10% of mine workers examined suffered from silicosis. Another study conducted in 1996, in sandstone mines in Jodhpur, showed that out of the 288 workers examined, 14% were found to be suffering from severe silicosis, and 28% were found to be suffering from silicosis of less severity.⁽⁶⁾

In a survey conducted by Center for Occupational and Environmental Health, New Delhi in Lal-Kuan area of New Delhi to assess health status of resident who had worked in stone crushers and quarries, showed that approximately 39% of the subjects examined were suspected to be suffering from Silicosis, or Silico-tuberculosis while the number of subjects with tuberculosis was 29%.⁽⁷⁾

4.0 SILICOSIS ⁽⁸⁾

Silicosis is caused by inhalation of airborne dust of Silicon Dioxide or Silica in the crystalline form also known as quartz. In metal mines, workers are exposed to high concentration of silica dust almost at every stage of mining operation. However, drilling, blasting, loading – unloading of ore, crushing, etc. are some of the dustiest operations and thus, workers in metal mines are at the higher risk of developing silicosis. Occurrence of silicosis is directly related to the degree of exposure to silica

dust and higher in the exposure more in the chance of developing silicosis. Silicosis is generally seen in sub-acute and chronic form after exposure to silica dust for many years. However, very heavy exposure to silica dust is known to cause acute silicosis.

4.1 Pathogenesis

The precise pathogenesis of silicosis is not completely understood. The studies suggest that interactions between pulmonary alveolar macrophages and silica particles play a major role in the pathogenesis of silicosis. Surface properties of the silica particles appear to promote macrophage activation. These cells then release chemotactic factors and inflammatory mediators that elicit cellular responses by polymorphonuclear leukocytes, lymphocytes, and additional macrophages. Fibroblast-stimulating factors are also released which promote hyalinization and collagen deposition. The resulting pathologic lesion is the hyaline nodule which contains a central acellular zone with free silica surrounded by whorls of collagen and fibroblasts and an active peripheral zone composed of macrophages, fibroblasts, plasma cells and additional free silica.

The precise properties of the silica particles that evoke pulmonary response are not known. The nature and extent of biologic response is related to the intensity of exposure to silica dust but the surface characteristics of the dust also appear to be important. There is growing evidence that freshly fractured silica may be more toxic than aged silica-containing dusts perhaps because of reactive radical groups on the cleavage planes of the freshly fractured moiety. This may offer a pathogenic explanation for the more frequent observation of cases of advanced disease in sandblasters and rock drillers, in whom exposure to recently fractured silica is particularly intense.

4.2 Clinical Features

Silicosis is a largely asymptomatic disease till the onset of Progressive Massive Fibrosis (PMF). There may be no symptoms even though the radiographic appearances may suggest fairly advanced silicosis. Dyspnoea on exertion is the most frequent and directly related symptom, although it is rarely complained of in the absence of complicating diseases such as tuberculosis or bronchitis. The severity of dyspnoea increases with the progress of disease. Slight unproductive cough may be present at initial stages, however, the quantity of sputum increases later on. The

symptoms usually resemble chronic bronchitis. Excessive sputum production is due to bronchial catarrh due to chronic dust exposure and sometimes due to secondary bacterial infection. Chest pain and haemoptysis are invariably due to tuberculosis.

Silicosis can also occur in acute form with heavy exposure to quartz dust over a short period. Acute silicosis develops within few months after inhalation of massive quantities of fresh silica dust. It generally presents as diffuse progressive irregular fibrosis of lower zones with few typical nodular shadows of silicosis. The radiological appearance is almost similar to pulmonary edema. There may also be acute enlargement of hilar lymph nodes. The histological findings are similar to pulmonary alveolar proteinosis. Acute silicosis presents as severe dyspnoea and associated weight loss. The disease is rapidly progressive and death is invariably due to severe hypoxemic ventilatory failure.

4.3 Chest Radiography

Chest radiography is the most important tool for the diagnosis of silicosis. There is direct relationship between degree of exposure to dust and severity of radiographic changes. In the initial stage, there is 'reticulation' of lung fields due to thickening of peri-vascular and inter-communicating lymphatics. However, the radiographic diagnosis of silicosis can only be made after appearance of nodules particularly in upper and middle zones of lungs. The silicotic nodules initially are 2-5 mm in diameter, homogenous in density and usually bilaterally symmetrical. The nodules increase in number and size to "r" type and eventually cover most parts of the lungs.

Silicotic opacities tend to increase even after cessation of exposure to silica dust and sometimes calcification is seen in small nodules. There may also be Kerley B Lines at bases and thickening of inter-lobar fissure and pleura. Eggshell calcification of hilar lymph nodes when present is almost pathognomonic of silicosis. At later stage, the silicotic nodules frequently unite and conglomerate to form large shadows of Progressive Massive Fibrosis (PMF). These shadows initially have a multi-nodular appearance but later on consolidate into contracted dense fibrotic masses often surrounded by bullae. The cavitation of shadows may occur with or without tuberculosis infection. There is invariably extensive pulmonary fibrosis close to the PMF lesions.

4.4 Lung Function Tests

Simple silicosis is rarely associated with lung function abnormalities except at the advance stage. However, there may be mixed type of lung function abnormalities due to exposure to dust. In cases of acute silicosis, restrictive type of lung function abnormalities may be seen. In late stages of progressive massive fibrosis there will always be severe mixed type of lung function abnormalities.

4.5 Complications of Silicosis

Pulmonary tuberculosis is the most frequent and an important complication of silicosis, presumably due to reactivation of previously existing quiescent lesions. There may also be infection due to atypical mycobacteria. The other complications of silicosis include pneumothorax associated with combination of fibrosis and bullae, increased frequency of scleroderma and tendency for renal failure. Recent studies have suggested that the silica dust may be carcinogenic and there may be increased incidence of lung cancer among silicotics. There is also some evidence to suggest that silica dust exposure may increase the incidence of ischemic heart diseases.

4.6 Prognosis

The prognosis in silicosis depends on the degree of exposure and the rate of development of silicosis. Acute silicosis invariably carries very poor prognosis and majority of the patient die within few months. Silicosis occurring at late stage is less debilitating till the onset of progressive massive fibrosis. Development of progressive massive fibrosis at any stage invariably carries poor prognosis.

5.0 STATUTORY REQUIREMENTS UNDER MINES ACT, 1952 AND RECOMMENDATIONS OF CONFERENCES ON SAFETY IN MINES

The Mines act, 1952 and Mines Rules, 1955 provide the statutory requirements for medical examination of workers and detection of notified diseases. The Conferences on Safety in Mines have further recommended detailed medical examination and classification of chest radiographs as per ILO classification. The important provisions are listed below.

5.1 Mines Act, 1952 ⁽¹⁰⁾

Section 25 Notice of Diseases

Mine management is required to submit notice of occurrence of notified diseases under section 25 of Mines Act, 1952.

The said section requires that:-

1. Where any person employed in a mine contracts any disease notified by Central Government as a disease connected with mining operations, the owner, agent or manager of the mine, shall send notice thereof to the Chief Inspector.
2. If any medical practitioner attends on a person who is or has been employed in a mine and who is or is believed by the medical practitioner to be suffering from any disease notified under sub-section (1), the medical practitioner shall send a report in writing to the Chief Inspector stating
 - a) the name and address of the patient.
 - b) the disease from which the patient is or is believed to be suffering.
 - c) The name and address of the mine in which the patient is or was last employed.

Following diseases have been notified as the diseases connected with mining operations for the purpose of sub-section (1) of Section 25 of the Mines Act, 1952:-

- Silicosis
- Pneumoconiosis
- Manganese Poisoning - Nervous type
- Asbestosis

- Cancer of lung or the stomach or the pleura and peritoneum (i.e. mesothelioma)

The Central Govt. vide notification S.O.399 (E) dated 21/2/2011 has further notified following diseases connected with the mines operation.⁽¹¹⁾

- Noise Induced Hearing Loss
- Contact dermatitis caused by direct contact with chemicals
- Pathological manifestations due to Radium or Radioactive substances

5.2 Mines Rules, 1955⁽¹²⁾

Rule 29 B: Initial and Periodical Medical Examination

The Rule provides for;

- (a) Initial medical examination of every person to be employed in the mine.
- (b) Periodical medical examination, once every five years of persons employed in the mines.
- (c) In case of the persons engaged in the process of mining or milling of asbestos, periodical medical examination shall be done at least once in every twelve months and every such examination shall include all the tests except the X-ray examination, which shall be carried out once in every three years.
- (d) The periodical medical examination or the x-ray examination or both, shall be conducted at more frequent intervals if the examining authority deems it necessary to confirm a suspected case of a dust related disease.

The routine initial or periodical medical examination should include -

- General physical examination,
- A full size postero-anterior chest radiograph,
- Lung Function Tests (Spirometry)

Central Government has notified;

Initial medical examination of every person seeking employment in mines and periodical medical examination once in five years of the following categories:-

- (i) persons employed below ground in a mine:
- (ii) persons employed in open cast workings of manganese mine or an asbestos mine:
- (iii) persons engaged in operation of draglines, shovels, dozers, scrapers, dumpers, power drills, boring machines, locomotives winding engines, air compressors and other machinery installed or deployed on the surface or in the open cast workings in a mine:
- (iv) persons engaged in crushing, grinding, dressing, processing, screening, or sieving of minerals, ores or stone or in any operation incidental thereto in a mine.

I. Rule 29C

The medical examinations to be conducted by a medical officer appointed by the mine.

II. Rule 29D

The rule describes the procedure to be followed for conduct of medical examination including notice of medical examination to the examinee in Form - M

III. Rule 29E

The rule describes the action required to be taken in case a person fails to submit himself for medical examination.

IV. Rule 29F

Initial and periodical medical examination of persons to be conducted in accordance with standards laid down in Form - P or Form - P I.

V. Rule 29G (1)

All medical examination records along with job details depicting occupational dust exposure profile of the person shall be retained till the person is in employment and ten years thereafter.

VI. Rule 29H

Every candidate for medical examination to handover three passport size photographs at the time of medical examination.

VII. Rule 29I

No woman shall, without her consent, be medically examined by a male medical practitioner except in presence of another woman

VIII. Rule 29J

Where a person is declared medically unfit on medical examination, he may file an appeal with the manager for medical re-examination by Appellate Medical Board.

IX. Rule 29K

The Appellate Medical Board shall consist of

- a. Inspector of Mines (Medical), Member Secretary
- b. One Physician
- c. One Radiologist

X. Rule 29L

The Appellate Medical Board shall examine a person in accordance with standard laid down in Form – P or PI and issue certificate in Form – S.

XI. Rule 29M

Medically unfit person not to be employed in mines.

XII. Rule 29N

If as a result of any medical examination a person is found to have any disease notified under section 25 of Mines Act, the provisions of Workman Compensation Act shall become applicable.

XIII. Rule 29O

The full cost of every medical examination under the rules shall be borne by the owner of the mine.

XIV. Rule 29P

Every mine shall submit an annual return about number of medical examinations conducted by it in form T.

5.3 Recommendations of VIIth, VIIIth and IXth Conferences on Safety in Mines

Important recommendations of VIIth, VIIIth and IXth National Conferences on Safety in Mines on Occupational Health Services and Medical Surveillance.

- (i) There is a need for creation of Occupational Health Services in each mining company working mechanized mines.
- (ii) Occupational Health Services shall have sufficient technical personnel with specialized training and experience in Occupational Medicine, Industrial Hygiene, Ergonomics, Occupational Health Nursing, etc. They should keep themselves up-to-date with progress in the scientific and technical knowledge necessary to perform their duties. Occupational Health Services should, in addition, have necessary administrative personnel, equipment and appliances for carrying out the assigned functions.
- (iii) (i) Management of every mechanised mine should, in consultation with experts of the Occupational Health Services, prepare a scheme for:
 - (a) Identification of operations and activities where factors hazardous to health of persons at work exist or may arise during the course of work.
 - (b) Monitoring the levels or values of different factors which may affect health of persons.
 - (c) Specifying the various control measures necessary for keeping the levels / values within the permissible limits.
 - (d) Health surveillance.
 - (e) Health education.
 - (f) First – aid training.

- (iv) There should be at least one medical officer properly trained in Occupational Health in each area who should also be associated with Periodical Medical Examinations.
- (v) At least one medical officer engaged in medical examinations should be trained in use of ILO Classification of Radiographs for Pneumoconiosis.
- (vi) Adequate facilities for X-rays and Lung Function Tests should be provided at each medical examination centre.
- (vii) Health surveillance record shall be properly maintained.
- (viii) If the profusion of any type of pneumoconiotic opacities in chest radiograph is 1/0 or above as per ILO Classification, the case shall be certified and notified as pneumoconiosis.
- (ix) One of the medical examination of every person should be arranged within one year of his superannuation.
- (x) To monitor the progress of profusion in certified cases of pneumoconiosis medical examination should be conducted at shorter intervals.

5.4 Recommendations of Xth Conference on Safety in Mines Relating to Occupational Health and Hygiene⁽¹³⁾

The Xth National Conference on Safety in Mines held in Delhi on 26th and 27th November, 2007 has made comprehensive recommendations on Occupational Health Surveillance and other occupational health and hygiene issues. Some of the important recommendations are;

Review of Status of Implementation of Recommendations of the 9th Conference on Safety in Mines

- The recommendations of DGMS (Tech) Circular No.18 of 1975 shall be implemented forthwith. (Protection of workers against Noise & Vibration in Working Environment.)
- Audiometry should be introduced, as a part of mandatory medical examination, for persons seeking employment in mines and for persons engaged in Operations / areas where noise level exceeds 90 dB(A).

Occupational Health Surveillance in Mining Industry

- All chest radiographs of Initial and Periodical Medical Examinations in private mines shall be classified for detection, diagnosis and documentation of pneumoconiosis in accordance with ILO classification for pneumoconiosis.
- The PME Medical Officer in every PME centre of private mines shall be trained in occupational health and use of ILO classification for pneumoconiosis.
- Each mining company operating mechanized mines shall set up an Occupational Diseases Board consisting of one occupational Health Physician, one radiologist and one general physician.

Occupational Health Surveillance and Notified Diseases.

Noise mapping should be made mandatory of various work places in the mine premises based on the various machines being used in concerned mines along with personal noise dosimetry of individual workmen exposed to noise level above 85 db(A)

Vibration studies of various mining machinery required to be done before their introduction in mining operations as per ISO standards.

Ergonomical assessment of all latest machines, before their introduction into mining operation as per ISO standards. Ergonomical assessment should include:

- * Assessment of work process.
- * Assessment of working Aids/tools
- * Assessment of working posture

Potability tests of drinking water supplied to the mine employees, to be made mandatory once in a year irrespective of its source, preferably after Rainy seasons, the sample of water should be collected from the points of consumption

Initial medical examination shall be made mandatory for all mining employees whether permanent, temporary or contractual, before they are engaged in any mining job.

The frequency of periodic medical examinations should be brought down from existing five years to three years for the mining employees above 45 years of age. This should be implemented in three years.

Standards of medical examinations for both Initial and Periodic should be modified as mentioned below in order to ensure early diagnosis of more diseases caused or get aggravated due to employment in mines.

- (a) In addition to measurement of blood pressure, detailed cardiovascular assessment of employees should be done. This should include 12 leads electrocardiogram and complete lipid profile.
- (b) Detailed neurological examinations including testing of all major superficial and deep reflexes and assessment of peripheral circulation to diagnose vibrational syndromes.
- (c) In addition to routine urine, fasting and post-parandial blood sugar should be included for early diagnosis of diabetes mellitus.
- (d) Serum Urea and Creatinine should be included for assessment of Renal function.
- (e) Haematological tests like Total count, Differential count, percentage of Haemoglobin and Erythrocyte Sedimentation Rate should be included to diagnose Blood Dyscrasias.

Special tests should be included in the PME for employees exposed to specific health hazard;

- (a) For employees exposed to manganese, special emphasis should be given to behavioral and neurological disturbances such as speech defect, tremor, impairment of equilibrium, adiadochokinesia H₂S and emotional changes.
- (b) For persons exposed to lead, PME should include blood lead analysis and delta aminolevulinic acid in urine, at least once in a year.
- (c) Employees engaged in food handling and preparation and handling of stemming material activities should undergo routine stool examination once in every six months and sputum for AFB and chest radiograph once in a year.
- (d) Employees engaged in driving/ HEMM operation jobs should undergo eye refraction test at least once in a year.
- (e) Employees exposed to ionizing radiation should undergo Blood count at least once in a year.

It is proposed to include following diseases in the list of Notified diseases under Section 25 (1) of Mines Act, 1952:

- (a) All other types of Pneumoconiosis including Coal workers pneumoconiosis, Silicosis and Asbestosis. This includes Siderosis & Berillyosis.
- (b) Noise induced hearing loss.
- (c) Contact Dermatitis caused by direct contact with chemicals.
- (d) Pathological manifestations due to radium or radioactive substances.

For smaller mines where PME facilities are not existing, medical examinations can be done through other competent agencies.

6.0 STATUTORY PROVISIONS UNDER WORKMEN COMPENSATION ACT, 1923. ⁽¹⁴⁾

Section 3 Employer's Liability for compensation:

A. (2) If a workman employed in any employment specified in Part A of Schedule III contracts any disease specified therein as an occupational disease peculiar to that employment, or if a workman whilst in the service of an employer in whose service he has been employed for a continuous period of not less than six months (which period shall not include a period of service under any other employer in the same kind of employment) in any employment specified in Part B of Schedule III, contracts any disease specified therein as an occupational disease peculiar to that employment, or if a workmen, whilst in the service of one or more employers in an employment specified in Part C of Schedule III for such continuous period as the Central Government may specify in respect of each such employment, contracts any disease specified therein as an occupational disease peculiar to that employment, the contracting of the disease shall be deemed to be an injury by accident within the meaning of this section and, unless the contrary is proved the accident shall be deemed to have arisen out of, and in the course of the employment :

[Provided that if it is proved –

- (a) That a workman whilst in the service of one or more employers, in any employment specified in Part C of Schedule III, has contracted a disease specified therein as an occupational disease peculiar to that employment during a continuous period which is less than the period specified under this sub-section for that employment, and
- (b) That the disease has arisen out of and in the course of the employment, the contracting of such disease shall be deemed to be an injury by accident within the meaning of this section :

Schedule III, Part C

1. Pneumoconioses caused by sclerogenic mineral dust (Silicosis, anthracosilicosis, asbestosis) and silico-tuberculosis : provided that silicosis is an essential factor in causing the resultant incapacity or death. All work involving exposure to the risk concerned.
2. Bagassosis All work involving exposure to the risk concerned.
3. Broncho-pulmonary diseases caused by cotton flax hemp and sisal dust (Byssinosis) All work involving exposure to the risk concerned.
4. Extrinsic allergic alveolitis caused by the insulation of organic dusts. All work involving exposure to the risk concerned.
5. Broncho-pulmonary diseases caused by hand metals. All work involving exposure to the risk concerned.

Model Draft Rules – Workmen’s Compensation (Occupational Diseases) Rules, 1961.

The Central Government had also formulated Model Draft Rules – Workmen’s Compensation (Occupational Diseases) Rules, 1961. However these rules were ratified by few states only and could not come into force in majority of the states. The relevant provisions of the rules are reproduced below;

- (e) “Pneumoconiosis” means silicosis or coalminers pneumoconiosis or asbestosis or bagassosis or any of those diseases accompanied by pulmonary tuberculosis;.

(5) Medical conditions under which pneumoconiosis may be considered to be an occupational disease-

- (1) The diagnosis of pneumoconiosis shall be carried out with all the necessary technical guarantees. Proof of the degree of development of the pathological or anatomical changes in the respiratory and cardiac systems shall be furnished by the radiographic record and other laboratory records, which shall be accompanied by the report of a full clinical examination, including a report of the industrial history of the person concerned, the record of all occupations in which he has been employed, the nature of the harmful dusts to which he was exposed and the duration of such exposure.
- (2) For entitlement to compensation, silicosis and coal miners' pneumoconiosis shall fulfil the following radiological and clinical conditions:
 - (a) The radiological examination of the workmen must reveal –
 - (i) The appearance of generalised micronodular or nodular fibrosis covering a considerable part of both lung fields whether accompanied or not by signs of pulmonary tuberculosis: or
 - (ii) In addition to a marked accentuation of the pattern of both lungs, the appearance of one or several pseudotumoral fibrotic formations, whether accompanied or not by signs of pulmonary tuberculosis; or
 - (iii) The appearance of both of these types of fibrotic lesions at once, whether accompanied or not by signs of pulmonary tuberculosis;
 - (b) Serial radiological pictures taken over a period during periodical medical examinations shall, as far as possible, be considered in making definite diagnosis in cases where doubt exists;
 - (c) Radiological interpretation shall be based on the standard International classification laid down by the International Labour Organisation (Geneva Classification).
 - (d) The clinical examination of the workman concerned must reveal a decrease or deterioration of the respiratory function or cardiac function, or a deterioration of the state of general health, caused by the pathological processes specified above.

(6) Evaluation of disablement –

- (1) The evaluation of disablement shall be made by reference to the physical (anatomical, physiological, and functional) and mental capacity for the exercise of the necessary functions of a normally occupied life which would be expected in a healthy person of the same age and sex. For such assessment, recognised cardio-respiratory function tests shall be used to assess the degree of cardio-respiratory function impairment.

- (2) It shall be determined whether the disablement is temporary or permanent and also the percentage loss of function as it pertains to the loss of working capacity for receiving compensation.

- (3) Assessment of disablement shall be proportionate to the loss of earning capacity, total disablement being taken to be 100% loss of earning capacity.

7.0 OBJECTIVES:

The main objectives of the study includes

1. To evaluate chest radiographs of persons with history of work in stone mines referred to NIMH for detection of silicosis
2. To suggest measures for management and rehabilitation, if any

8.0 MATERIALS & METHODS:

Dang Vikas Sanstha (DVS) of ARAVALI referred chest x-rays of 314 persons including 2 females having history of work in stone mines and / or had been suffering from various respiratory symptoms [Annexure -1]. The chest x-rays of 314 persons were sent to NIMH and were evaluated by three specialists experienced in evaluation of chest radiographs as per ILO classifications of radiographs for Pneumoconiosis, 2000.

9.0 RESULTS:

9.1 The Study Population

The age wise distribution of the subjects is given in table-1 and figure -2.

Table - 1

Age Group	Male	Female	Total
20-30	25	0	25
31-40	76	0	76
41-50	104	2	106
51-60	83	0	83
>60	24	0	24
Total	312	2	314

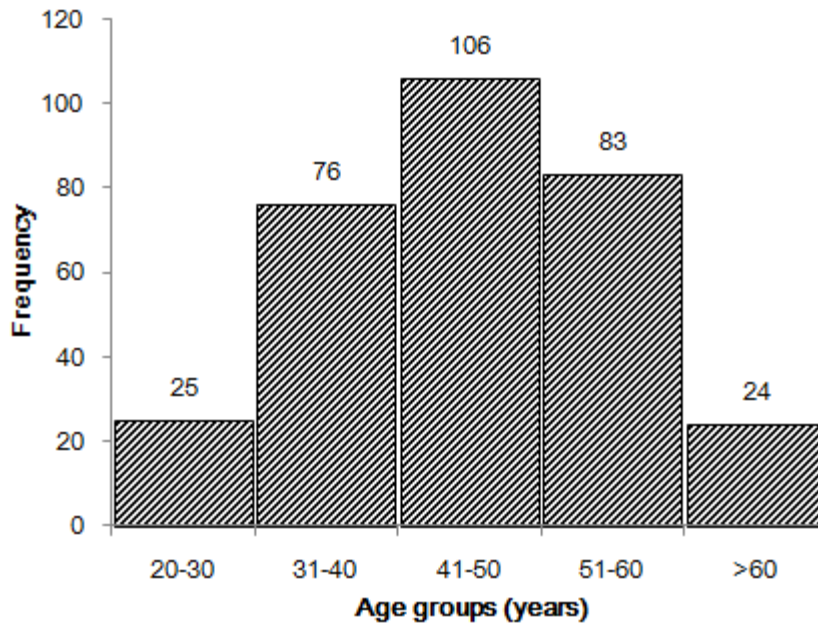


Figure 2: Histogram showing the distribution of subjects as per age

The table-2 shows distribution of person according to history of work in stone mines.

Table - 2

Years of Work	Male	Female	Total
< 10	26	2	28
11-20	95	0	95
21-30	93	0	93
> 30	98	0	98
TOTAL	312	2	314

Evaluation of records showed that out of 314 persons 263 had completed DOTS (Directly Observed Treatment, Short Course) therapy,

9.2 Chest X-ray:

The chest radiographs of 314 subjects were evaluated as per ILO classification of Radiographs of Pneumoconiosis, 2000 under standardized condition.⁽¹⁵⁾

Each radiograph was classified for film quality, type of opacities, profusion of opacities, extent and other abnormalities. The findings were noted in a standardized radiograph reading sheet.

9.2.1 Technical Quality

The technical quality was evaluated as below:

1. Good
2. Acceptable, with no technical defects likely to impair classification of the radiograph for pneumoconiosis
3. Acceptable, with some technical defects but still adequate for classification purpose.
4. Unacceptable for classification purpose.

Table 3 shows the distribution according to the technical quality of radiographs

Table - 3

Quality of Film	Number
1	0
2	49
3	249
4	16
Total	314

16 chest x-rays which were of quality 4 or unreadable were not acceptable for evaluation and hence excluded from further analysis. **Remaining 298 chest x-rays were considered for evaluation.**

Table - 4

Category	Number of Subject
Category - 0	149*
Category - 1	63
Category - 2	49
Category - 3	37
Total	298

***Includes 31 cases with radiological evidence of Pulmonary Tuberculosis and 4 cases of other lung diseases but no Pneumoconiotic opacities**

Majority of small rounded opacities were of type “r” i.e. opacities with diameter exceeding 3 mm and up to about 10 mm

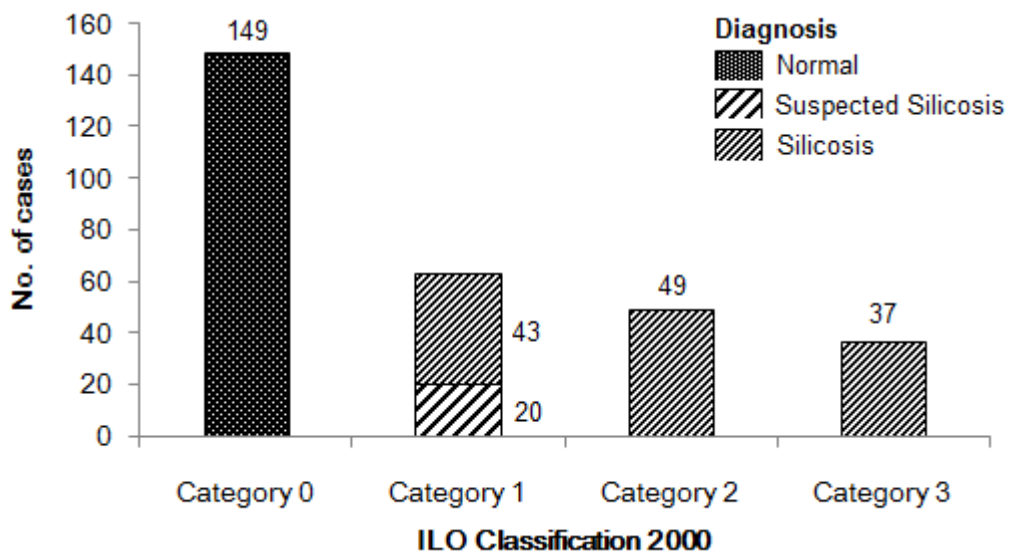


Figure 3 : Bar chart showing the number of cases as per major categories of ILO classification

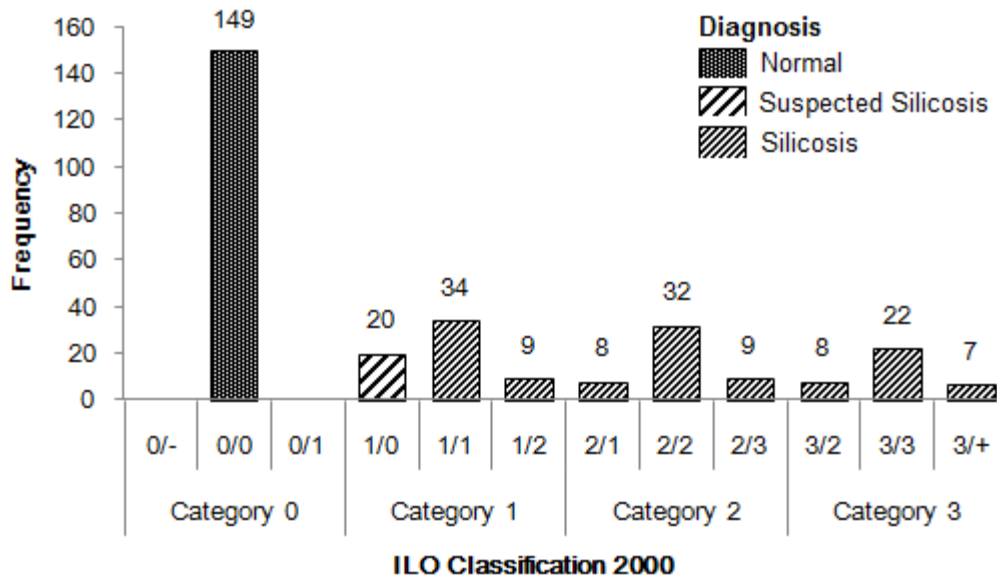


Figure 4 : Bar chart showing the number of cases as per subcategories and major categories of ILO Classification

Fig- 5 and Fig- 6 show the photograph of chest radiograph of subjects with category 3 silicosis and silicotuberculosis respectively.



Fig-5: Chest radiograph with category 3 silicosis

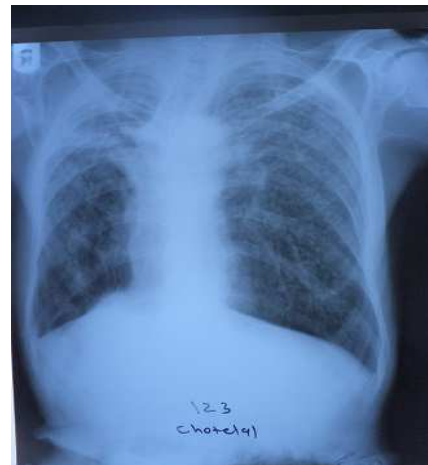


Fig-6: Chest radiograph with Silicotuberculosis

9.2.3 Large Opacities:

A large opacity is defined as an opacity having the longest dimension exceeding 10 mm.

Category A: One large opacity having the longest dimension up to about 50 mm, or Several large opacities with the sum of their longest dimensions not exceeding about 50 mm

Category B: One large opacity having the longest dimension exceeding 50 mm but not exceeding the equivalent area of the right upper zone, or several large opacities with the sum of their longest dimensions exceeding 50 mm but not exceeding the equivalent area of the right upper zone

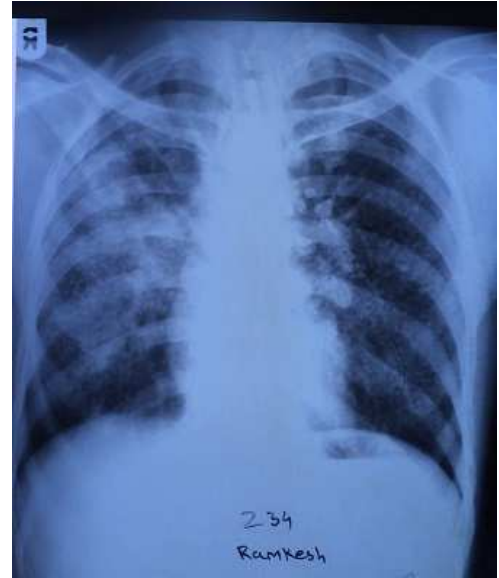


Fig- 7: Chest radiograph showing silicosis with PMF

Category C: One large opacity which exceeds the equivalent area of the right upper zone, or several large opacities which, when combined, exceed the equivalent area of the right upper zone

The chest radiographs of 20 workers showed large opacities suggestive of Pulmonary Massive Fibrosis (PMF). Fig-7 shows the photograph of chest radiograph of silicosis with Progressive Massive Fibrosis. The distribution of cases is given in table-5

Table - 5

Sr. No	Type of Large Opacity	Number of subjects
1	Category A	3
2	Category B	14
3	Category C	3
	Total	20

The further analysis of result showed that occurrence and profusion of pneumoconiotic opacities due to silicosis and progressive massive fibrosis were directly related to the number of years of work in stone mine

The distribution of cases of silicosis and progressive massive fibrosis along with number of subjects according to the years of work in mines is given in Table-6

Table – 6

Years of work	Silicosis	PMF	Total Number of Subjects
< 10	0	0	28
11-20	33 (37)	0	89
21-30	56 (61.5)	9 (9.8)	91
> 30	60 (66.6)	11 (12.2)	90
Total	149 (50)	20 (6.7)	298

Note: - The numbers in parenthesis indicates % of subjects suffering from silicosis and PMF

The association between duration of exposure and detection of silicosis was evaluated using *Chi-square test*. The *P*-value for the test was obtained through *Monte-Carlo simulation*. The test resulted into a *P*-value of 0.0004 indicating statistically significant association between duration of exposure and the occurrence of Silicosis. It is evident from the table that as the years of exposure increases, the proportion of patients with Silicosis and PMF also increases. Figure-8 shows the stacked bar chart representation of diagnosis with respect to duration of exposure.

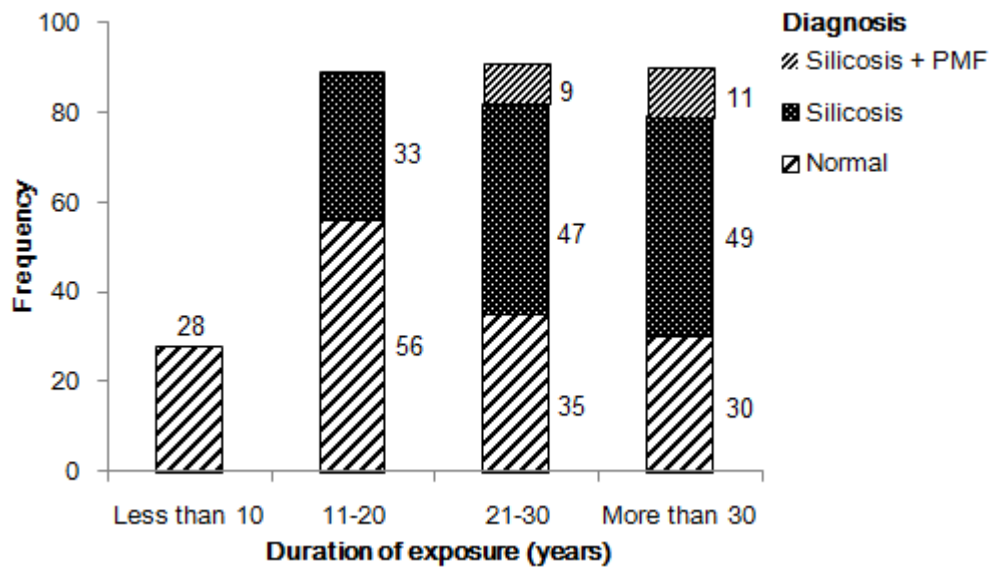


Figure 8: Stacked bar showing the distribution of subjects as per duration of exposure and diagnosis

Table -7 provides the distribution of subjects as per duration of exposure and Category of pneumoconiosis. The association between the two factors was evaluated using *Chi-square test*. A simulated *P*-value was obtained using *Monte-Carlo* approach with 2000 runs. The computation was performed using *R*-programming tool. The test resulted into a *P*-value of 0.0049 ($P < 0.05$) indicating statistically significant association between duration and ILO category. Figure - 9 gives the stacked bar chart representation of the data according to ILO category

Table-7 shows distribution of category of silicosis according to number of years of work in stone mines.

Table - 7

Years of work	Category 1	Category 2	Category 3	Total Number of cases of Silicosis
< 10	0	0	0	0
11-20	17	10	6	33
21-30	26	18	12	56
> 30	20	21	19	60
Total	63	49	37	149

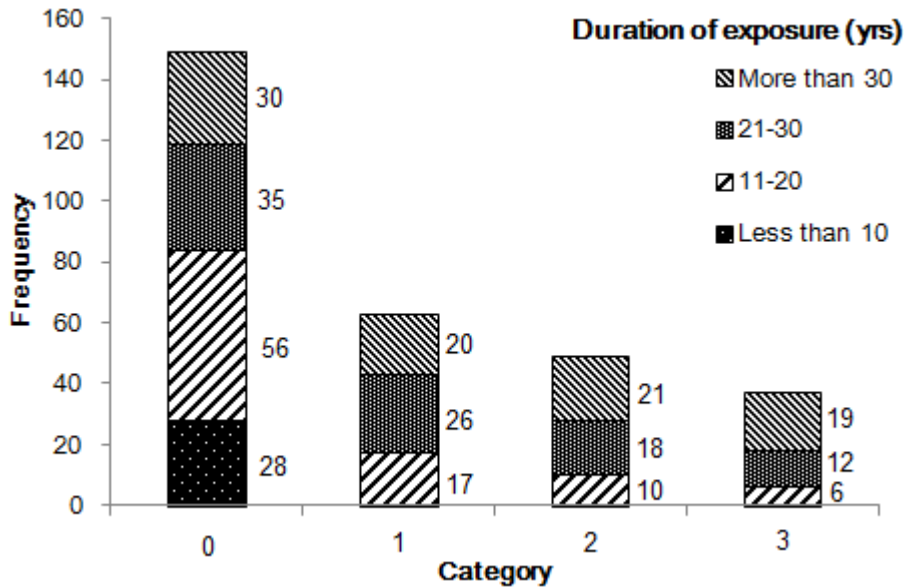


Figure 9: Stacked bar chart showing the distribution of subjects as per category and duration of exposure.

Table-8 shows distribution of cases of progressive massive fibrosis according number of years of service in mines.

Table - 8

Years of work	Category A	Category B	Category C	Total Number of cases of PMF
< 10	-	-	-	0
11-20	-	-	-	0
21-30		8	1	9
> 30	3	6	2	11
Total	3	14	3	20

The distribution of subjects was obtained for cases of progressive massive fibrosis according to years of exposure. The distribution of cases with and without PMF was obtained as shown in the Table -9 below:

Table- 9

Years of Work	Progressive massive fibrosis (PMF)		
	Yes	No	Total
<= 10	0	28	28 (9.4%)
11 – 20	0	89	89 (29.87%)
21 – 30	9	82	91 (30.54%)
31 – 40	7	61	68 (22.82%)
41 – 50	4	16	20 (6.71%)
>= 51	0	2	2 (0.67%)
Total	20 (6.71%)	278 (93.29%)	298

Table reveals that maximum i.e. 9 cases of PMF were observed in workers having exposure of 21-30 years, followed by 7 cases in workers having exposure of 31-40 years. To obtain statistical significance of association between duration and occurrence of PMF, exposure categories were pulled using a cut-off value of 20 years and *Chi-square test* with Yate's continuity correction was used, resulting into a *P*-value of 0.00049 ($P < 0.001$). This suggested that more than 20 years of exposure has significant impact on the prevalence of PMF amongst mine workers.

9.2.4 Other important radiological findings:

Other important findings in chest radiographs include 31 cases of radiological evidence of Pulmonary Tuberculosis. In 34 subjects there was evidence of silicosis associated with pulmonary tuberculosis, henceforth termed as Silicotuberculosis.

The association was also obtained according to number of cases of pulmonary tuberculosis and silicotuberculosis and years of work in mines, with the distribution given in Table -10 below:

Table- 10

Years of Work	Pulmonary TB and Silicotuberculosis		
	Yes	No	Total
<= 10	1	27	28 (9.4%)
11 – 20	17	72	89 (29.87%)
21 – 30	19	72	91 (30.54%)
31 – 40	20	48	68 (22.82%)
41 – 50	7	13	20 (6.71%)
>= 51	1	1	2 (0.67%)
Total	65 (21.81%)	233 (78.19%)	298

Table -10 reveals that workers with work in mines in the range of 11 – 40 years had Pulmonary TB and silicotuberculosis. The statistical relevance between duration of work in mines and occurrence of pulmonary TB and silicotuberculosis was evaluated using *Chi-square test* and the *P*-value was estimated using *Monte-Carlo simulation*. The test resulted into a value 0.0485 ($P < 0.05$) indicating significant influence of years of work in mines on the prevalence of pulmonary TB with silicosis.

10.0 DISCUSSION:

The results of evaluation of chest x-rays of 314 subjects [Annexure-2] submitted by ARAVALI to National Institute of Miners' Health show that majority of the subjects who had worked in stone mines had radiological evidences of silicosis. Of the 298 chest radiographs evaluated as per ILO classification, 149 (50 %) showed evidence of silicosis and 20 (13.4 %) of them had developed Progressive Massive Fibrosis. As is evident from table - 4, 86 subjects had silicosis of category 2 or higher which indicates advance stage of the disease. Similarly, majority cases of Progressive Massive Fibrosis were of category B or C showing advance stage of disease.

Table 6, 7 and 8 show that the occurrence and stage of silicosis and Progressive Massive Fibrosis are directly related to years of work in stone mines. Longer the duration of work, higher is the occurrence and advancement of silicosis. As expected, silicosis mostly developed after 10 years of working in the mine. The prevalence of silicosis increased with increasing number of years of work in mines, as seen in the study, 37 % of persons developed silicosis who had work history of 11-20 years. 61.5 % of persons developed silicosis who had work history of 21-30 years and the highest 66.6% of persons developed silicosis who had worked for more than 30 years in mines. Similarly, prevalence of PMF also increased with increasing number of years of work.

It is known that silicosis tends to predispose to tuberculosis and may be a contributing factor towards high prevalence of tuberculosis. It is also observed that 31 (10.43 %) of the subjects had radiological evidence of pulmonary tuberculosis and 34 (11.4 %) had Silicotuberculosis.

Overall, based on the evaluation of results of chest radiographs, it can be concluded that a large proportion of the subjects are suffering from silicosis and some of them had advance stage of Progressive Massive Fibrosis invariably complicated by associated pulmonary tuberculosis. Majority of these cases were diagnosed as pulmonary tuberculosis and are repeatedly given anti-tuberculosis treatment with little response.

The present study cannot be considered as representative of prevalence of silicosis and PMF in stone workers of the Karauli District as the study population has not been selected considering epidemiological study point of view. The actual prevalence of

silicosis may vary considerably as it does not include persons working in mine who do not suffer from any respiratory symptoms at present. It also does not take into account those who may have died due to silicosis and PMF. Therefore, a large scale epidemiological study is required to determine prevalence of silicosis among the stone mines workers in this area.

11.0 SUMMARY & CONCLUSION

Silicosis remains the most important occupational lung disease for the persons employed in mines. Though, reliable statistics of prevalence of silicosis in Indian mines are not available, it is estimated that a significant proportion of workers may be suffering from silicosis more so in small scale and unorganized mines. In Rajasthan, stone mining is being carried out in Jodhpur, Bharatpur, Karauli and many other districts. In Karauli area, ARAVALI, one of the Government of Rajasthan NGO has been working on the livelihood project. It had observed that many of the workers engaged in stone mining have been suffering from respiratory problems and being treated as cases of tuberculosis with very little response. National Institute of Miners' Health in collaboration with ARAVALI evaluated the chest radiographs of 314 subjects with the history of work in stone mines. Evaluation of chest x-rays have showed that 50.1% of subjects have evidence of silicosis of which 13.4% had Progressive Massive Fibrosis. Majority of the subjects were suffering from advance stage of silicosis. It is also observed that 10.4 % of persons had radiological evidence of pulmonary tuberculosis and 11.4% of subjects with silicosis had associated tuberculosis.

On the basis of evaluation of chest radiographs, it is evident that many workers engaged in stone mining in this area may be suffering from silicosis and associated tuberculosis. As majority of these workers belong to the poorest of poor class, the livelihood of the persons is affected due to occurrence of silicosis and pulmonary tuberculosis. There is urgent need for devising an intervention programme for providing medical services and rehabilitation of these persons including compensation for occurrence of silicosis as silicosis is a compensable disease under Workmen Compensation Act. All cases of silicosis also need to be notified to the enforcement agency i.e. Directorate General of Mines Safety as required under Mines Act, 1952.

In this regard, the DGMS (Tech) (S&T) Circular No. 01 of 2010 on “Respirable Dust Measurement and Control to prevent Pneumoconiosis in Mine” and DGMS (Tech) (S&T) Circular No. 01 of 2011 on “Guidelines on Occupational health Survey (Medical Examination) of persons working at places or operations / processes prone to generate airborne dust” which also includes the recommendation of National Human Right commission on “Preventive, Remedial, Rehabilitative and Compensation aspects of Silicosis” with the aim to significantly reduce the prevalence of Pneumoconiosis / Silicosis by 2015 and to totally eliminate Pneumoconiosis / Silicosis at workplace by 2030 in line with ILO/WHO Global Programme on Elimination of silicosis are significant. However, it will remain a distant dream without a concerted effort by all concerned.

12.0 RECOMMENDATIONS

1. There is immediate need for starting an intervention programme to provide treatment to the persons affected with silicosis.
2. A comprehensive study involving all persons engaged in stone mining should be carried out to determine prevalence of silicosis in the area.
3. The persons affected with silicosis need to be compensated as provided under Workmen Compensation Act, 1923.
4. All cases of silicosis should be notified to Directorate General of Mines Safety, as provided under Mines Act, 1952.
5. A detailed study on airborne dust levels and suitable dust control measures should be carried to reduce dust exposure to persons engaged in stone mining.
6. The mine owners and workers need to be educated and made aware of health hazards of stone dust and preventive measures required to be taken.
7. A special drive needs to be launched for detection and treatment of persons suffering from Pulmonary Tuberculosis in stone mines.

8. All persons engaged in stone mines should undergo periodic medical examination regularly.
9. An effective rehabilitation programme should be undertaken for persons suffering from silicosis.
10. There is need to train local doctors in diagnosis of silicosis as large number of cases are misdiagnosed as cases of Pulmonary Tuberculosis.

13.0 REFERENCES

1. Sikand, B.K. and Pamra, S.P. (1949): Preliminary Report on the occurrence of Silicosis among Stone Masons, Proceedings of 7th Tuberculosis Workers'(1964) *Ind. Jour. Chest Diseases*, 6, 1, 37-38. Conference, p. 260, openmed.nic.in/1872/01/JAN78E.pdf
2. Mathur ML. Silicosis among sand stone quarry workers of a desert district Jodhpur. *Ann Nat Acad Med Sci* 1996;32:113-8.
3. <http://icmr.nic.in/000004/achievements1.htm>
4. Saiyed HN, Tiwari RR. Occupational Health Research in India. *Ind Health* 2004; 42, 141-148.
5. Kashyap SK, Occupational Pneumoconiosis and Tuberculosis, *Ind. J. Tub*, 1994, 41, 73.
6. <http://www.indiatogether.org/2005/aug/env-lungdust.htm>.
7. Short Report on Health Survey of **Lal Kuan** Victims, www.okinternational.org/docs/LKscan2.pdf.
8. Parker JE et a; (2005) "Silicosis"
Safework Bookshelf, Encyclopaedia of Occupational Safety and Health, Fourth Edition, International Labour Office, Geneva.

9. Family Livelihood
<http://www.aravali.org.in/livelihoodfamily.html> [22nd November, 2011]
10. Directorate General of Mines Safety, Ministry of Labour, "The Mines Act, 1952"
http://www.dgms.net/ma_1952.pdf
11. Directorate General of Mines Safety, Ministry of Labour, "Notification of diseases as reportable under Section 25 of the Mines Act, 1952"
<http://www.dgmsindia.in/pdf/circulars/Legislation> [23rd November, 2011]
12. Directorate General of Mines Safety, Ministry of Labour, "The Mines Rules, 1955"
<http://www.dgms.net/mr.pdf> [23rd November, 2011]
13. Directorate General of Mines Safety, Ministry of Labour, "Recommendation of the 10th Conference on Safety in Mines, 2007" DGMS Circular 2008
14. "The Workmen Compensation Act, 1923"
<http://www.vakilno1.com/bareacts/workmenscompensationact.htm>
15. International Labour Organization (2003) Occupational Safety and Health Series No. 22, "Guidelines for the use of ILO International Classification of Radiographs of Pneumoconiosis" Revised Edition 2000, International Labour Office, Geneva.

Annexure - 1

Details of records of individual persons

Sr. No.	Patient Name	Father's Name	X-ray No.	Age	Sex	Address	Name of Mine	Mine Work Exposure	Anti TB treatment
1	Devilal	Amol	1	40	M	Village Kote post Chabar karauli	Kote Mine	20	DOTS Completed
2	Maganlal	Bharoshi	2	43	M	Village Kote post Chabar karauli	Kote Mine	15	No
3	Mangal	Heera	3	55	M	Village Kote post Chabar karauli	Kote Mine	40	DOTS Completed
4	Dojiram	Bhekari	4	70	M	Village Kote post Chabar karauli	Kote Mine	45	DOTS Completed
5	Parbhati	Heera	5	65	M	Village Kote post Chabar karauli	Kote Mine	45	DOTS Completed
6	Saroop	Heera	6	55	M	Village Kote post Chabar karauli	Kote Mine	20	DOTS Completed
7	Hansram	Balkisan	7	55	M	Village Chabar	Chabar Mine	20	DOTS Completed
8	Mavasi	Mangal	8	55	M	Village Chabar	Chabar Mine	36	DOTS Completed
9	Bharatlal	Mangilal	9	40	M	Village Chabar	Chabar Mine	19	DOTS Completed
10	Ramdayal	Sugan	10	65	M	Village Chabar	Chabar Mine	45	DOTS Completed
11	Sualal	Sugan	11	55	M	Village Chabar	Chabar Mine	30	DOTS Completed
12	Ramphool	Buddu	12	55	M	Village Kote post Chabar karauli	Kote Mine	35	DOTS Completed
13	Amarsingh	Sarua	13	40	M	Village Chabar	Chabar Mine	25	DOTS Completed
14	Mohan	Jawali	14	50	M	Village Chabar	Chabar Mine	30	DOTS Completed
15	Pappu	Budha	15	40	M	Village Chabar	Chabar Mine	20	DOTS Completed
16	Sohanlal	Sukua	16	50	M	Village Chabar	Chabar Mine	20	DOTS Completed

17	Simbhu	Sampat	17	48	M	Village Chabar	Chabar Mine	22	No
18	Hansram	Pankhi Meena	18	41	M	Village Chabar	Chabar Mine	15	Completed
19	Ramesh	Ramkhiladi	19	45	M	Village Chabar	Chabar Mine	30	Completed
20	Ramkumar	Jinshi	20	43	M	Village Chabar	Chabar Mine	25	Yes
21	Babloo	Basanta	21	30	M	Chabar	Chabar Mine	12	Yes
22	Longi	Jagan	22	55	M	Chabar	Chabar Mine	35	Yes
23	Devilal	Manka	23	55	M	Chabar	Chabar Mine	35	Yes
24	Prahlad	Poonya	24	40	M	Chabar	Chabar Mine	20	No
25	Ballu	Ramfool	25	45	M	Chabar	Chabar Mine	25	Yes
26	Ramesh	Sunder	26	55	M	Chabar	Chabar Mine	35	Yes
27	Motilal	Mangi	27	50	M	Chabar	Chabar Mine	30	Yes
28	Deviram	Budhu	28	60	M	Chabar	Chabar Mine	40	Yes
29	Kalua	Chirmoli	29	48	M	Chabar	Chabar Mine	30	No
30	Halke	Syoji	30	50	M	Chabar	Chabar Mine	30	Yes
31	Laxman	Bhabooti	31	39	M	Chabar	Chabar Mine	28	Yes
32	Ramjilal	Bhabooti	32	60	M	Chabar	Chabar Mine	40	Yes
33	Sualal	Sanoo	33	55	M	Chabar	Chabar Mine	30	Yes
34	Chotelal	Bhabooti	34	55	M	Chabar	Chabar Mine	30	Yes
35	Ramkhiladi	Ratanlal	35	65	M	Chabar	Chabar Mine	40	Yes
36	Gullu	Tunda	36	60	M	Chabar	Chabar Mine	35	Yes
37	Ramraj	Mannu	37	55	M	Ratiyapura	Ratiyapura	30	Yes
38	Sharan	Bhola	38	55	M	Ratiyapura	Ratiyapura	40	Yes

39	Jamnalal	Parsadi	39	40	M	Ratiyapura	Ratiyapura	25	Yes
40	Antu	Parsadi	40	50	M	Ratiyapura	Ratiyapura	30	Yes
41	Gaurilal	Moola	41	58	M	Saankda	Saankda	42	Yes
42	Dilip	Ashok	42	32	M	Saankda	Saankda	8	No
43	Raju	Aala	43	40	M	Saankda	Saankda	20	Yes
44	Hakim	Khiladi	44	35	M	Saankda	Saankda	11	Yes
45	Mohansingh	Durga	45	38	M	Saankda	Saankda	15	Yes
46	Bhoorsingh	Battu	46	22	M	Saankda	Saankda	5	No
47	Hemu	Hari	47	22	M	Saankda	Saankda	5	No
48	Mukesh	Shivlal	48	32	M	Saankda	Saankda	9	No
49	Shivsingh	Hajari	49	25	M	Saankda	Saankda	8	No
50	Jagram	Jaggannath	50	27	M	Saankda	Saankda	10	Yes
51	Jaggannath	Kalli	51	48	M	Saankda	Saankda	25	Yes
52	Vishnu	Ramjilal	52	37	M	Saankda	Saankda	13	No
53	Lakhan	Babu	53	28	M	Saankda	Saankda	10	Yes
54	Chothilal	Ramratan	54	55	M	Saankda	Saankda	40	Yes
55	Sattu	Noraya	55	52	M	Saankda	Saankda	35	Yes
56	Mahesh	Babulal	56	29	M	Saankda	Saankda	11	No
57	Mukesh	Sunder	57	28	M	Saankda	Saankda	10	No
58	Sunder	Kalli	58	50	M	Saankda	Saankda	35	Yes
59	Ramdhan	Kishore	59	41	M	Saankda	Saankda	18	Yes
60	Ramsingh	Lokhariya	60	51	M	Saankda	Saankda	40	Yes

61	Kishore	Noraya	61	65	M	Saankda	Saankda	35	Yes
62	Brijlal	Devichand	62	50	M	Saankda	Saankda	30	Yes
63	Harisingh	Motilal	63	38	M	Saankda	Saankda	15	No
64	Halke	Birbal	64	40	M	Saankda	Saankda	20	Yes
65	Brijmohan	Babu	65	34	M	Saankda	Saankda	12	No
66	Brahma	Ramjilal	66	23	M	Saankda	Saankda	8	No
67	Roshan	Kishanlal	67	26	M	Saankda	Saankda	10	No
68	Mangal	Durga	68	28	M	Saankda	Saankda	10	No
69	Shivlal	Bhajan	69	50	M	Saankda	Saankda	30	Yes
70	Prakash	Murari	70	30	M	Saankda	Saankda	8	No
71	Vishnu	Battu	71	27	M	Saankda	Saankda	8	No
72	Gaurishankar	Hajari	72	32	M	Saankda	Saankda	15	Yes
73	Meghram	Ramsingh	73	30	M	Saankda	Saankda	10	No
74	Rupa	Ramcharan	74	45	M	Saankda	Saankda	25	Yes
75	Jagmohan	Ramjilal	75	50	M	Saankda	Saankda	20	Yes
76	Bharatlal	Kajora	76	46	M	Saankda	Saankda	15	Yes
77	Dharamsingh	Chauthilal	77	39	M	Saankda	Saankda	20	Yes
78	Amarsingh	Beerbal	78	40	M	Saankda	Saankda	16	Yes
79	Rameshwar	Devichand	79	32	M	Saankda	Saankda	10	Yes
80	Saumoti	Jaggannath	80	46	F	Saankda	Saankda	3	No
81	Ramesh	Tuntun	81	40	M	Saankda	Saankda	20	Yes
82	Halke	Beerval	84	35	M	Saankda	Saankda	12	No

83	Dinesh	Gaurilal	85	30	M	Saankda	Saankda	10	No
84	Narayani	Ramjilal	86	49	F	Saankda	Saankda	3	No
85	Ramswroop	Mangal	87	60	M	Ratiyapura	Ratiyapura	40	Yes
86	Shriram	Santokhi	88	38	M	Ratiyapura	Ratiyapura	15	Yes
87	Manroop	Kewal	89	42	M	Ratiyapura	Ratiyapura	20	Yes
88	Kalyan	Parsadi	90	45	M	Ratiyapura	Ratiyapura	20	Yes
89	Ramcharan	Mohanlal	91	58	M	Ratiyapura	Ratiyapura	40	Yes
90	Sukhlal	Gajua	92	60	M	Ratiyapura	Ratiyapura	45	Yes
91	Matarua	Panna	93	54	M	Ratiyapura	Ratiyapura	40	Yes
92	Halke	Chinga	94	36	M	Gadikagav	Gadikagav	19	Yes
93	Rajpal	Sanno	95	48	M	Gadikagav	Gadikagav	35	Yes
94	Kamallal	Bhabuti	96	31	M	Gadikagav	Gadikagav	8	Yes
95	Ramkhiladi	Dooji	97	62	M	Gadikagav	Gadikagav	40	Yes
96	Sayamlal	Visan Meena	98	36	M	Gadikagav	Gadikagav	25	Yes
97	Mukesh	Jagram	99	32	M	Gadikagav	Gadikagav	10	No
98	Rameshwar	Bheroolal	100	32	M	Gadikagav	Gadikagav	10	No
99	Jatan	Ramdhan	101	25	M	Gadikagav	Gadikagav	9	No
100	Meghram	Natholi	102	55	M	Gadikagav	Gadikagav	40	Yes
101	Purushottam	Kangaliya	103	35	M	Gadikagav	Gadikagav	20	Yes
102	Rampal	Murari	104	43	M	Gadikagav	Gadikagav	22	Yes
103	Pyarelal	Ramswroop	105	42	M	Gadikagav	Gadikagav	25	Yes
104	Babulal	Sannu	106	60	M	Gadikagav	Gadikagav	40	Yes

105	Bhartu	Ramlal	107	32	M	Gadikagav	Gadikagav	15	No
106	Bhawarlal	Ramswroop	108	34	M	Gadikagav	Gadikagav	20	Yes
107	Virju	Jagram	109	38	M	Gadikagav	Gadikagav	27	No
108	Chote	Laxman	110	42	M	Gadikagav	Gadikagav	20	No
109	Shivlal	Laxman	111	43	M	Gadikagav	Gadikagav	17	Yes
110	Kajodi	Sannu	112	65	M	Gadikagav	Gadikagav	43	Yes
111	Rogan	Teja	113	50	M	Ratiyapura	Ratiyapura	32	Yes
112	Arjun	Ganesa	114	54	M	Gadikagav	Gadikagav	35	Yes
113	Harilal	Susariya	115	55	M	Gadikagav	Gadikagav	20	Yes
114	Harilal	Ganesa	116	50	M	Gadikagav	Gadikagav	25	Yes
115	Dharma singh	Mannu	117	46	M	Gadikagav	Gadikagav	34	Yes
116	Parmal	Mangal	118	50	M	Gadikagav	Gadikagav	30	Yes
117	Ramprasad	Buddi	119	46	M	Pahadipura (saurya)	Pahadipura	30	Yes
118	Bharoosi	Samaliya	120	50	M	Pahadipura (saurya)	Pahadipura	30	Yes
119	Roopsingh	Simbhu	121	40	M	Pahadipura (saurya)	Pahadipura	28	Yes
120	Harisingh	Indar	122	50	M	Pahadipura (saurya)	Pahadipura	20	Yes
121	Chotelal	Gyarsa	123	48	M	Arampura	Arampura	20	Yes
122	Suresh	Doji	124	42	M	Arampura	Arampura	22	Yes
123	Bhoorsingh	Durga	125	39	M	Arampura	Arampura	28	Yes
124	Rajaram	Johoree	126	37	M	Arampura	Arampura	18	No
125	Vijaysingh	Sarua	127	33	M	Arampura	Arampura	12	Yes
126	Dayaram	Nathua	128	45	M	Arampura	Arampura	25	Yes

127	Harvilash	Cheguriya	129	40	M	Arampura	Arampura	20	Yes
128	Siyaram	Shivlal	130	55	M	Arampura	Arampura	25	Yes
129	Ramswroop	Lokkee	131	42	M	Arampura	Arampura	20	No
130	Misree lal	Ramet	132	48	M	Arampura	Arampura	28	Yes
131	Prbhulal	Visan	133	50	M	Arampura	Arampura	18	Yes
132	Darsan	Sundar	134	50	M	Arampura	Arampura	25	Yes
133	Misree	Sundar	135	42	M	Arampura	Arampura	25	Yes
134	Bahadur	Patram	136	40	M	Arampura	Arampura	10	No
135	Ramkesh	Kelash	137	32	M	Arampura	Arampura	10	Yes
136	Rambabu	Bhabuti	138	36	M	Arampura	Arampura	25	Yes
137	Shrmohar	Durga	139	35	M	Arampura	Arampura	20	Yes
138	Amarlal	Chiguriya	140	50	M	Arampura	Arampura	35	Yes
139	Prakash	Angad	141	46	M	Arampura	Arampura	25	No
140	Ranglal	Durga	142	30	M	Arampura	Arampura	15	Yes
141	Ghansayam	Ratan	143	55	M	Arampura	Arampura	30	Yes
142	Prakash	Khemchand	144	50	M	Arampura	Arampura	20	Yes
143	Prakash	Bhudee	145	55	M	Bhavarpura	Bhavarpura	35	Yes
144	Devilal	Bhudee	146	60	M	Bhavarpura	Bhavarpura	45	Yes
145	Shantilal	Kesariya	147	56	M	Bhavarpura	Bhavarpura	36	No
146	Brajmohan	Indar	148	45	M	Bhavarpura	Bhavarpura	25	Yes
147	Harilal	Sadhu	149	48	M	Bhavarpura	Bhavarpura	25	Yes
148	Jagan	Khetu	150	65	M	Bhavarpura	Bhavarpura	45	Yes

149	Gulab	Balkisan	151	50	M	Bhavarpura	Bhavarpura	40	Yes
150	Ramprasad	Sadhu	152	45	M	Bhavarpura	Bhavarpura	28	Yes
151	Nabal	Moti	153	70	M	Bhavarpura	Bhavarpura	55	Yes
152	Parbhati	Sadhu	154	56	M	Bhavarpura	Bhavarpura	40	Yes
153	Pannu	Gopi	155	45	M	Bhavarpura	Bhavarpura	25	Yes
154	Brajlal	Nandu	156	50	M	Bhavarpura	Bhavarpura	35	Yes
155	Ramadhan	Kamal gurjar	157	52	M	Bhavarpura	Bhavarpura	35	Yes
156	Halke	Ramlal	158	52	M	Bhavarpura	Bhavarpura	28	Yes
157	Halke	Shivnarayan	159	56	M	Gadikagav	Gadikagav	30	Yes
158	Pooran	Ramkisan	160	40	M	Gadikagav	Gadikagav	20	Yes
159	Phoolsingh	Sukhchand	161	42	M	Pahadipura	Pahadipura	28	Yes
160	Rajulal	Mangya	162	55	M	Mamchare	Mamchare	30	Yes
161	Shivcharan	Mangya	163	50	M	Mamchare	Mamchare	35	Yes
162	Haricharan	Mangya	164	65	M	Mamchare	Mamchare	45	Yes
163	Pyarelal	Kundere	165	54	M	Mamchare	Mamchare	25	Yes
164	Ramswroop	Hargayan	166	52	M	Mamchare	Mamchare	30	Yes
165	Ramsingh	Bhorya	167	45	M	Mamchare	Mamchare	18	Yes
166	Shivcharan	Kunkuniya	168	50	M	Mamchare	Mamchare	25	Yes
167	Kailash	Naroti	169	40	M	Mamchare	Mamchare	25	Yes
168	Pooran	Panna	170	40	M	Mamchare	Mamchare	18	Yes
169	Mohanlal	Hargayan	171	46	M	Mamchare	Mamchare	25	Yes
170	Jamnallal	Hargayan	172	47	M	Mamchare	Mamchare	25	Yes

171	Vijay	Visan	173	39	M	Mamchare	Mamchare	23	Yes
172	Shripat	Bhekee	174	50	M	Mamchare	Mamchare	35	Yes
173	Radhey	Tinnuram	175	50	M	Mamchare	Mamchare	30	Yes
174	Jagdes	Tinnuram	176	38	M	Mamchare	Mamchare	25	Yes
175	Bharatlal	Bhorya	177	40	M	Mamchare	Mamchare	20	Yes
176	Ramsahay	Sualal	178	40	M	Mamchare	Mamchare	20	Yes
177	Haribhura	Cheguriya	179	45	M	Mamchare	Mamchare	30	Yes
178	Dayaram	Heera	180	28	M	Mamchare	Mamchare	12	No
179	Munshi	Visanlal	181	30	M	Mamchare	Mamchare	12	No
180	Suresh	Charan	182	40	M	Mamchare	Mamchare	30	Yes
181	Roshan	Ramkhiladi	183	35	M	Mamchare	Mamchare	20	Yes
182	Ramraj	Chothya	184	30	M	Mamchare	Mamchare	15	Yes
183	Bhoora	Bhorya	185	35	M	Mamchare	Mamchare	20	Yes
184	Intulal	Shivnarayan	186	40	M	Mamchare	Mamchare	15	Yes
185	Hansram	Shivnarayan	187	45	M	Mamchare	Mamchare	30	Yes
186	Pooran	Gilori	188	45	M	Mamchare	Mamchare	30	Yes
187	Thandi	Prabhu	189	58	M	Mamchare	Mamchare	40	Yes
188	Ramesh	Shivnarayan	190	50	M	Mamchare	Mamchare	30	Yes
189	Badri	Sukki	191	60	M	Mamchare	Mamchare	35	Yes
190	Bhura	Charan	192	33	M	Mamchare	Mamchare	17	Yes
191	Babulal	Sanvaliya	193	55	M	Mamchare	Mamchare	40	Yes
192	Brijmohan	Chirmoli	194	58	M	Machet	Machet	40	Yes

193	Bispatiya	Saamanta	195	50	M	Machet	Machet	32	Yes
194	Ramdas	Butaram	196	25	M	Machet	Machet	8	No
195	Divarilal	Buddhi	197	30	M	Machet	Machet	13	No
196	Omveer	Butaram	198	35	M	Machet	Machet	18	Yes
197	Shivlal	Buddhu	199	45	M	Machet	Machet	25	Yes
198	Gopal	Pampoli	200	45	M	Machet	Machet	25	Yes
199	Roopchand	Gulab	201	60	M	Machet	Machet	40	Yes
200	Lalsingh	Chunni	202	35	M	Machet	Machet	20	Yes
201	Ramniwas	Ramswroop	203	40	M	Machet	Machet	22	Yes
202	Navalsingh	Sarvan	204	45	M	Machet	Machet	25	Yes
203	Ramfal	Chokha	205	55	M	Machet	Machet	37	No
204	Ramcharan	Gulab	206	65	M	Machet	Machet	40	Yes
205	Jagmohan	Buddhu	207	45	M	Machet	Machet	30	Yes
206	Bhourilal	Kundan	208	60	M	Machet	Machet	40	Yes
207	Murari	Murli	209	60	M	Machet	Machet	42	Yes
208	Kalyan	Mangal	210	60	M	Machet	Machet	41	Yes
209	Ramcharan	Bhajan	211	60	M	Machet	Machet	40	Yes
210	Halli	Sarvan	212	40	M	Machet	Machet	22	No
211	Chetram	Kundan	213	55	M	Machet	Machet	37	Yes
212	Lakhansingh	Motiram	214	35	M	Machet	Machet	15	No
213	Ramlal	Punya	215	65	M	Machet	Machet	43	Yes
214	Bharatlal	Vishna	216	50	M	Machet	Machet	32	Yes

215	Kalyan	Nanga	217	45	M	Machet	Machet	25	No
216	Jaisingh	Ramjilal	218	35	M	Machet	Machet	15	No
217	Rama	Kundan	219	67	M	Machet	Machet	55	Yes
218	Ramraj	Chirmoli	220	50	M	Machet	Machet	30	Yes
219	Lakhan	Bharosi	221	40	M	Machet	Machet	20	Yes
220	Kamalsingh	Sarvan	222	50	M	Machet	Machet	32	Yes
221	Charan	Mangal	223	50	M	Machet	Machet	32	Yes
222	Shrikishan	Kundan	224	65	M	Machet	Machet	45	Yes
223	Vijaysingh	Sohansingh	225	40	M	Sevasingh ka pura, Manchi	Manchi	20	Yes
224	Jaisingh	Sevasingh	226	30	M	Manchi	Manchi	15	No
225	Badrisingh	Madhosingh	227	65	M	Manchi	Manchi	40	Yes
226	Mansingh	Sevasingh	228	55	M	Manchi	Manchi	34	Yes
227	Shaitansingh	Sevasingh	229	65	M	Manchi	Manchi	45	Yes
228	Ummedsingh	Sohansingh	230	55	M	Manchi	Manchi	30	Yes
229	Rajendrasingh	Sevasingh	231	40	M	Manchi	Manchi	20	No
230	Chiranjilal	Vishan	232	65	M	Sasedi	Sasedi	50	Yes
231	Fosu	Jacksan	233	65	M	Sasedi	Sasedi	50	Yes
232	Ramkesh	Badri	234	42	M	Sasedi	Sasedi	27	Yes
233	Ramdayal	Suganram	235	52	M	Sasedi	Sasedi	35	Yes
234	Shridhar	Kashiram	236	60	M	Sasedi	Sasedi	40	Yes
235	Patram	Kishanlal	237	56	M	Sasedi	Sasedi	38	Yes
236	Halke	Kishanlal	238	38	M	Sasedi	Sasedi	19	Yes

237	Hari	Habura	239	58	M	Sasedi	Sasedi	45	Yes
238	Ramjilal	Shrifool	240	58	M	Sasedi	Sasedi	40	Yes
239	Prakash	Batashya	241	56	M	Sasedi	Sasedi	40	Yes
240	Ramkhilladi	Bhajna	242	58	M	Sasedi	Sasedi	40	Yes
241	Kedar	Basanta	243	65	M	Sasedi	Sasedi	40	Yes
242	Veersingh	Basanta	244	60	M	Sasedi	Sasedi	45	Yes
243	Raghubeer	Munkandi	245	46	M	Sasedi	Sasedi	30	Yes
244	Ramraj	Shrifool	246	58	M	Sasedi	Sasedi	40	Yes
245	Ramkishor	Gangadhar	247	50	M	Sasedi	Sasedi	32	Yes
246	Rajpal	Bhajanlal	248	40	M	Sasedi	Sasedi	16	No
247	Charanlal	Durjan	249	40	M	Sasedi	Sasedi	20	Yes
248	Lekhraj	Badri	250	46	M	Sasedi	Sasedi	28	Yes
249	Lahlariya	Haburya	251	60	M	Sasedi	Sasedi	35	Yes
250	Hansram	Ramfool	252	35	M	Padeva	Sankra	8	No
251	Pappu	Misri	253	40	M	Padeva	Sankra	15	Yes
252	Ramphool	Sukamali	254	55	M	Padeva	Sankra	30	Yes
253	Sualal	Suka	255	51	M	Padeva	Sankra	35	Yes
254	Ramswroop	Dauji	256	55	M	Kalyani	Kalyani	40	Yes
255	Hari	Bissu	257	55	M	Kalyani	Kalyani	35	Yes
256	Ramdhan	Dauji	258	55	M	Kalyani	Kalyani	35	Yes
257	Prahlad	Ramjilal	259	35	M	Bhadravati Nadi	Sankda	10	No
258	Bhagwansingh	Sarvan	260	40	M	Rajour	Rajour	20	Yes

259	Bhorilal	Suganlal	261	60	M	Surari Khurd, Dholpur	Surari	32	Yes
260	Shrichand	Kesariya	262	63	M	Karsai	Karsai	45	Yes
261	Gangavishan	Bhambai	263	60	M	Saurya	Saurya	30	Yes
262	Prahlad	Basanta	264	42	M	Gujar Bhavli	Gujar Bhavli	23	Yes
263	Harkesh	Bhambu Ram	265	57	M	Barrif Ki Jhounpdi	Sankda	40	Yes
264	Ramsingh	Jauhri	266	35	M	Rampur	Sankda	15	Yes
265	Ramcharan	Samnta	267	56	M	Ladaurkala	Ladaur	18	Yes
266	Sitaram	Jhniguriya	268	42	M	Manakhur	Manakhur	26	Yes
267	Babu	Nathua	269	60	M	Kurgaon	Gerai	22	Yes
268	Onkar	Niroti	270	48	M	Gadoli	Machani	30	Yes
269	Jeevan	Kishori	271	50	M	Bichpuri	Bichpuri	20	Yes
270	Ramlal	Vishnya	272	45	M	Manoharpura	Langra	20	Yes
271	Govind	Ramprasad M	273	45	M	Patar, Harnagar	Harnagar	20	Yes
272	Devilal	Hariyal Mali	274	42	M	Dhher	Gadhikagav	18	Yes
273	Bhanvar	Dhaniram	275	45	M	Dhher	Gadhikagav	20	Yes
274	Girraj	Hariyal	276	42	M	Dhher	Gadhikagav	20	Yes
275	Raju	Moti	277	38	M	Baliyan ka Pura	Sankda	15	Yes
276	Bharat	Ramjilal	278	39	M	Bhdravati Nadi	Sankda	15	Yes
277	Bhartu	Shivlal	279	34	M	Saurya	Saurya	20	Yes
278	Gopi	Rama	280	55	M	Longatiyan Ka Pura	Chabar Mine	30	Yes
279	Rooplal	Natholi	281	46	M	Longatiyan Ka Pura	Chabar Mine	20	Yes
280	Bhartlal	Parma	282	43	M	Fulwada	Chabar Mine	12	Yes

281	Bhanwarsingh	Mularam	283	45	M	Fulwada	Chabar Mine	17	Yes
282	Ramdev	Hukma	284	65	M	Fulwada	Chabar Mine	40	Yes
283	Jhandu	Mangya	285	76	M	Longatiyan Ka Pura	Chabar Mine	50	Yes
284	Chunni	Mangya	286	75	M	Longatiyan Ka Pura	Chabar Mine	48	Yes
285	Hiralal	Mangya	287	53	M	Longatiyan Ka Pura	Chabar Mine	22	Yes
286	Ramcharan	Sugna	288	56	M	Bandh ka Nagla	Chabar Mine	18	Yes
287	Mohanlal	Mangya	289	50	M	Longatiyan Ka Pura	Chabar Mine	20	Yes
288	Hemraj	Kistorchand	290	40	M	Longatiyan Ka Pura	Chabar Mine	25	Yes
289	Ganpat	Chunnilal	291	40	M	Longatiyan Ka Pura	Chabar Mine	20	Yes
290	Motilal	Mangya	292	60	M	Longatiyan Ka Pura	Chabar Mine	40	Yes
291	Rajendra	Mohanlal	293	30	M	Longatiyan Ka Pura	Chabar Mine	18	No
292	Vijaysingh	Chunnilal	294	46	M	Longatiyan Ka Pura	Chabar Mine	25	Yes
293	Shankar	Laxman	295	46	M	Gadikagav	Gadikagav	20	Yes
294	Prabhu	Dauji	296	46	M	Arapura	Arapura	25	Yes
295	Prabhulal	Ramswroop	297	45	M	Saurya	Saurya	30	Yes
296	Pappu	Ramswroop	298	42	M	Saurya	Saurya	25	Yes
297	Amarlal	Bhauna	299	50	M	Ratiyapura	Ratiyapura	25	Yes
298	Ramchand	Rambal	300	45	M	Ratiyapura	Ratiyapura	20	Yes
299	Ramfal	Habura	301	65	M	Sasedi	Sasedi	45	Yes
300	Gulab	Sannu	302	48	M	Gadikagav	Gadikagav	25	Yes
301	Hari	Nathua	303	54	M	Sankda	Sankda	31	Yes
302	Ramphool	Buddhu	304	55	M	Kote	Kote	35	Yes

303	Jagan	Buddhu	305	60	M	Kote	Kote	40	Yes
304	Ramjeet	Gajua	306	55	M	Ratiyapura	Ratiyapura	30	Yes
305	Ramdev	Bharosi	307	30	M	Kosara	Kosara	15	Yes
306	Bachhu	Foolchand	308	55	M	Sasedi	Sasedi	30	Yes
307	Shrilal	Bhambal	309	50	M	Saurya	Saurya	35	Yes
308	Briju	Ramratan	310	40	M	Najir ka Mandir	Khohri	20	Yes
309	Parsadi	Ramratan	311	50	M	Najir ka Mandir	Khohri	25	Yes
310	Ramraj	Kalyan	312	42	M	Pahadipura	Saurya	20	Yes
311	Purshottam	Kangaliya	313	43	M	Gadikagav	Gadikagav	22	No
312	Sarvan Lal	Shyama Mali	314	57	M	Mahu	Langra	40	Yes
313	Gajanand	Girvar	315	48	M	Chabar	Chabar	10	Yes
314	Kalyan	Sillu	316	45	M	Chabar	Chabar	30	Yes

Annexure - 2

Details of x-rays findings and diagnosis of individual persons

Sr. No.	Patient Name	X-ray No.	Age	Sex	Name of Mine	Mine Work Exposure	X-ray Findings					Results
							Quality	Small Opacity		Large Opacity	Other Abnormality	
								Shape & Size	Profusion			
1	Devilal	1	40	M	Kote Mine	20	3	r/r	3/3		ax	Silicosis
2	Maganlal	2	43	M	Kote Mine	15	2		0/0			Within Normal Limits
3	Mangal	3	55	M	Kote Mine	40	3	q/q	1/1		tb	Silicotuberculosis
4	Dojiram	4	70	M	Kote Mine	45	3	r/r	3/+	A	ax	Silicosis with PMF
5	Parbhathi	5	65	M	Kote Mine	45	3	r/r	2/2		ax, cg, tb	Silicotuberculosis
6	Saroop	6	55	M	Kote Mine	20	3	q/r	1/2		cg, tb	Silicotuberculosis
7	Hansram	7	55	M	Chabar Mine	20	3	r/r	2/2			Silicosis
8	Mavasi	8	55	M	Chabar Mine	36	3	r/r	3/3		ax	Silicosis
9	Bharatlal	9	40	M	Chabar Mine	19	3	q/q	1/0		tb	Suspected Silicosis
10	Ramdayal	10	65	M	Chabar Mine	45	3	r/r	2/3	B	cg, ax	Silicosis with PMF
11	Sualal	11	55	M	Chabar Mine	30	3	q/q	1/0		tb, es, cg, ef	Suspected Silicosis
12	Ramphool	12	55	M	Kote Mine	35	3	r/r	3/2		ax	Silicosis
13	Amarsingh	13	40	M	Chabar Mine	25	3		0/0		tb	Old Healed TB

14	Mohan	14	50	M	Chabar Mine	30	3	r/r	2/1	C	ax, di	Silicosis with PMF
15	Pappu	15	40	M	Chabar Mine	20	3		0/0			Within Normal Limits
16	Sohanlal	16	50	M	Chabar Mine	20	2	q/q	1/1		tb	Silicotuberculosis
17	Simbhu	17	48	M	Chabar Mine	22	3	r/r	1/0		tb, ef	Suspected Silicosis
18	Hansram	18	41	M	Chabar Mine	15	2		0/0			Within Normal Limits
19	Ramesh	19	45	M	Chabar Mine	30	3	r/r	2/3		ax,em, tb, di	Silicotuberculosis
20	Ramkumar	20	43	M	Chabar Mine	25	2	r/r	2/3			Silicosis
21	Babloo	21	30	M	Chabar Mine	12	3	r/r	2/2		ax	Silicosis
22	Longi	22	55	M	Chabar Mine	35	UR					Repeat X-ray
23	Devilal	23	55	M	Chabar Mine	35	3		0/0		pi, tb	Old Healed TB
24	Prahlad	24	40	M	Chabar Mine	20	3		0/0		tb	Old Healed TB
25	Ballu	25	45	M	Chabar Mine	25	2		0/0		px	Pneumothorax
26	Ramesh	26	55	M	Chabar Mine	35	3		0/0			Within Normal Limits
27	Motilal	27	50	M	Chabar Mine	30	2		0/0			Within Normal Limits
28	Deviram	28	60	M	Chabar Mine	40	3	q/r	2/2		tb	Silicotuberculosis
29	Kalua	29	48	M	Chabar Mine	30	3	r/r	1/0			Suspected Silicosis
30	Halke	30	50	M	Chabar Mine	30	3		0/0		tb	Old Healed TB
31	Laxman	31	39	M	Chabar Mine	28	3	q/q	1/1			Silicosis
32	Ramjilal	32	60	M	Chabar Mine	40	3	r/r	3/3		ax	Silicosis
33	Sualal	33	55	M	Chabar Mine	30	3	r/r	3/3		ax	Silicosis
34	Chotelal	34	55	M	Chabar Mine	30	3	q/q	1/2		pi	Silicosis
35	Ramkhiladi	35	65	M	Chabar Mine	40	3		0/0			Within Normal Limits

36	Gullu	36	60	M	Chabar Mine	35	3	r/r	3/+		ax	Silicosis
37	Ramraj	37	55	M	Ratiyapura	30	2	q/r	2/1		tb	Silicotuberculosis
38	Sharan	38	55	M	Ratiyapura	40	UR					Repeat X-ray
39	Jamnalal	39	40	M	Ratiyapura	25	2		0/0			Within Normal Limits
40	Antu	40	50	M	Ratiyapura	30	3	q/q	1/2		pi	Silicosis
41	Gaurilal	41	58	M	Saankda	42	2		0/0			Within Normal Limits
42	Dilip	42	32	M	Saankda	8	2		0/0			Within Normal Limits
43	Raju	43	40	M	Saankda	20	3		0/0			Within Normal Limits
44	Hakim	44	35	M	Saankda	11	3		0/0			Within Normal Limits
45	Mohansingh	45	38	M	Saankda	15	3	q/q	1/0			Suspected Silicosis
46	Bhoorsingh	46	22	M	Saankda	5	3		0/0			Within Normal Limits
47	Hemu	47	22	M	Saankda	5	3		0/0			Within Normal Limits
48	Mukesh	48	32	M	Saankda	9	3		0/0			Within Normal Limits
49	Shivsingh	49	25	M	Saankda	8	2		0/0			Within Normal Limits
50	Jagram	50	27	M	Saankda	10	2		0/0			Within Normal Limits
51	Jaggannath	51	48	M	Saankda	25	3		0/0		tb	Old Healed TB
52	Vishnu	52	37	M	Saankda	13	2		0/0			Within Normal Limits
53	Lakhan	53	28	M	Saankda	10	3		0/0			Within Normal Limits
54	Chothilal	54	55	M	Saankda	40	3	r/r	3/3		ax	Silicosis
55	Sattu	55	52	M	Saankda	35	2		0/0			Within Normal Limits
56	Mahesh	56	29	M	Saankda	11	UR					Repeat X-ray
57	Mukesh	57	28	M	Saankda	10	2		0/0			Within Normal Limits

58	Sunder	58	50	M	Saankda	35	3	q/q	1/2		es, tb, pi	Silicotuberculosis
59	Ramdhan	59	41	M	Saankda	18	2		0/0			Within Normal Limits
60	Ramsingh	60	51	M	Saankda	40	3		0/0			Within Normal Limits
61	Kishore	61	65	M	Saankda	35	3	q/p	1/1			Silicosis
62	Brijlal	62	50	M	Saankda	30	3	r/r	2/2			Silicosis
63	Harisingh	63	38	M	Saankda	15	3		0/0			Within Normal Limits
64	Halke	64	40	M	Saankda	20	3		0/0			Within Normal Limits
65	Brijmohan	65	34	M	Saankda	12	3		0/0			Within Normal Limits
66	Brahma	66	23	M	Saankda	8	3		0/0			Within Normal Limits
67	Roshan	67	26	M	Saankda	10	3		0/0			Within Normal Limits
68	Mangal	68	28	M	Saankda	10	3		0/0			Within Normal Limits
69	Shivlal	69	50	M	Saankda	30	3	q/q	1/1			Silicosis
70	Prakash	70	30	M	Saankda	8	3		0/0			Within Normal Limits
71	Vishnu	71	27	M	Saankda	8	2		0/0			Within Normal Limits
72	Gaurishankar	72	32	M	Saankda	15	3	q/q	1/0			Suspected Silicosis
73	Meghram	73	30	M	Saankda	10	3		0/0			Within Normal Limits
74	Rupa	74	45	M	Saankda	25	2		0/0			Within Normal Limits
75	Jagmohan	75	50	M	Saankda	20	3	q/q	1/1			Silicosis
76	Bharatlal	76	46	M	Saankda	15	3	r/r	2/3		ax	Silicosis
77	Dharamsingh	77	39	M	Saankda	20	3		0/0			Within Normal Limits
78	Amarsingh	78	40	M	Saankda	16	2		0/0			Within Normal Limits
79	Rameshwar	79	32	M	Saankda	10	3		0/0			Within Normal Limits

80	Saumoti	80	46	F	Saankda	3	2		0/0			Within Normal Limits
81	Ramesh	81	40	M	Saankda	20	3	q/q	1/0		pi	Suspected Silicosis
82	Halke	84	35	M	Saankda	12	3		0/0		tb	Old Healed TB
83	Dinesh	85	30	M	Saankda	10	2		0/0			Within Normal Limits
84	Narayani	86	49	F	Saankda	3	2		0/0			Within Normal Limits
85	Ramswroop	87	60	M	Ratiyapura	40	3		0/0		cg, tb	Old Healed TB
86	Shriram	88	38	M	Ratiyapura	15	3	r/q	1/1		tb	Silicotuberculosis
87	Manroop	89	42	M	Ratiyapura	20	3	r/r	3/+		ax	Silicosis
88	Kalyan	90	45	M	Ratiyapura	20	3	q/q	1/0		cg	Suspected Silicosis
89	Ramcharan	91	58	M	Ratiyapura	40	3		0/0		cg, tb	Old Healed TB
90	Sukhlal	92	60	M	Ratiyapura	45	3	q/q	2/2			Silicosis
91	Matarua	93	54	M	Ratiyapura	40	3	r/r	2/2		cg	Silicosis
92	Halke	94	36	M	Gadikagav	19	3	r/r	2/3		ax	Silicosis
93	Rajpal	95	48	M	Gadikagav	35	3	r/r	3/2	C	em	Silicosis with PMF
94	Kamallal	96	31	M	Gadikagav	8	2		0/0			Within Normal Limits
95	Ramkhiladi	97	62	M	Gadikagav	40	3	r/r	2/2		ax, em, di, tb	Silicotuberculosis
96	Sayamlal	98	36	M	Gadikagav	25	3	q/q	1/0		cg , es	Suspected Silicosis
97	Mukesh	99	32	M	Gadikagav	10	2		0/0			Within Normal Limits
98	Rameshwar	100	32	M	Gadikagav	10	2		0/0		tb	Old Healed TB
99	Jatan	101	25	M	Gadikagav	9	2		0/0			Within Normal Limits
100	Meghram	102	55	M	Gadikagav	40	3	r/r	3/3		ax , pi	Silicosis
101	Purushottam	103	35	M	Gadikagav	20	3		0/0			Within Normal Limits

102	Rampal	104	43	M	Gadikagav	22	3		0/0		od	Consolidation in Right middle & lower zone
103	Pyarelal	105	42	M	Gadikagav	25	3		0/0			Within Normal Limits
104	Babulal	106	60	M	Gadikagav	40	3	r/r	2/2		ax	Silicosis
105	Bhartu	107	32	M	Gadikagav	15	3	r/q	2/2			Silicosis
106	Bhawarlal	108	34	M	Gadikagav	20	2		0/0			Within Normal Limits
107	Virju	109	38	M	Gadikagav	27	3		0/0			Within Normal Limits
108	Chote	110	42	M	Gadikagav	20	3		0/0			Within Normal Limits
109	Shivlal	111	43	M	Gadikagav	17	3		0/0		tb	Old Healed TB
110	Kajodi	112	65	M	Gadikagav	43	3	r/r	3/3	B	ax, em, tb	Silicotuberculosis with PMF
111	Rogan	113	50	M	Ratiyapura	32	3		0/0		tb	Old Healed TB
112	Arjun	114	54	M	Gadikagav	35	3	q/q	1/0		tb	Suspected Silicosis
113	Harilal	115	55	M	Gadikagav	20	3	r/r	1/1		cg, tb	Silicotuberculosis
114	Harilal	116	50	M	Gadikagav	25	3	q/q	2/2	B	cg	Silicosis with PMF
115	Dharma singh	117	46	M	Gadikagav	34	3		0/0			Within Normal Limits
116	Parmal	118	50	M	Gadikagav	30	3	r/r	2/2		ax, em, tb	Silicotuberculosis
117	Ramprasad	119	46	M	Pahadipura	30	3	q/q	1/0			Suspected Silicosis
118	Bharoosi	120	50	M	Pahadipura	30	3	r/r	2/2		ax	Silicosis
119	Roopsingh	121	40	M	Pahadipura	28	3	q/q	1/0			Suspected Silicosis
120	Harisingh	122	50	M	Pahadipura	20	3		0/0			Within Normal Limits
121	Chotelal	123	48	M	Arapura	20	3	r/r	3/3		em, tb	Silicotuberculosis
122	Suresh	124	42	M	Arapura	22	3	q/q	1/0			Suspected Silicosis

123	Bhoorsingh	125	39	M	Arapura	28	3		0/0		tb	Old Healed TB
124	Rajaram	126	37	M	Arapura	18	2		0/0			Within Normal Limits
125	Vijaysingh	127	33	M	Arapura	12	2		0/0			Within Normal Limits
126	Dayaram	128	45	M	Arapura	25	3	r/r	2/3		tb	Silicotuberculosis
127	Harvilash	129	40	M	Arapura	20	2		0/0			Within Normal Limits
128	Siyaram	130	55	M	Arapura	25	3	q/q	2/1			Silicosis
129	Ramswroop	131	42	M	Arapura	20	3	q/q	1/0		pi	Suspected Silicosis
130	Misree lal	132	48	M	Arapura	28	3	q/q	1/1		ef	Silicosis
131	Prbhulal	133	50	M	Arapura	18	3	r/r	2/2		ax, tb	Silicotuberculosis
132	Darsan	134	50	M	Arapura	25	3		0/0		pi, cg	Within Normal Limits
133	Misree	135	42	M	Arapura	25	3		0/0			Pleural thickening in Right lower zone
134	Bahadur	136	40	M	Arapura	10	3		0/0			Within Normal Limits
135	Ramkesh	137	32	M	Arapura	10	2		0/0			Within Normal Limits
136	Rambabu	138	36	M	Arapura	25	3		0/0			Within Normal Limits
137	Shrmohar	139	35	M	Arapura	20	UR					Repeat X-ray
138	Amarlal	140	50	M	Arapura	35	3	q/q	1/0		es	Suspected Silicosis
139	Prakash	141	46	M	Arapura	25	2	q/q	1/1			Silicosis
140	Ranglal	142	30	M	Arapura	15	3		0/0			Within Normal Limits
141	Ghansayam	143	55	M	Arapura	30	2	r/r	3/3	B	em, ax , cn, es	Silicosis with PMF
142	Prakash	144	50	M	Arapura	20	3	q/q	1/1			Silicosis
143	Prakash	145	55	M	Bhavarapura	35	3	q/q	2/2		cg , es	Silicosis
144	Devilal	146	60	M	Bhavarapura	45	UR					Repeat X-ray

145	Shantilal	147	56	M	Bhavarapura	36	2		0/0			Within Normal Limits
146	Brajmohan	148	45	M	Bhavarapura	25	3		0/0			Within Normal Limits
147	Harilal	149	48	M	Bhavarapura	25	3		0/0			Within Normal Limits
148	Jagan	150	65	M	Bhavarapura	45	3		0/0		tb	Old Healed TB
149	Gulab	151	50	M	Bhavarapura	40	3	q/q	2/1		tb	Silicotuberculosis
150	Ramprasad	152	45	M	Bhavarapura	28	UR					Repeat X-ray
151	Nabal	153	70	M	Bhavarapura	55	3	r/r	1/1		em, ax, tb	Silicotuberculosis
152	Parbhati	154	56	M	Bhavarapura	40	UR					Repeat X-ray
153	Pannu	155	45	M	Bhavarapura	25	3	r/r	2/2		cg, es	Silicosis
154	Brajlal	156	50	M	Bhavarapura	35	3	q/q	1/1			Silicosis
155	Ramdhan	157	52	M	Bhavarapura	35	3	r/r	3/2	A	ax	Silicosis with PMF
156	Halke	158	52	M	Bhavarapura	28	3	q/r	3/2		ax	Silicosis
157	Halke	159	56	M	Gadikagav	30	UR					Repeat X-ray
158	Pooran	160	40	M	Gadikagav	20	UR					Repeat X-ray
159	Phoolsingh	161	42	M	Pahadipura	28	3		0/0		tb	Old Healed TB
160	Rajulal	162	55	M	Mamchare	30	3	r/r	3/+		ax	Silicosis
161	Shivcharan	163	50	M	Mamchare	35	3	q/q	2/2			Silicosis
162	Haricharan	164	65	M	Mamchare	45	3	r/r	3/+	B	ax	Silicosis with PMF
163	Pyarelal	165	54	M	Mamchare	25	3	r/q	2/2			Silicosis
164	Ramswroop	166	52	M	Mamchare	30	3	p/q	1/1		tb	Silicotuberculosis
165	Ramsingh	167	45	M	Mamchare	18	3	r/r	1/2		bu, em, di	Silicosis
166	Shivcharan	168	50	M	Mamchare	25	3	r/r	3/2	B	ax	Silicosis with PMF

167	Kailash	169	40	M	Mamchare	25	3		0/0		pi	Within Normal Limits
168	Pooran	170	40	M	Mamchare	18	3		0/0			Within Normal Limits
169	Mohanlal	171	46	M	Mamchare	25	3	q/q	2/2		ax	Silicosis
170	Jamnalal	172	47	M	Mamchare	25	3		0/0			Within Normal Limits
171	Vijay	173	39	M	Mamchare	23	3	q/q	1/1			Silicosis
172	Shripat	174	50	M	Mamchare	35	3	r/r	1/1		cg	Silicosis
173	Radhey	175	50	M	Mamchare	30	3		0/0			Within Normal Limits
174	Jagdes	176	38	M	Mamchare	25	3	q/q	1/1		pi	Silicosis
175	Bharatlal	177	40	M	Mamchare	20	UR					Repeat X-ray
176	Ramsahay	178	40	M	Mamchare	20	2		0/0			Within Normal Limits
177	Haribhura	179	45	M	Mamchare	30	3	q/q	1/0			Suspected Silicosis
178	Dayaram	180	28	M	Mamchare	12	3		0/0			Within Normal Limits
179	Munshi	181	30	M	Mamchare	12	3		0/0			Within Normal Limits
180	Suresh	182	40	M	Mamchare	30	3	r/r	3/3		ax	Silicosis
181	Roshan	183	35	M	Mamchare	20	3		0/0			Within Normal Limits
182	Ramraj	184	30	M	Mamchare	15	2		0/0			Within Normal Limits
183	Bhoora	185	35	M	Mamchare	20	3	q/q	2/1			Silicosis
184	Intulal	186	40	M	Mamchare	15	3	r/r	1/1		tb	Silicotuberculosis
185	Hansram	187	45	M	Mamchare	30	2	r/r	3/3	B	ax, em	Silicosis with PMF
186	Pooran	188	45	M	Mamchare	30	3	r/r	3/3	B	ax, em	Silicosis with PMF
187	Thandi	189	58	M	Mamchare	40	3		0/0		tb	Old Healed TB
188	Ramesh	190	50	M	Mamchare	30	3	q/q	1/1		tb	Silicotuberculosis

189	Badri	191	60	M	Mamchare	35	3	r/r	3/+	B	ax, cn, cg	Silicosis with PMF
190	Bhura	192	33	M	Mamchare	17	3		0/0			Within Normal Limits
191	Babulal	193	55	M	Mamchare	40	3		0/0			Within Normal Limits
192	Brijmohan	194	58	M	Machet	40	3		0/0			Within Normal Limits
193	Bispatiya	195	50	M	Machet	32	3	q/r	2/2			Silicosis
194	Ramdas	196	25	M	Machet	8	3		0/0			Within Normal Limits
195	Divarilal	197	30	M	Machet	13	3		0/0			Within Normal Limits
196	Omveer	198	35	M	Machet	18	3		0/0			Within Normal Limits
197	Shivlal	199	45	M	Machet	25	3		0/0			Within Normal Limits
198	Gopal	200	45	M	Machet	25	3	r/r	2/2		ax, tb	Silicotuberculosis
199	Roopchand	201	60	M	Machet	40	3	r/r	1/1			Silicosis
200	Lalsingh	202	35	M	Machet	20	3		0/0			Within Normal Limits
201	Ramniwas	203	40	M	Machet	22	3		0/0			Within Normal Limits
202	Navalsingh	204	45	M	Machet	25	3		0/0			Within Normal Limits
203	Ramfal	205	55	M	Machet	37	3		0/0		od	Consolidation in Right lower zone
204	Ramcharan	206	65	M	Machet	40	3		0/0		tb	Old Healed TB
205	Jagmohan	207	45	M	Machet	30	3		0/0			Within Normal Limits
206	Bhourilal	208	60	M	Machet	40	3		0/0			Within Normal Limits
207	Murari	209	60	M	Machet	42	3		0/0		tb	Old Healed TB
208	Kalyan	210	60	M	Machet	41	UR					Repeat X-ray
209	Ramcharan	211	60	M	Machet	40	3		0/0		pi	Within Normal Limits
210	Halli	212	40	M	Machet	22	3	q/q	1/2			Silicosis

211	Chetram	213	55	M	Machet	37	3	r/r	3/3	B	ax	Silicosis with PMF
212	Lakhansingh	214	35	M	Machet	15	3		0/0		pi	Within Normal Limits
213	Ramlal	215	65	M	Machet	43	3	r/r	1/1		tb	Silicotuberculosis
214	Bharatlal	216	50	M	Machet	32	3		0/0			Within Normal Limits
215	Kalyan	217	45	M	Machet	25	3	q/q	1/0			Suspected Silicosis
216	Jaisingh	218	35	M	Machet	15	3		0/0		pi	Within Normal Limits
217	Rama	219	67	M	Machet	55	3	r/r	2/3		ax, em, cg, es	Silicosis
218	Ramraj	220	50	M	Machet	30	3		0/0			Within Normal Limits
219	Lakhan	221	40	M	Machet	20	2		0/0			Within Normal Limits
220	Kamalsingh	222	50	M	Machet	32	3	q/q	1/1			Silicosis
221	Charan	223	50	M	Machet	32	3	r/r	1/1		tb	Silicotuberculosis
222	Shrikishan	224	65	M	Machet	45	3		0/0		tb	Old Healed TB
223	Vijaysingh	225	40	M	Manchi	20	2		0/0			Within Normal Limits
224	Jaisingh	226	30	M	Manchi	15	3		0/0			Within Normal Limits
225	Badrisingh	227	65	M	Manchi	40	UR					Repeat X-ray
226	Mansingh	228	55	M	Manchi	34	UR					Repeat X-ray
227	Shaitansingh	229	65	M	Manchi	45	3		0/0			Within Normal Limits
228	Ummedsingh	230	55	M	Manchi	30	3		0/0			Within Normal Limits
229	Rajendrasingh	231	40	M	Manchi	20	3		0/0			Within Normal Limits
230	Chiranjilal	232	65	M	Sasedi	50	3	r/r	3/3		ax	Silicosis
231	Fosu	233	65	M	Sasedi	50	3	r/r	1/1		tb	Silicotuberculosis
232	Ramkesh	234	42	M	Sasedi	27	3	r/r	3/3	B	ax, es	Silicosis with PMF

233	Ramdayal	235	52	M	Sasedi	35	3	r/r	2/2		ax	Silicosis
234	Shridhar	236	60	M	Sasedi	40	3	r/r	2/2	B	ax	Silicosis with PMF
235	Patram	237	56	M	Sasedi	38	3	q/r	2/2		tb	Silicotuberculosis
236	Halke	238	38	M	Sasedi	19	3	q/q	2/2			Silicosis
237	Hari	239	58	M	Sasedi	45	3	r/r	3/3		ax	Silicosis
238	Ramjilal	240	58	M	Sasedi	40	3	r/r	3/2			Silicosis
239	Prakash	241	56	M	Sasedi	40	3	r/r	2/3		ax	Silicosis
240	Ramkhiladi	242	58	M	Sasedi	40	3	q/q	1/2			Silicosis
241	Kedar	243	65	M	Sasedi	40	3	q/q	2/1			Silicosis
242	Veersingh	244	60	M	Sasedi	45	3	r/r	3/3		ef	Silicosis
243	Raghubeer	245	46	M	Sasedi	30	3	q/q	1/0		ef	Suspected Silicosis with Consolidation and Pleural
244	Ramraj	246	58	M	Sasedi	40	3		0/0		tb	Old healed tb
245	Ramkishor	247	50	M	Sasedi	32	3	q/q	1/1			Silicosis
246	Rajpal	248	40	M	Sasedi	16	2	r/r	3/3		ax	Silicosis
247	Charanlal	249	40	M	Sasedi	20	3	q/q	2/1			Silicosis
248	Lekhraj	250	46	M	Sasedi	28	3	q/q	3/3		ax	Silicosis
249	Lahlariya	251	60	M	Sasedi	35	3	r/r	2/3		ax	Silicosis
250	Hansram	252	35	M	Sankra	8	2		0/0			Within Normal Limits
251	Pappu	253	40	M	Sankra	15	2		0/0			Within Normal Limits
252	Ramphool	254	55	M	Sankra	30	3		0/0			Within Normal Limits
253	Sualal	255	51	M	Sankra	35	3		0/0			Within Normal Limits
254	Ramswroop	256	55	M	Kalyani	40	3	q/q	1/1		od	Silicosis

255	Hari	257	55	M	Kalyani	35	UR					Repeat X-ray
256	Ramdhan	258	55	M	Kalyani	35	3	r/q	2/2		ax, cg, tb	Silicotuberculosis
257	Prahlad	259	35	M	Sankda	10	2		0/0			Within Normal Limits
258	Bhagwansingh	260	40	M	Rajour	20	2		0/0			Within Normal Limits
259	Bhorilal	261	60	M	Surari	32	3		0/0		em, tb	Old Healed TB
260	Shrichand	262	63	M	Karsai	45	3	r/r	2/2		tb	Silicotuberculosis
261	Gangavishan	263	60	M	Saurya	30	2		0/0			Within Normal Limits
262	Prahlad	264	42	M	Gujar Bhavli	23	3	q/r	2/2			Silicosis
263	Harkesh	265	57	M	Sankda	40	3	r/r	3/3		ax, cn	Silicosis
264	Ramsingh	266	35	M	Sankda	15	3		0/0		tb	Old healed tb
265	Ramcharan	267	56	M	Ladaur	18	3		0/0		tb	Old Healed TB
266	Sitaram	268	42	M	Manakhur	26	3	r/r	1/1		tb	Silicotuberculosis
267	Babu	269	60	M	Gerai	22	3		0/0		tb	Old healed tb
268	Onkar	270	48	M	Machani	30	3	r/r	3/+	B	ax	Silicosis with PMF
269	Jeevan	271	50	M	Bichpuri	20	3	r/r	3/2		ax	Silicosis
270	Ramlal	272	45	M	Langra	20	UR					Repeat X-ray
271	Govind	273	45	M	Harnagar	20	3		0/0		tb	Old Healed TB
272	Devilal	274	42	M	Gadhikagav	18	3	q/q	2/2			Silicosis
273	Bhanvar	275	45	M	Gadhikagav	20	3	q/q	1/1		ax	Silicosis
274	Girraj	276	42	M	Gadhikagav	20	2		0/0			Within Normal Limits
275	Raju	277	38	M	Sankda	15	3		0/0			Within Normal Limits
276	Bharat	278	39	M	Sankda	15	3		0/0			Within Normal Limits

277	Bhartu	279	34	M	Saurya	20	3		0/0			Within Normal Limits
278	Gopi	280	55	M	Chabar Mine	30	3	q/q	2/1		tb	Silicotuberculosis
279	Rooplal	281	46	M	Chabar Mine	20	3		0/0		tb	Old healed tb
280	Bhartlal	282	43	M	Chabar Mine	12	3		0/0			Within Normal Limits
281	Bhanwarsingh	283	45	M	Chabar Mine	17	3		0/0		tb	Old healed tb
282	Ramdev	284	65	M	Chabar Mine	40	3		0/0		tb	Old Healed TB
283	Jhandu	285	76	M	Chabar Mine	50	3		0/0			Within Normal Limits
284	Chunni	286	75	M	Chabar Mine	48	3		0/0			Within Normal Limits
285	Hiralal	287	53	M	Chabar Mine	22	3	r/r	2/2		cn, tb	Silicotuberculosis
286	Ramcharan	288	56	M	Chabar Mine	18	3		0/0			Within Normal Limits
287	Mohanlal	289	50	M	Chabar Mine	20	3	q/q	1/0			Suspected Silicosis
288	Hemraj	290	40	M	Chabar Mine	25	3	q/q	1/1		tb	Silicotuberculosis
289	Ganpat	291	40	M	Chabar Mine	20	3		0/0		tb	Old healed tb
290	Motilal	292	60	M	Chabar Mine	40	3		0/0		tb	Old healed tb
291	Rajendra	293	30	M	Chabar Mine	18	2		0/0			Within Normal Limits
292	Vijaysingh	294	46	M	Chabar Mine	25	3		0/0			Within Normal Limits
293	Shankar	295	46	M	Gadikagav	20	3	r/r	1/1			Silicosis
294	Prabhu	296	46	M	Arapura	25	3	q/q	1/1		tb	Silicotuberculosis
295	Prabhulal	297	45	M	Saurya	30	3	q/q	2/2		pi	Silicosis
296	Pappu	298	42	M	Saurya	25	3		0/0			Within Normal Limits
297	Amarlal	299	50	M	Ratiyapura	25	3	q/q	1/0			Suspected Silicosis
298	Ramchand	300	45	M	Ratiyapura	20	3	r/r	3/3		ax, em	Silicosis

299	Ramfal	301	65	M	Sasedi	45	3	r/r	1/2			Silicosis
300	Gulab	302	48	M	Gadikagav	25	3	r/r	3/3	B	ax, em, ih	Silicosis with PMF
301	Hari	303	54	M	Sankda	31	3	r/r	1/1		tb	Silicotuberculosis
302	Ramphool	304	55	M	Kote	35	3	r/r	2/2	A	ax	Silicosis with PMF
303	Jagan	305	60	M	Kote	40	3	r/r	3/2		ax	Silicosis
304	Ramjeet	306	55	M	Ratiyapura	30	3		0/0			Within Normal Limits
305	Ramdev	307	30	M	Kosara	15	2		0/0			Within Normal Limits
306	Bachhu	308	55	M	Sasedi	30	3	r/r	1/1			Silicosis
307	Shrilal	309	50	M	Saurya	35	3	r/r	1/1		tb	Silicotuberculosis
308	Briju	310	40	M	Khohri	20	UR					Repeat X-ray
309	Parsadi	311	50	M	Khohri	25	3		0/0			Within Normal Limits
310	Ramraj	312	42	M	Saurya	20	3		0/0		tb	Old Healed TB
311	Purshottam	313	43	M	Gadikagav	22	2		0/0			Within Normal Limits
312	Sarvan Lal	314	57	M	Langra	40	3	r/r	1/2	C	ax, bu	Silicosis with PMF
313	Gajanand	315	48	M	Chabar	10	3		0/0			Within Normal Limits
314	Kalyan	316	45	M	Chabar	30	3		0/0		tb	Old healed tb

0/0 ----- Within Normal Limits

1/0 ----- Suspected Silicosis

1/1 and Above --- Silicosis

UR - Unacceptable for classification purposes

Symbols:

ax -coalescence of small opacities

bu - bulla (e)

cn - calcification in small pneumoconiotic opacities

cg - calcified non-pneumoconiotic nodules or nodes

di - marked distortion of an intrathoracic structure

ef - pleural effusion

em -emphysema

es - eggshell calcification of hilar or mediastinal lymph nodes

px - pnemothorax

tb - tuberculosis

od - other disease or other significant abnormality