

DUSTY MINING



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A study on Lung Health of
Mineworkers in the Thar Desert, India





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Written by

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Foreword

Silicosis is a significant health problem in the stone mines. A common form of pneumoconiosis found in stone mines; silicosis has put lives of thousands of mineworkers on risk. Poor precautionary arrangements, lack of health checkups and delivery of health services and negligence of safety norms have worsened the complexity of situation leading to high prevalence of the disease. At an estimate, 2.5 million people work in mines in Rajasthan out of which some 300,000 work in stone mine sector and are prone to silicosis.

Further, silicosis and tuberculosis are two common respiratory diseases that mineworkers suffer with. Co-existence of silicosis and tuberculosis is known as silico-tuberculosis, prevalence of which is high in stone mines of Rajasthan in particular. Silico-tuberculosis over the years has affected mining community profoundly causing significant social and economic loss.

Since 1994, GRAVIS has been working actively in the area of lung health. Its interventions include providing curative and diagnostic services through a rural hospital, generating health awareness and advocating for occupational health safety.

We believe it is timely to conduct a study that can examine the effectiveness of GRAVIS' interventions on lung health (silicosis and TB) affecting mineworkers, the current extent of problems and provide some guidance for future strategy and to understand what the future action should be. Hence this study has been planned and conducted.

I thank Dr Neetu Sharma for leading the study and a word of sincere gratitude goes to our partner Xertifix, Germany from their financial support. The communities in Thar and GRAVIS team member deserve a special note of thanks for their contributions and support.

I hope that the study is a useful reference to people and organizations working on occupational health in India and around the world.

Prakash Tyagi
Executive Director, GRAVIS





Author's note

India has a disproportionately high burden of chronic respiratory diseases. The increasing contribution of these diseases to the overall disease burden across India and the high rate of health loss from them. Amongst all the states in India, Rajasthan that embraces a majority of the Indian side of the Thar Desert, accounts for the highest instances of lungs and respiratory diseases in the country. Lung health is a matter of grave concern for the poor people who end up working in the stone mines in the state. Demand from the construction industry and need for livelihood opportunities coerce poor and largely unskilled workforce in the Desert to work in extremely challenging environment in the stone mine. Prolonged inhalation of toxic dust that is generated during various processes has adverse and irreversible repercussions on the lung health of workers.

Gramin Vikas Vigyan Samiti (GRAVIS), Rajasthan, as part of its mandate to work towards the integrated community development has been working closely with the mining communities since early 1990s. In addition to the social security, GRAVIS has been focusing on the health of workers and lung health of mineworkers has been high on GRAVIS' agenda. Through the project *Promoting Lung Health in Mineworkers of Thar Desert (PLHMT)* GRAVIS channelised its energies to combat tuberculosis (TB) and silicosis among mineworkers. Present report is based on the study of various lung health issues being faced by the mineworkers, especially TB and silicosis, journey of GRAVIS while making attempts to contain the diseases and making health services accessible to the mineworkers. Amidst all the breakthroughs at the policy front and outreach for health support, the acknowledgement of silicosis as the fatal disease, continues to present a forbidding challenge. And as the outcome of silicosis is also borne by the families of the deceased, rehabilitative and supportive mechanisms for the dependents of the patients are to be re-imagined.

Current nature of lung health crises demands a multidimensional strategy involving direct health support, awareness, surveillance to achieve full compliance, along with social security support to mineworkers. Investment in research and development to achieve the ability to manage and ultimately cure should be the vision, but in the interim, investment in advance technology to evade dust inhalation by the workers and exploration of alternative livelihood options needs to be explored. GRAVIS has a long and onerous journey ahead in the pursuit of improved lung health for the workers that it intends to continue along with existing and prospective partnerships.

The author is immensely grateful to the GRAVIS team for sharing valuable insights and supporting in data gathering, and the mineworkers communities that continue to inspire through their undeterred resilience.

Neetu Sharma, PhD





I. The Lung health:

1. Lung health: a global concern

Different kinds of physical, psychological and social impacts on people may be identified as occupational hazards, however, there are a few with the highest degree of fatal impact on human health and life. Globally, mining is one of the dangerous occupations which lead to hazardous effects on mine workers due to production and dispersion of fine dust. It is heartening to know that most of the mine workers are usually aware how their involvement in mining processes and exposure to and inhalation of the fine particles of the fine dust may jeopardise their lung health for the rest of their lives, and may even lead them to a slow death, mine workers continue to languish in the most unfavourable working conditions. Their penury, lack of skills and opportunities prevent them from exploring any other employment alternatives.

According to the 1994 WHO Declaration on Occupational Health for All, approximately 100 million workers sustain injuries, resulting in 2,00,000 deaths annually due to occupational diseases and accidents¹. As compared to most other manual workers, minework is one of the very few occupations that involve greater work intensity than the general group of workers. Mineworkers face more survival and working pressure than normal workers. Most mines operate 24 hours a day, 7 days per week, and heavy and continuous physical work, the severity of working conditions, workplace injuries and exposure to dust produced are the major causes of morbidity and mortality in mineworkers.

In addition to the physical hazards like trauma, noise-induced hearing loss, heat and humidity effects, that are curable, mine workers are constantly exposed to irreversible and incurable, dust particles and the chemical residue are inhaled by the mineworkers and the same cause severely damaging impact on their respiratory system and lung health. Described as one of the oldest, commonest and deadliest lung occupational diseases, silicosis affects the lungs permanently.

Silicosis and tuberculosis are two commonly found respiratory diseases that mineworkers suffer with. Silicosis is a dust-borne disease that causes irreversible and fatal changes to the lung tissue. Tuberculosis is infectious and caused by mycobacterium tuberculosis. Both silicosis and tuberculosis are potentially life-threatening diseases. While TB can be treated completely with adequate medication, silicosis can only be provided palliative support. Mineworkers suffering with either of these diseases, have a great risk of developing the other disease. Co-existence of silicosis and tuberculosis is known as silico-tuberculosis, prevalence of which is high in stone mines of Rajasthan. Silico-tuberculosis over the years has affected mining community profoundly causing significant social and economic loss.

Silicosis is a significant health problem in the stone mines of Rajasthan. A common form of pneumoconiosis found in Rajasthan mines, silicosis has put the lives of thousands of mineworkers on risk. Poor precautionary arrangements, lack of health checkups and delivery of health services and negligence of safety norms have worsened the complexity of situation leading to high prevalence of the disease. At an estimate, 2.5 million people work in mines in Rajasthan out of which some 300,000 work in stone mine sector and are prone to silicosis.

1. M K Devarajan, Alok Rajan, *Silicosis in Rajasthan: The Trajectory of Policy Response*, vol VI no 42 23, *Economic & Political Weekly*, June 5, 2021,

2. Lung Health in the Thar Desert

A large workforce in the state of Rajasthan is affected by respiratory diseases, or other lung health issues. 2.5 million mineworkers engaged in 64 kinds of metallic and non-metallic mineral extraction activities in the State of Rajasthan. The state accounts for the highest number of silicosis cases every year and thousands of people have been succumbing to it. As per the official government records currently, there are about 16000 silicosis patients in the state of Rajasthan in the year 2021, however, the figures may not be reflective of the exact number of silicosis patients owing to a number of reasons. These figures reflect only those who have been able to get themselves registered online with the Rajasthan State Department of Mines. Silicosis patients have to travel a long and arduous path before they are finally recognised and are certified as silicosis patients and become entitled for any support from the government.

As there is no specific test for the diagnosis of silicosis, it requires multiple visits and test to detect and establish if a person has silicosis. As there is lack of infrastructure and support mechanism that allows workers to tend to their health, a large number of silicosis cases go undetected. The exact number of the silicosis patients in the country and in the state of Rajasthan may be unknown. However, as shown in Table # according to the official online registration portal of the State Government of Rajasthan² the total number of registered cases of silicosis is 1,36,751 as on September 2021, Jodhpur district having the highest number of such cases. However, net certified cases stand only at 16144, indicating that less than 12% cases are actually certified and more than 88% of the cases are either in the process of getting registered and are pending for testing with the relevant medical facilities or have been rejected by the competent authorities.



A stone mine in Thar Desert

2. Silicosis patients Summary Report, <http://silicosis.rajabsthan.gov.in/SummaryReportAlive.aspx>



Table 1- Silicosis in Rajasthan, India

District	Net Registered	Net Registered Cases Pending for Screening At CHC	Net Registered Cases Pending for Screening MB	Net Certified Cases	Net Rejected Cases	Net Disbursed	Net Registered Cases Pending for Payment
Ajmer	8,099	140	56	763	7,343	530	30
Alwar	281	28	5	146	110	81	57
Banswara	1,985	553	1	70	1,361	59	11
Baran	31	3	0	10	18	8	2
Barmer	3,433	150	10	429	2,897	327	49
Bharatpur	10,515	111	31	2,082	8,733	1,430	210
Bhilwara	6,125	537	222	596	4,898	429	39
Bikaner	159	29	1	69	69	37	23
Bundi	342	19	0	232	120	175	28
Chittorgarh	197	2	1	51	148	39	7
Churu	51	0	0	20	32	17	2
Dausa	3,069	203	38	1,124	2,163	432	233
Dhaulpur	17,548	3,847	228	1,047	12,516	727	230
Dungarpur	41	5	0	6	30	4	2
Hanumangarh	4	1	0	0	3	0	0
Jaipur	1,790	137	104	465	1,151	319	79
Jaisalmer	834	41	11	81	704	71	7
Jalore	205	3	0	36	169	30	3
Jhalawar	348	15	2	89	262	64	5
Jhunjhunu	55	3	0	36	16	36	0
Jodhpur	28,935	1,772	653	4,152	22,363	3,000	1,147
Karauli	22,066	292	1,173	2,920	18,786	863	952
Kota	705	37	70	152	476	108	14
Nagaur	3,507	32	3	1,274	2,286	1,172	14
Pali	3,251	1,185	448	748	1,235	294	89
Pratapgarh	41	15	0	10	18	0	8
Rajsamand	2,148	386	190	81	1,494	73	5
Sawai Madhopur	895	87	21	138	661	89	37
Sikar	357	54	1	97	210	79	13
Sirohi	6,774	2,439	742	1,996	2,395	964	234
Sri Ganganagar	9	0	0	0	9	0	0
Tonk	80	10	13	40	25	10	22
Udaipur	12,871	4,008	682	1,049	7,187	984	10
Total	1,36,751	16,144	4,706	20,009	99,888	12,451	3,562



3. Silicosis: slow and silent killer

Silicosis manifests in prolonged illness and painful death. Workers who work in mines, stone quarries and crushers are at the highest risk of becoming victim of this. Artisans engaged in gem cutting, stone carving, sculpture making and polishing industry are also highly prone to this disease. Silicosis poses a major health concern for the mineworkers and other workers who are exposed to silica dusts across the globe. Owing to a number of limitations in reporting systems and data collection, global statistics on the incidence and prevalence of silicosis are not available today. Countries report their own national statistics which, despite the limitations related to under-diagnosis and under-reporting, show the trend of the disease. America's Elimination of Silicosis Initiative considers the burden of silicosis on global health status as substantial³. In fact, in 2000 an estimated 8800 deaths and 486, 000 disability-adjusted life years were attributed to silicosis and these figures do not include the burden from silica-related lung cancer⁴.

Silicosis has a slow onset and it affects the lungs after a continuous exposure to silica dust. The symptoms are not very obvious until the disease has affected the body, especially the lungs to the irreparable and irreversible extent. Discomfort in breathing and continuing work for longer duration may be the initial symptoms, accelerated and acute form of these symptoms may appear after 2 to 10 years post initial exposure that are similar to those of chronic silicosis, but progress at a faster rate.

In India first few cases of silicosis were in 1948 from the Kolar Gold Mines. Given that most of the mineworkers in India remain unorganised, authentic data is not available on the detections of silicosis in India. Further, there is little to no reporting of silicosis despite it being a reportable disease under the Mines Act, 1952 and the Factories Act, 1948, making it incumbent on employers and doctors detecting the disease to report it to designated authorities, and failure of which is a punishable offence. As per the report of Indian Council for Medical Research, there are about 30 lakhs workers in India who are at a high risk of exposure to silica⁵. Out of these, 17 lakhs are in mining/quarrying activities, 6.3 lakhs in glass and mica industry and 6.7 lakhs in metals industry. In addition, 53 lakhs construction workers are also at the risk of silica exposure, that may potentially become a major cause for silicosis.

4. Mining in Thar

Life of desert communities is defined by the unvarying hardship afflicted upon them due to poverty, food and water insecurities and the forbidding climate. It is common knowledge that minework may take an irreversible toll on their health and it is despite that a mineworker and his families are forced to choose an occupation that may potentially ravage the family. For the 2.5 million mineworkers in the Thar Desert, minework is not a choice. Their financial status, demand from the industry coerces them to engage in minework in the absence of any alternative source of employment and livelihood.

There are many occupations in which workers may be exposed to crystalline silica like; mining, quarrying, construction work, glass including fiber glass industry, agriculture work, industries producing metal products etc. However, in the mining work, mine workers are exposed to high levels of silica dust in various processes. Breathing the tiny bits of silica on a regular basis over the years leads to several respiratory issues and lung related health problems for the mine workers. Mineworkers are involved in several categories of work in the mines, and these may range from drilling, hammering, digging, cutting,

3. National Institute for Occupational Safety and Health & Pan American Health Organization,
<https://www.paho.org/hq/dmdocuments/2009/Silicosis%20Fact%20Sheet%20-%20ALGRANTI.pdf#:~:text=Silicosis%20is%20one%20of%20the,burden%20of%20silicosis%20is%20substantial.>

4. Driscoll T, Nelson DI, Steenland K, Leigh J, Concha-Barrientos M, Fingerhut M, Prüss-Üstün A [2005b].

5. The global burden of disease due to occupational carcinogens. *Am J Ind Med* 48:419-431.
Nandini Sharma et al., *Silicosis and silicotuberculosis in India*,
Bulletin of the World Health Organization; Type: Perspectives Article ID: BLT.15.163550

polishing, and grinding. All of these processes lead to production of fine silica particles that are inhaled directly by the workers in the mines. Silica particles that are not inhaled also pose a serious threat to the communities living in and around mining area, as it either settles on the ground or travels through the air, camouflaging with the dust storms that are very common in the Desert. This phenomenon endangers lung health of other women and even small children in the surrounding areas.



Mineworkers' daily life involves navigating the heavy machines and inhaling immeasureable amount of dust

With a large part of it located in the Great Desert of the Thar, Rajasthan is a mineral rich state with abundant availability of limestone, rock phosphate, silica, marble, granite, sandstone, etc. All of these have a market all over the country and the state has become a mining hub from where mined stone is supplied for construction work, big and small, all across the country. Out of the total 5,30,232.93 hectares under mining in the country⁶. The Department of Mines of the State Government of Rajasthan has issued the highest number of mining leases in the country: 189 leases for major minerals, 15,245 for minor minerals, and 17,688 quarry licences, amounting to a total of 33,122 mining leases⁷. Most mineral mines in Rajasthan are privately owned, Both the mines that extract silica-containing minerals, and the industries that process these minerals, are mostly small and in the unorganised sector. A majority of these mines employ a large proportion of their workers from the unorganised sector, and from areas adjoining the mining sites. Mining employs about three million workers, and the building and construction industry employs another 2.3 million in Rajasthan. Most of the sandstone mines and quarries are in the unorganised and small-scale sector. Sandstone mining is done majorly in six districts of the state including Jodhpur, Bundi, Alwar, Bharatpur, Karauli and Bhilwara.

6. http://timesofindia.indiatimes.com/articleshow/36406048.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

7. Indian Bureau of Mines, <https://ibm.gov.in/index.php?c=pages&m=index&id=355>



Mineworkers spend long hours in exacting circumstances

A majority of individual mines employ about 10–30 workers. A large proportion of these workers are unskilled or have acquired skills on the job. It is common practice for workers to start working in the mines from an early age and continue well into their adulthood. They are employed on a daily wage basis, negotiated between the employer and the middleman or an unofficial “contractor.”

Mineworkers and their families get affected from the disease in multiple ways. Most of them are now aware of the fatality of the disease, and that it self makes it traumatic for the mineworkers and their families. Working conditions in the mines are quite challenging – high intensity noise, extreme temperatures, no safety equipment, nonexistent safety gear, etc – make mines the most difficult places to work in. As the mines are open and functional almost 24 hours in a day, mineworkers are expected to work in long shifts, with low compensation hardly enough to feed their families and live a life with dignity. Most of them are either illiterate or have only primary level of formal education and are unable to afford education for children and health care for their families. Despite the recognition of the threats to their health, mineworkers find themselves in a situation wherein they are not even able to get their periodic health checkups done. Those affected by silicosis struggle to continue working in the mines and are discarded by their employers, the mine owners, and are pushed out of the jobs even if they are willing to work. For silicosis affected workers, food security for their families is even a bigger challenge when compared with the disease.

With no cure available for silicosis, loss of life is an unescapable reality for silicosis patients. Silicosis deaths leave most of the families devastated as the loss of the primary breadwinner means unending financial crises for the family members. Silicosis has a slow onset and a prolonged and inevitable heal impact. Most of the mineworkers would have spent a lot of productive time visiting health facilities or taking breaks with loss of payments. Most mineworkers take their last breadth with the burden of high debt that eventually has to be borne by their families they leave behind. The dichotomy is that members of the same family, in the absence of any other alternative end up working in the mines. The acrimonious sequence of silicosis continues to inflict upon their lives for eternity.



5. Policy perspective

The efforts to prevent and respond to silicosis worldwide started as early as in early 1900s. First International Conference on Silicosis was convened by the International Labour Organisation (ILO) in 1930 in Johannesburg, South Africa, to discuss prevention of silicosis that was highly prevalent in miners. The silicosis conferences organized by ILO during the last eight decades have greatly contributed to the advance of respiratory medicine around the world. They have always focused on important current issues, as reflected by the expanding conference themes and titles. In 1992 the same series of conference were named as the International Conference on Occupational Lung Diseases and by 1997, the International Conference on Occupational Respiratory Diseases (ICORD). Over the period of 890 years, the deliberations expanded to include all respiratory diseases associated with the occupational hazards, and reflected on not only the medical aspects of the disease but also looked at it as a an issue relevant to labour welfare and community health.

In India the right to a safe working environment has been recognized by law for more than 100 years. Since the 1920s requirements were established for compensation by employers if workers suffered an injury in the workplace. Subsequently, this was expanded to include occupational diseases, such as silicosis. However, the sum of these efforts has been insufficient to protect public health as witnessed by the high prevalence of silica-related disease and the ubiquity of excessive silica dust exposures in the workplace. With regard to the mines, these are regulated by the Mines Act, 1952 and the rules and regulations framed there under. Despite a bunch of these regulations in place, their enforcement remained a challenge and situation with regard to the status of mineworkers and extent of silicosis continued to worsen.

Closer home, it was not until the Supreme Court of India while hearing the Writ Petition (Civil) No 110/2006 (People's Rights and Social Research Centre (PRASAR) vs Union of India & Others) passed an interim order on 5 March 2009⁸. that adequate attention was paid to the problem of nutrition. Through this order, the Supreme Court of India issued directions to the Union Ministries of Health and Labour and Employment to provide all necessary assistance to the National Human Rights Commission (NHRC) for any action concerning silicosis. In the said order, it further directed that NHRC may make up specific and confirmed cases of persons sufferings from silicosis and recommend providing immediate medical relief to them through the concerned authorities. In cases of death on account of Silicosis, NHRC may facilitate in providing compensation to the families of the diseased through the authorities concerned.

The NHRC upheld that the occupational hazard of silicosis is preventable if the working conditions are properly regulated and proper protective equipment are used. at the same time, once a worker or any other person is affected by silicosis, it is the responsibility of the concerned government departments to take appropriate short-term and long-term measures from the point of view of providing medical facilities and rehabilitation of the victims. NHRC also constituted an Expert Group on Silicosis to assist in devising

8. *People's Rights and Social Res. Centre v/s Union of India (writ petition no. 110 of 2006 came for hearing on March 5, 2009)*



strategies for dealing with this occupational hazard and to evolve necessary preventive, remedial, rehabilitative measures to alleviate the problem faced by the affected workers and their families. Based on the advice of the Expert Group, the Commission prepared a set of recommendations on Preventive, Remedial, Rehabilitative and Compensation aspects of Silicosis⁹. The Expert Groups was of the opinion that the officials of the Union and State Labour Departments across the country are not taking adequate steps to ensure the compliance of statutory requirements. It is the primary responsibility of the concerned officials of these departments to ensure enforcement of the labour laws and make the employers accountable for their legal obligation towards workers. They also need to make all out efforts to prevent silicosis by ensuring all necessary precautionary measures through the employers. Timely diagnosis followed by appropriate medical care of affected workers too needs to be ensured.

Initiatives of the Government of Rajasthan

Despite the fact that central and western parts of India has a concentration of silicosis affected workforce and Rajasthan has the highest number of mines in the country that breed silicosis, it was only in the year 2019 that the Government of Rajasthan expressed an intention to frame a policy to prevent and respond to silicosis in the state. This policy that come to be known as the 'Rajasthan Policy on Pneumoconiosis including Silicosis Detection, Prevention, Control and Rehabilitation' was unveiled in October 2019. The policy acknowledges that the focus needs to be on prevention, as there is no cure of this disease. It declares the ultimate aim is “to provide relief and rehabilitation to affected persons”. The policy covers not only mine workers and their family members but also the “habitants residing in the neighbourhood of mines and industry” who are likely to be exposed to dust which may cause pneumoconiosis.

State Government of Rajasthan provides Rs 3,00,000 as one-time assistance to the affected person after certification and a pension of Rs 1,500 per month and a sum of Rs 2,00,000 to the legal heir or nominee in the event of the death of the victim. There is also a widow pension to wife and benefits under another scheme named *Palanhar*¹⁰. On the death of the pneumoconiosis patient, the government also provides funeral assistance of Rs 10,000 to the dependent. The certification also makes the patients eligible for several social welfare schemes run by state and central government. For instance, the certification makes the patient eligible for all the benefits given to citizens under Below Poverty Line like subsidised ration and free medical care. Eligibility for the *Palanhaar Yojana* which is a monthly cash transfer programme aims to nurture, educate and provide health care to orphans and other vulnerable children in a family setting.

9. NHRC Interventions on Silicosis, 2016, https://nhrc.nic.in/sites/default/files/NHRC_Interventions_on_Silicosis_27122016.pdf

10. <https://palanhaar.rajasthan.gov.in/information.html>



II. GRAVIS: A ray of hope for the mining community in Desert

Health care is one of the most important components of the GRAVIS' interventions with the community, it has been working with for more than three and a half decades. GRAVIS' first encounter with a severe lung health issue among the mineworkers dates back to 1994 when GRAVIS started working to provide social and economic security to the mineworkers and their families. In the absence of any cure of the disease, the most critical aspect of GRAVIS' interventions has been prevention, screening, referral and facilitating compensation for those who have been going through the excruciating pain. Since 1994, GRAVIS proactively oriented its work towards lung health. Major interventions of GRAVIS included providing curative and diagnostic services through a rural hospital, generating health awareness and advocating for occupational health safety.

GRAVIS adopts a holistic approach to its programmes with the mineworkers' community. An all-encompassing strategy and integrated approach to their health and wellbeing involve not only the mineworkers, but also the mine owners, families of miners, women, children, self-help groups of women and concerned government agencies. Lung health related interventions take the form and shape of direct support to the mineworkers, as well as enabling an environment for care, wellbeing and improved health for them and their families. With a specific focus on a gender mainstreaming, GRAVIS has deliberated oriented its interventions to facilitated participation of women and girls at each stage – from planning to execution and follow up. As a large number of women also work in the mines, focus on the specific challenges faced by women assumes importance.

Efforts towards creation of an enabling environment for better lung health, have also manifested in nutritional support to the workers and their families. Financial constraints and inability to grow and consume diverse food for themselves deprives them from the nutritious food and GRAVIS supports the families to access better food and nutrition by supporting them for establishing small horticulture units. Tuberculosis and silicosis are infectious diseases, and since the miners live in crowded places, similar to slums, mainly in unsanitary conditions, they are not able to use the necessary preventive methods and even inadequate medication. Such workers are identified and listed by GRAVIS and provided with additional support.

GRAVIS has been working with the Desert communities, especially the mineworkers and their families for the past two and a half decades or so. On the lung health, GRAVIS' interventions include providing curative and diagnostic services through a rural hospital, generating health awareness and advocating for occupational health safety.

Figure 1- GRAVIS outreach for preventing and addressing silicosis in the Thar

250,000	Workers Benefitted
72,000	People treated for lung diseases
3,000	People treated for TB
550	Outreach medical camps
3	Research studies conducted
200	Health workers trained
4	Satellite Clinic set up
1	Major rural hospital set up
100,000	Outreach for awareness and education on TB Silicosis

Figure 2 - Mining landscape in Jodhpur District

Mining Landscape of Jodhpur District : An Overview	
Mining area	250 Sq. Kms.
Number of mines	12,000
Mine size (quarries)	200 x 100 ft.
Mine depth	6-45 meters
Brisk mining months	November to July
Origin of worker	90% rural
	10% from around city
Workers strength	Men: 60000
	Women: 20000 to 25000
	Children:(Below 18) 30000-35000
Workers caste	Predominantly Scheduled castes/Scheduled Tribes
Major Mining Belt	Chonka, Barli, Kadamkandi, Kaliberi, Soorsagar, Chopasani,
	Kailana, Jodhpur Fort, Kaga, Bhadasia, Balsamand, Mandore,
	Beri Ganga and Daijar

The expanse of GRAVIS work with mineworkers, especially on their lung health, may be classified into three broad and overlapping categories.



A medical camp by GRAVIS



Figure 3 - GRAVIS' interventions on lung health of mineworkers: An Overview

Direct outreach	Research and Advocacy	Partnerships and other supportive activities
Health Screening, diagnostic, medical support, treatments for TB, training for village health workers, provision of protective gear, facilitation of competition amount etc.	Research Studies on impact of silicosis, specific issues faced by women, socio economic challenges, policy on silicosis engagement with the courts, etc.	Working with all concerned government agencies and departments such as department of health, mines and rural development, research agencies provision of nutrition and other social security support to the workers

1. Direct outreach

GRAVIS has directly reached out to more than 250,000 mineworkers living in 4 districts of Western Rajasthan. This outreach has taken the form of screening and diagnostics, provision of medical support, awareness, and other support. By the end of 2020, GRAVIS had provided diagnostic and curative services to over 80000 people with lung diseases and more than 3500 TB patients were treated continuously till TB was entirely eliminated. GRAVIS has also organised about 600 outreach medical camps for mineworkers and their families to ensure that their overall health is fine. However, setting up a rural hospital in the heart of Thar with an advanced lab for lung diseases has been the most crucial aspect of these interventions. A large number people from neighbouring villages visit the hospital on a regular basis. In the absence of accessible public health facilities, this hospital has catered to the rural population of the Desert.

GRAVIS acknowledged the fact that even the rural hospital also may not be within the reach of people considering the long distances, harsh weather and preoccupation of people with their daily wage labour or other important activities at the household level, and set up four satellite health clinics with a doctor, community health workers, basic facilities for screening and primary treatment. These clinics also have proved to be a boon for the population that is usually village bound and may not afford to travel to distant places to seek health support. In addition to providing direct health support, these satellite clinics have played a critical role in detecting TB and silicosis cases on a large scale, such cases would have gone undiagnosed otherwise. Through these satellite clinics several awareness campaigns have also been facilitated with an objective of raising awareness on lung health and preventive strategies.

2. Awareness and trainings

Awareness of mineworkers, sensitisation of mine owners and creation of a cadre of community health professional on occupational lung diseases and health safety have been at the heart of GRAVIS' interventions on lung health. As prevention is the only available means for the mineworkers for combating TB and silicosis, awareness on the tools, precautions and alternative methods to minimise dust inhalation are effective ways for the mineworkers to maintain and protect their lung health. GRAVIS has so far trained 2500 village health workers (VHW) in and around the mining areas of Jodhpur. These VHWs provide community with basic medical and health care. In remote areas where

people do not have access to services for even the most basic health needs, short training courses can provide the population with basic primary care services. They perform a wide range of activities including preventive, promotional and emotive services across issues of drinking water, nutrition, sanitation, disease control etc. Village Health Workers have been equipped with the skills to administer silicosis prevention work with the communities. Special workshops are organised to sensitise VHWs on Silicosis and Tuberculosis. Comprehensive training manuals were prepared to improve the knowledge and develop requisite skills among the VHWs in community-based management of the issue. These VHWs proactively approach TB patients for regular medication, check-ups and help them to maintain nutrition level in the community.



A SHG meeting in mining area

Awareness of the community is a critical aspect of strengthening prevention. Awareness camps, and circulation of information through written materials have been effective strategies for GRAVIS. GRAVIS also publishes a quarterly newsletter *Khan Mazdoor: The mineworkers*, that raises awareness among miners and act as a means for allowing miners to express their opinions. *Khan Mazdoor* has more than 1000 subscriptions per edition and more than 3,000 miners read this newsletter. Some of the issues addressed through various editions of *KHAN Mazdoor* are: general health of miners, occupational diseases and insurance policies, women and occupational medicine, and the human rights of miners. These newsletters continue to be a channel of communication and aids in informing the public and relevant organizations about the current problems faced by miners.

3. Research and advocacy

Constructive and collaborative engagement with the state and non-state actors remained at the centre of all direct and policy interventions of GRAVIS in the context of lung health of the mineworkers. GRAVIS used evidence-based research and networking with state agencies, local organisations and the mine-owners to strengthen its advocacy with the state and operationalisation of progressive elements of

the policy. Several research studies¹¹ were conducted in the initial period of the struggle to understand the silicosis, to fill the knowledge gap that existed on silicosis and ways to prevent and address it. Studies on women miners¹² defied the popular notion of minework as a masculine occupation, and based on the evidence established that over the years statistical data and qualitative research have demonstrated the growing number of women miners across all kinds of mines around the world. The research on women miners challenged the insignificance attached to women miners, as their plight is worse than their male counterparts. Research on the gender aspect of the mineworkers enabled understanding and appreciating the contribution and the needs of the women miners.

Recent studies on silicosis¹³ further expanded the scope of understanding not only on the technical aspects but also on explore the critical policy perspectives, to guide the strategic interventions with miners' communities. Proactive dissemination of research outputs has resulted in generating sensitive responses to the problems of mineworkers, including their lung health. GRAVIS organised meetings, discussions, workshops and public hearings and used them as fora for sharing the mineworkers plight mineworkers to voice their concerns, and to facilitate the dialogues between the community and administration. For instance, the public hearing platform was used as an opportunity to demonstrate mineworkers' concerns about the low wage level, lack of facilities and safety equipment, prevalence of



Women mineworkers

11. See for instance: *Silico-Tuberculosis: Burdening Lives of Miners*, GRAVIS, 2010, <http://www.gravis.org.in/images/Books/silico-tuberculosis%20-%20burdening%20lives%20of%20miners.pdf>, *Silicosis: The Silent Slayer*, GRAVIS, 2007, <http://www.gravis.org.in/images/Books/SILICOSIS%20-%20THE%20SILENT%20SLAYER.pdf>
12. *Tears of Dust*, GRAVIS, 2005, <http://www.gravis.org.in/images/Books/tears%20of%20dust.pdf>; *Women Miners in Rajasthan*, 2010, <http://www.gravis.org.in/images/Books/women%20miners%20in%20rajasthan.pdf>
13. See for example, *Future of Preventing Silicosis*, GRAVIS, <https://mail.google.com/mail/u/1/#search/prakash%40gravis.org.in+mineworker/FMfCGxwLsmgFfJLfcPhBFpfkJJcdVmJD?projector=1&messagePartId=0.1>



bonded labour, addiction and ineffective and inefficient government policies. During these public hearings, mineworkers got the opportunity to direct their concerns and questions and many were resolved on the spot as these public meetings were also attended by government officials, NGOs' representatives, politicians, eminent social activists, journalists and union members.

GRAVIS was successful in reaching out to the state human rights commissions (SHRC) and the district level officers and seek redressal for the grievances raised by the workers. These agencies and authorities then took *suo motu* cognisance of the problems of mineworkers such as increased health hazards due to the increased use of machines in the mining industry, need to provide drinking water facilities, sheds for taking breaks, signboards indicating high risk zones, and health kits availability in the mining area.

4. Strengthening and leveraging policy

Intense involvement with the mineworkers and their families has led to creation of knowledge base and expertise within GRAVIS, not only in health related issues that they face but also from the point of view of creation of a support system for the, this expertise has informed the policy making at state level. In the year 2019, Rajasthan became the first state to adopt a specialise policy on silicosis. Not only the Silicosis policy of the state reflects the some of the recommendations made by GRAVIS at the time of drafting of the policy, are efforts also on to bring in progressive reforms in it.

Implementation of any policy for scheme is highly contingent on the awareness levels of people on its content, use and ways and means to access its benefits. In the case of silicosis policy, GRAVIS launched awareness campaigns and persuaded and supported the mine workers to avail its benefits. With a view to enable a wider outreach GRAVIS translated the policy in vernacular/Hindi making it understandable to the miners, published the same and widely disseminated among the mining community.

GRAVIS has also been instrumental in reaching out to the judiciary and making the pleas of the mineworkers heard. In the year 2018, GRAVIS submitted a report to the Hon'ble Supreme court and apprised the court about the pathetic state of affairs as regards of Silicosis, issues with the certification and the complexity of the process. GRAVIS also submitted a set of recommendations to the court and taking note of these recommendations, the apex court issued guidelines and suggestions to the state government of Rajasthan. Many of these recommendations got translated into action on the ground by the state government.

The compensation amount for certified silicosis patients was raised from INR 3 lakhs to INR 5 lakhs by the state government. State government pays INR 2 lakhs to the person who is certified as a silicosis patient and INR 300,000 to the legal heir in case of any deaths due to silicosis. However, this compensation is paid by the State Government on orders of the State Human Rights Commission for infringement of their right to life. The Government of Rajasthan also started scheme through which a sum of Rs. 1500 per month is directly credited into the bank accounts for the persons who are certified as silicosis patients by a public health facility.

Some benefits are available to mineworkers through the schemes of the central government. *Nikshay Poshan Yojana* provides the mine workers with a sum of 500 INR every month for their nutrition. Consistent efforts by GRAVIS have resulted thousands of TB patients getting connected to this scheme. On the front of health support, Silicosis Medical Mobile Unit (SMMU) are run by the government to reach out to the remotely located patients. Outreach of these units is being expanded incrementally in collaboration with GRAVIS.

5. Systems strengthening

A helpdesk was established for Miners and labourers at a hospital to provide immediate support in terms of information on the registration process, key contacts and the expected timelines. This helpline has helped the workers in accessing information in time and also knowing more about the effect of silicosis.



GRAVIS' interventions at a later stage have also helped in ensuring improved management of incoming calls by the staff including maintenance of the well documented call records by the year 2020. More than 52000 queries were registered, aggrieved people were being listened to and assistance was provided as per the need. Queries that could not be directly addressed were being directed to the relevant departments for further action.

GRAVIS interventions have contributed towards expediting the process of certification of the silicosis for the affected persons. Constant efforts from GRAVIS in this direction have finally resulted in bringing the duration of the process of certification done to 30 days or so, while earlier it used to take people 6-8 months. As GRAVIS extends its support to people in submitting online applications, the resultant case of certification helps people accessing the support from the government in timely manner. By the end of 2020 GRAVIS had supported more than 500 workers and their families getting such relief.

6. Supportive activities

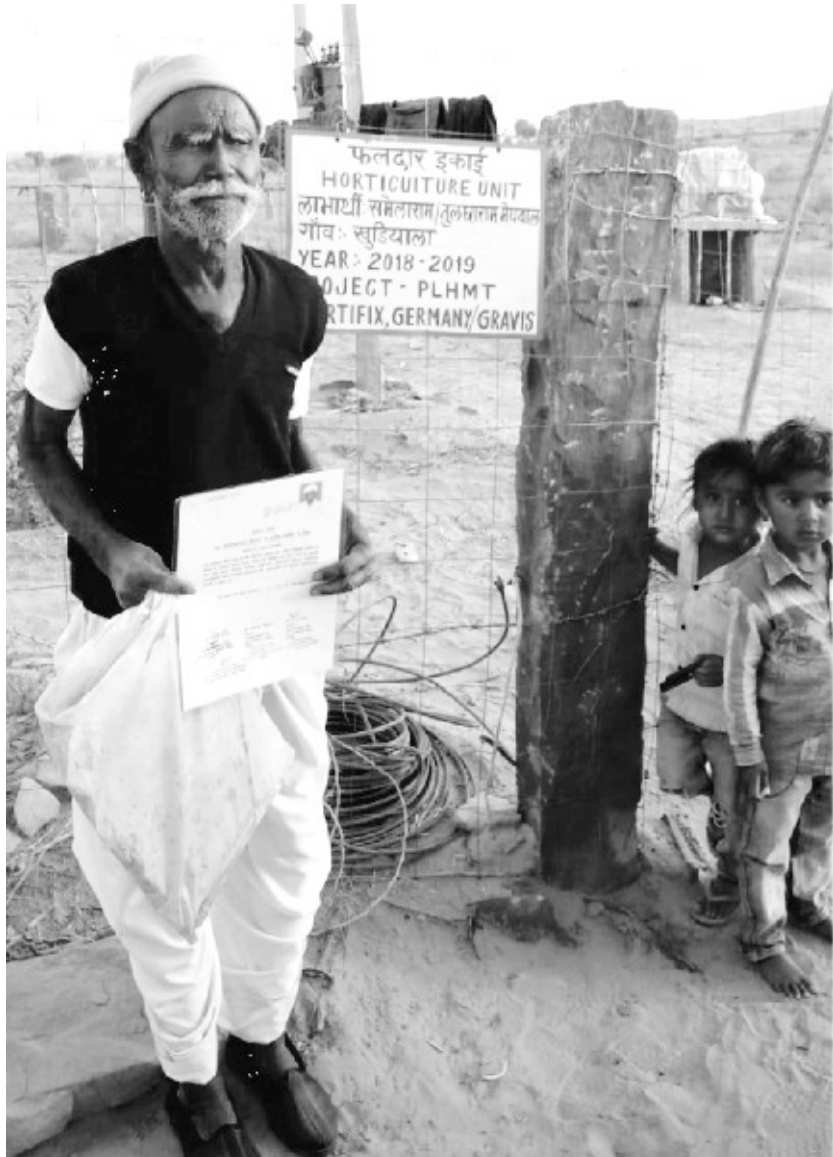
Operationalisation of the integrated and comprehensive approach to mineworkers' lung health was supported by the vision of their overall wellbeing. In the dry and arid region communities are confronted with the challenges that threaten their food and nutrition security, their access to productive resources, financial security and even educational facilities. A number of initiatives that promote improved nutrition for the mine workers and their families have been undertaken. As TB and silicosis patients need to have balanced diets with adequate nutrition, GRAVIS supported the families of mineworkers in establishing their own kitchen gardens that became sources of seasonal fruits, green leafy vegetable, and roots and tubers. These kitchen gardens helped the community maintain their nutrition levels with no additional costs. Such initiatives were complemented with provision of necessary trainings in maintaining the kitchen gardens and getting the highest yields, technical aspects of farming, education on good health practices, importance of regular screening and mobilisation for demand for enhanced wages.



School by GRAVIS for mineworkers' children

Nutrition for mineworkers

With moist eyes, Sahela Ram gently brushes his hands on the greens grown in his garden which is full of greens, tubers, and other vegetables. It is after a long time that there are so many vegetables at home, we could never afford to eat so many greens. Its only after I set up the kitchen garden next to my house that we can have them on a regular basis. Mounting expenditures on visits to the health centre, and not being able to work since the onset of lung related issues has pushed us to poverty and resourcelessness. We were not able to spend much on the vegetables. GRAVIS provided us with the saplings and other materials to start a garden of our own and also trained me and my wife in taking care of it. We have grown fenugreek, spinach and radish. Its amazing that plenty of these are available for our consumption every day. Since I have been falling sick very often, the doctor had advised me to eat a healthy diet, which is not available to me.



Sahela Ram next to kitchen garden

Sahela Ram is one of the 200 silicosis patients who have been supported to start a kitchen garden. About 10 years ago in 2010, he was diagnosed with tuberculosis and since then has been undergoing treatment for lung health related issues. Because of ill health, he has to take many breaks from work and there are days that he is not able to go to work. Supporting the family of seven seems a challenge. GRAVIS has also reached out to him and thousands of other silicosis patients and provided medical support, information on managing silicosis, linking them to the welfare schemes of the government and discussing and communicating their concerns to the appropriate authority. Sahela Ram knows that his disease is not curable, but through these interventions his quality of life has improved and his desire to live life has revived.



A training session facilitated on the International Labour Day

7. Partnerships

Most critical aspects of the strategic programming of GRAVIS for improved lung health of mineworkers has been building and nurturing partnerships with the state agencies and non state actors having concern over the status of mineworkers in the country. Working in the spirit of collective and participatory planning and action, GRAVIS has proactively engaged with the concerned government departments such as the Department of Mines and Geology, Medical Health and Family Welfare, Labour, Agriculture, Horticulture and Rural Development; National and State Human Rights Commissions, Jodhpur District Administration, academic and research institutions, and community based organisations such as the self help groups of women (SHGs) and successfully leveraged from their involvement and expertise. Success of GRAVIS' intervention was also a result of close collaboration between local services delivery functionaries GRAVIS staff who worked in coordination towards implementation of various state-run programme and to lend an added efficacy to GRAVIS' programmes.

8. Enhancing the impact

Decades of GRAVIS' work resulted in laying a sound foundation for focused work towards prevention of silicosis and TB among the workers engaged in various processes in the silica mines across Jodhpur district. A policy environment that was relatively conducive and receptive of ideas, a sound knowledge base and partnerships with all the stakeholders, motivated the team to undertake intensive work with the mineworkers. Between the years and 2018-2021, GRAVIS has been implementing the project – *Promoting Lung Health in the Mineworkers of the Thar Desert (PLHMT)*, with the support of Xertifix, Germany in the Thar Desert region. The project covered 30,000 mineworkers with its activities and made a long-lasting impact through a range of interconnected activities.



Specific objectives of this project were to:

- Expand the knowledge and awareness on lung health among mineworkers and mine-owners in the Thar Desert region.
- Improve health status through Village Health Workers (VHWs) and medical services to mineworkers aimed at improved lung health.
- Enhance nutritional status of mineworkers through nutrition gardens, training and capacity building.
- Liaise with the local government and advocate for better healthcare facilities for mine workers.
- Document the best practices and learning to promote replication of lung health programmes around the world.

Orientation meetings for the project team, discussions on project plans, exposure visits for the staff and mineworkers, awareness camps on lung health and health safety trainings for knowledge leaders were organised by GRAVIS with a view to achieve the objective of expansion of knowledge. The objective of improving the health status of the mineowkrers and their families was achieved through developing a cadre of 10 VHWs to who were engaged in health education to mineworkers. These VHWs were provided with trainings and refreshers were organised for them every year. These trainings helped them update their knowledge and skills in lung health. Additionally, Outreach Medical Camps to provide screening, diagnostic, curative and referral support as well as to provide health education. During the project cycle of three years more than 30 such camps were organised.

As general health and nutrition are directly linked to each other, specific measures were taken to set up Home Nutrition Gardens (HNGs) for mineworkers and their families with fruits and vegetables. These HNGs provided the much needed nutrition to the community leading to stronger immunity and better lung health for them. Setting up of HNGs was supported by provision of nutrition knowledge to the mineworking community through trainings facilitated by the VHWs.

During the project period, several events were organised to commemorate Labour Day, Women's Day, world Lung Health Day, Public Hearings, several meetings and district and state level workshops, to highlight the issue of lung health among miners, drawn attention towards the needs and challenges of women working in mines, bring mineworkers, mine-owners and local government to jointly discuss health issues and possible solutions and facilitating multi-stakeholder meeting to discuss a joint and holistic approach on promoting lung health. These meetings also helped in participatory learning, replication and networking effectively Mineworker, the newsletter published by GRAVIS also became a carrier for information dissemination.

9. Optimising the impact

As mentioned, GRAVIS work has had a significant impact on the lives of mineworkers, there current awareness levels testify the positive effects of GRAVIS' intervention. At this juncture GRAVIS endeavoured to reflect upon the decades of work with the mineworkers and assess the outcomes and glean lessons for future work, desired strategies and priorities. It is in this context that the present study was conducted to examine the effectiveness of GRAVIS' interventions on lung health (silicosis and TB) affecting mineworkers, the current extent of problems and provide some guidance for future strategy.

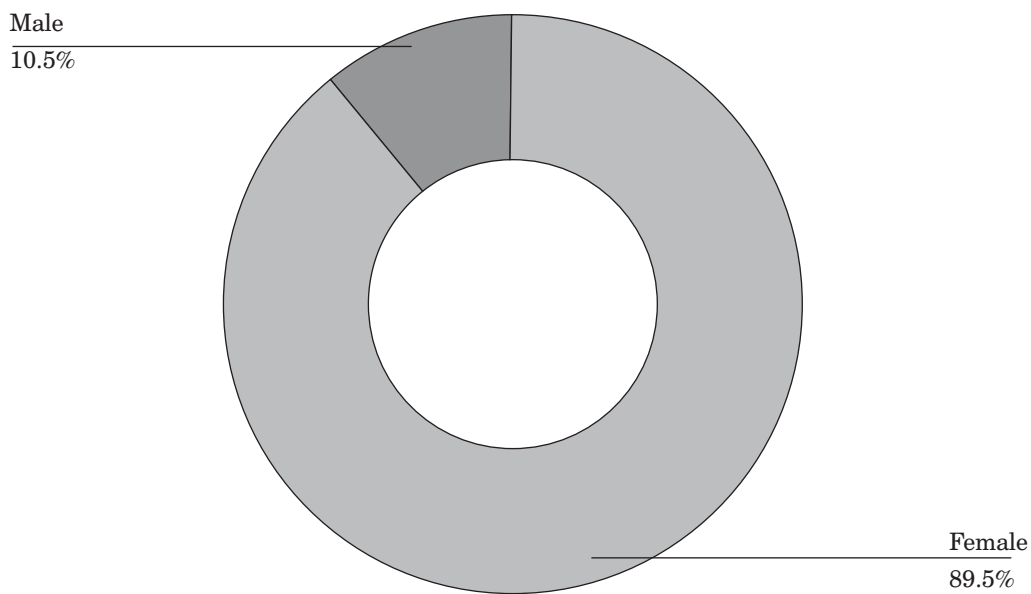
Specific objectives of the study were to:

- Thoroughly document and understand GRAVIS' work on mineworkers' lung health aspects
- Identify the best practices in the context
- Understand gaps, current challenges that need to be addressed

- Draw a plan for future strategy and interventions

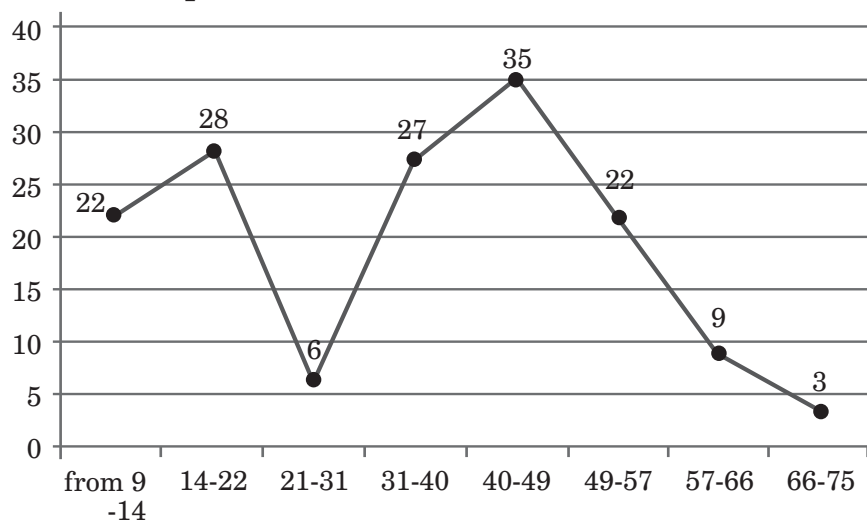
The study builds upon the work undertaken by GRAVIS in the past, assesses its efficacy in the present scenario and attempts at chalking out the broader way forward, in addition to identifying the specific measures that might help augmenting the efforts. A total number of 152 mineworkers working in the different stone mines in Jodhpur district, and 30 mine owners were interviewed for the purpose of the study. All these mineworkers had a very low family income and frail financial situation. The samples were randomly selected and about 90% were females and only about 10% were males. Although this is not reflective of the gender proportion of labourers, this does establish that a large number of women are also engaged in mine work.

Figure 4 - Gender segregation of mineworkers interviewed



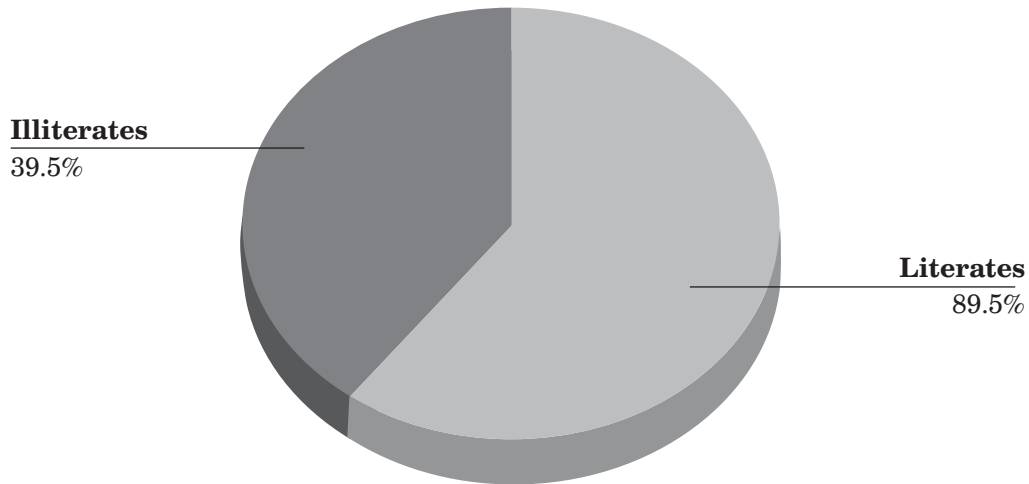
Out of the total mineworkers interviewed, 22 were below 14 years, showing a gross violation of child labour law as mining is a hazardous occupation and prohibited for engagement of children. 35 of them were in the age group of 40 to 49, with few also being between 65 and 75 years of age.

Figure 5 - Age profile of respondents



Formal education levels of all the mine workers were very low. It was found that about 40% of the total mine workers were illiterate and others also had low levels of formal education.

Figure 6 - Literacy level of mineworkers



For majority of the mineworkers and their families, mine work was the sole source of income. About 1/3 of the mineworker reported to have their other family members also involved in the mineworker, and only 10 of them reported that their families are also engaged in agriculture. This data may be interpreted to project better financial status for only a small number of mineworkers, who were able to ensure a better standard of living. However, for most of them there were no other sources of income and no other livelihood opportunities.

Figure 7 - Income sources of mineworkers

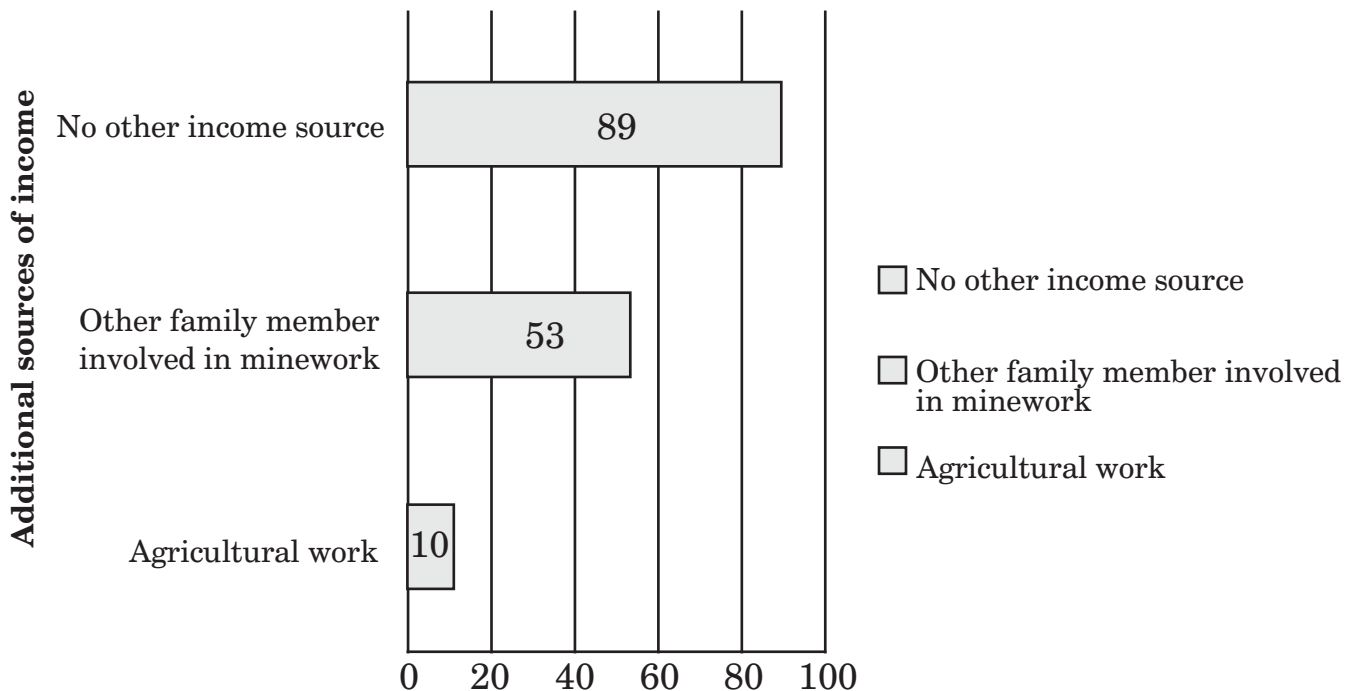
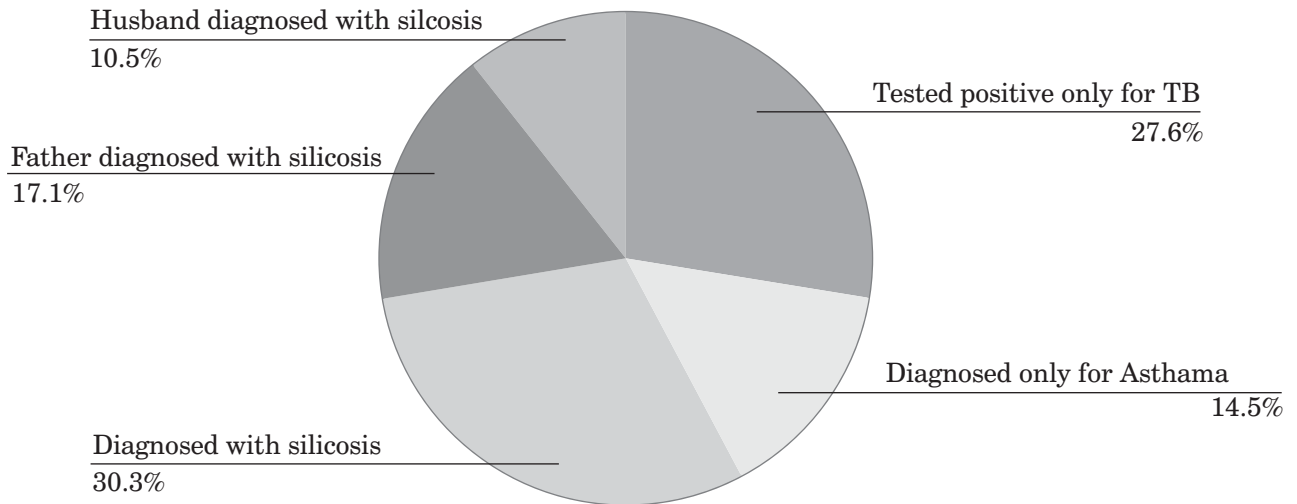


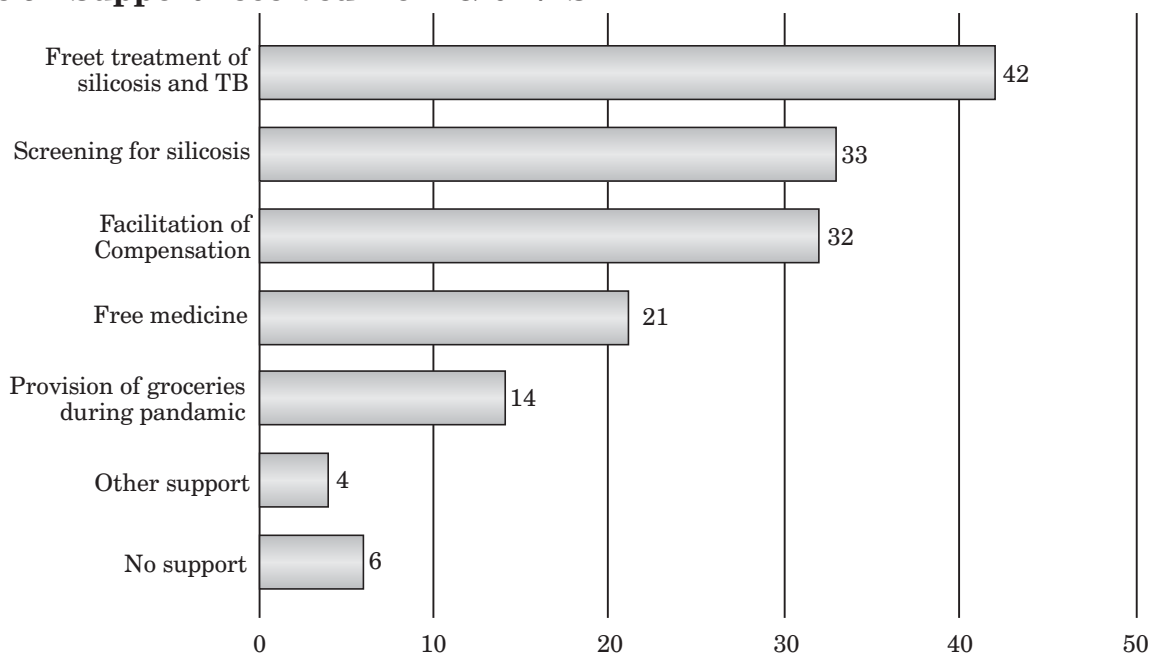
Figure 8 - Lung health status of mineworkers



Out of all the mineworkers interviewed for the study, either themselves or their family members were affected by asthma, or tuberculosis, or silicosis, or two of these. It was found that more than 30% had been diagnosed with silicosis, while about 14.5% had asthma and 27.5% had TB. Overall, about 73% had lung related issues and the rest had their family members infected with either TB or silicosis.

Out of the total mineworkers interviewed about 1/3 had received free treatment for TB or silicosis from GRAVIS. 33 had undergone screening for silicosis, 32 had got compensation with GRAVIS' intervention, 21 had received free medicines from GRAVIS hospital. During the crisis situation posed due to pandemic, GRAVIS also provided essentials to the mining communities to ensure their food security while the mine work had stopped and the mineworkers were not getting their wages.

Figure 9 - Support received from GRAVIS





With a view to substantiate the understanding about the condition of the mine workers, interviews were also conducted with the owners of the mines who have the responsibility to take all the preventive measures to ensure that the mineworkers are protected against any possible exposure to silica dust and its inhalation. As per the Mining Rules of the Ministry of labour, Government of India, owners are supposed to set up Safety Committees and ensure that miners do not face any risks. Owners are also supposed to conduct medical examinations on a regular basis. It was found that 96% of the mine owners had negligible awareness about their role to prevent silicosis and most of them were oblivious about their statutory responsibility towards the mineworkers' health.

The study pointed towards a glaring gap between the rules and practice. It was found that although most of the mine owners were aware about silicosis and the nature of impact that it leaves on the human body, the measures that they take to contain the disease are limited to provisioning of masks to the workers. None of the mine owners are investing in wet drilling and are not getting the dust levels measured on a regular basis. It was found that only in one mine workers were insured and this practice was not being followed in most mines. It was found that even the monitoring and inspections that are supposed to happen on a regular basis, do not take place often. More than half of the mine owners said that no government officers have visited them in recent past, while a few of them said that the government officers come sometimes, however, they do not visit the mines.

It was also found that the knowledge of miners on the national guidelines on silicosis, and the laws on mineworkers' safety, was limited to the need to wearing masks. They were not aware of any other aspects of the guidelines, regular medical check ups and insurance for the mineworkers. However, most of the mineworkers were aware that wet drilling may be one of the means to avoid dust and hence prevent silicosis, although they felt that wet drilling is an expensive technique and they may resort to it only if financial support is provided for the same.

10. A difficult road

The path to combating silicosis and ensuring better health for the mineworkers and their families is marred with countless challenges. Starting from its prevention, to managing it and supporting the mine-working communities and if needed, helping towards rehabilitation of the families that have suffered the loss of primary breadwinners, multidimensional impediments are witnessed along the way. Initially, lack of awareness about lung health among the mineworkers remained one of the major reasons for their poor lung health. As silicosis was discovered and recognised as a major medical issue, the mining communities, including the mineworkers and mine owners remained oblivious from it. It has been a long road to enabling an understanding about the disease, its fatal disposition, causes and prevention. With rising awareness over a period of many years, logically the workers should have moved away from mine work, especially in the silica mines that are abode to silicosis. However, even today, there is no dearth of labourers available to slog in the forbidding mines, as they do not have any other livelihood options available in the vicinity. Either the recurring droughts in the Western Rajasthan regions has already rendered farming as a financially unviable option, or the agriculture produce is insufficient to ensure food security for the households. Hence the mineworkers, despite the fatal implications are drawn to mine work.

In the hot and dusty mines, while the workers engage in drilling, cutting, cleaning and stacking the stones, the environment is quite conducive for causing lung health issues. A large set of data and research has been put together to establish the perils of working in the mines, which still continues

because of the market demands and lack of other livelihood opportunities. However, despite that the basic preventive measure of screening for lung health of workers is not taken, and it is only a prolonged illness that the workers finally release the extent of the disease.

Technological advancements over the few decades have led to innovative techniques and tools that may be used to prevent the inhalation of dust by the workers. As mineworkers are not interested in investing such techniques given the cost involved in switching to the modern technologies, the mineworkers continue to inhale the dust without preventive gears. As the mineworkers themselves do not afford quality protective gears, even those who are aware about the importance of masks etc., are not able to use them. Mineworkers themselves, in many cases, see this as worthless investments.



Rally on International Women Day

Long distance, remote locations and harsh climate, along with the low level of education has kept the Desert communities away from the public facilities meant for providing education, health and other social security support. Owing to low levels of education, there is little or no awareness among the communities about their entitlements and lack of exposure to outside world deprives them from the benefits of modern facilities. In such situation making medical facilities such as regular checkups, treatments and referrals etc. accessible to the community is quite challenging. Community, by itself is not even in a situation to sustain food and nutrition security, health, education and any specialised

16. See table for instance.



medical support in case of any emergency and chronic or acute illness. This whole situation keeps the community excluded from the mainstream and thwarts them from seeking support, reinforcing the status quo.

All the aforementioned challenges get further aggravated in the absence of little or no surveillance on the part of regulatory authorities of the government. Policies and programmes adopted by the state governments do not get fully implemented by the state as silicosis prevention and support to the patients of silicosis does not seem to be a priority. As there is no monitoring or surveillance on regular basis, the rules pertaining to quality of machineries, provision of protective gears to the workers and compensation for the silicosis patients get flouted very often. Solutions offered in the form of compensation us only a drop in the ocean as compared to the mountain of challenges. Non implementation of the rules for protecting workers' interest is another issue and is evident from the a wide gap between the number of registrations, actual certification of the cases following a long process of screening at various levels, time taken in reviewing and certification and final disbursement of the compensation amount to the family of deceased people who could not survive the disease.

16. See table for instance.

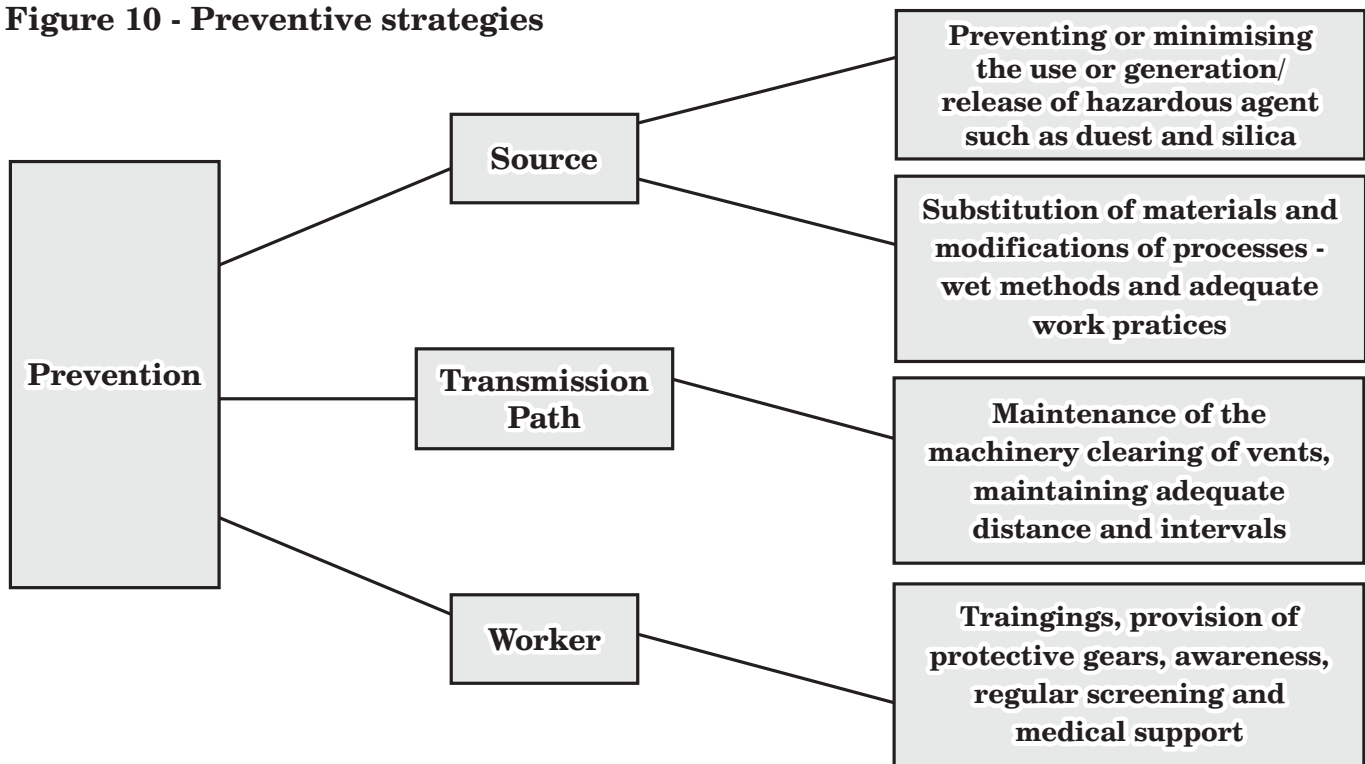
III. Desired direction

Unlike in the past, silicosis is formally recognised as one of the most lethal occupational hazard of recent times. Not only the medical fraternity, but the concerned government too have taken cognizance of the severity and have initiated statutory and regulatory measures to prevent the disease. However, the very fact that the disease is not curable leaves us only with two major strategies – first, prevention of the disease which would entail either avoiding or minimising the exposure to dust as far as possible; secondly, making sure that the those who are already carrying the burden of this disease are supported adequately with medical support and social security.

1. Strengthening prevention:

The very nature of silicosis, for which there is no cure available, demand adopting and executing preventive approaches. The most hazardous conditions at work are in principle preventable and the primary prevention approach is the most cost-effective strategy for their elimination and control. Primary prevention aims at interrupting the “chain of exposure” - the process by which hazardous agents are formed/used and transmitted from their source to the receptor (worker)¹⁵. Control and prevention are critical because this lung disease has no cure. The control or prevention must be attempted at three distinct levels in order for it to be effective: *control of the source, control at the transmission path, control at the level of the worker.* (see figure 9).

Figure 10 - Preventive strategies



15. https://www.who.int/occupational_health/publications/newsletter/gohnet12e.pdf?ua=1

Control of the source aims at preventing or minimizing the use or generation/release of a hazardous agent. Examples of measures in this category include substitution of materials and equipment, modification of processes, wet methods, and adequate work practices. It is of critical importance that the machines being used in the process of mining, be it drilling, cutting, mining, chiseling or stone carving, come with the dust collection system which would mean transforming the existing system altogether. Whenever source control is not feasible or sufficient, measures should be taken somewhere along the transmission path to prevent hazardous agents from being disseminated or propagated thus reaching workers, by means of, for example: isolation (to perform the operation inside an enclosure) local exhaust ventilation (to remove the particles, as they are generated thus preventing them to disperse in the work environment and be inhaled) good housekeeping (to avoid dust accumulation and formation of secondary sources).

Good work practices are extremely important as they can eliminate or minimize hazards even at their source. Control at the worker also includes preventing dust from reaching the worker's breathing zone, by means of some form of respiratory protection, such as masks and helmets. The protective gears, such as masks with filters, need to be of certified quality and of proven efficiency for dust evasion, well adapted to the worker, comfortable, routinely checked and well maintained. Along with these, education of the workers on importance of using protective gears efficiently and regularly, are integral components of the good work practices in the mining sector.



Advocacy event

As per the recommendations made¹⁶ by the NHRC several short term preventive measures may be suggested. Occupational health survey and dust survey on half yearly basis must be made mandatory in suspected hazardous industries. All the enrolled workers must be medically examined with chest radiography and pulmonary function test to rule out any respiratory disorders. Additionally, State

16. *Special Report To Parliament of India On Silicosis.pdf* (nhrc.nic.in)



governments should encourage development and promotion of various cost-effective engineering control measures to manage silica dust through surveillance of processes or operations where silica is involved. Implementation of precautionary measures including the protective gears for the workers of silicosis prone industries needs to be made mandatory by the concerned enforcement authorities. Dust control devices may be installed to reduce the dust generation at the workplace. National Institute of Occupational Health (NIOH) has developed control devices for agate, grinding and quads crushing industries based on the principle of local exhaust ventilation. The use of wet drilling and dust extractors may be enforced by respective regulatory authorities.

It is also important to ramp up monitoring of the silicosis cases at local level and state government must keep a track of silicosis cases and its trend with the help of district administration and local authorities. Focused and intense interventions must be designed for the pockets with high number of lung health cases reported. In the process, coordination with the primary health care centres will help conduct the screenings and diagnostics more efficiently. Another immediate action may be in the direction of carrying out vigorous publicity campaigns by making use of the electronic and print media at all levels in order to create awareness among workers, employers and medical practitioners about silicosis being a health hazard.

Silica prone industrial units should also have Occupational Health and Safety Committees (OHSC) with the representation from workers and health care providers and these committees must be entrusted with the task of monitoring and extending support to the workers. In addition, a mechanism to have intersectoral coordination among various departments and ministries such as Ministry of Health and Family Welfare, Ministry of Labour and Employment, Director General of Factory Advice Services Labour Institute, NIOH, Tuberculosis Association of India (TAI) and civil society organizations, needs to be evolved to design and operationalise an appropriate strategy to deal with the dual problems of silicosis and tuberculosis.

Prevention is not only the most cost-effective way of getting rid of the problem it is the most simple one too. It is quite clear that if occupational exposure to dust is avoided, silicosis will cease to occur. This is primary prevention, and its application is the only way to eliminate silicosis. All preventive measures need to be complemented with the educating the workers on the use of protective gears diligently and regularly.

2. Responding to the situation:

It is very important to evaluate and deal with the consequences of exposure to silica dust. Adequate diagnosis and reporting of silicosis is essential for many reasons, including triggering the required political will to fight for its elimination. This can be achieved by mandatory regular screening of the workers for their lung health. Early detection may help making the safety measures more stringent. It is also believed that the data pertaining to exact number of people will go a long way in sensitising the policy makers and enforcement and regulatory agencies and hence perform better. The accountability for the implementing the directives must be with the employers and any noncompliance must be responded with stringent action against the employer.

As silicosis remains incurable, other form of medical and social security support should be augmented for reducing the problems faced by the mineworkers and their families. Management of diseases, in the absence of cure, may guide a pragmatic approach. This may involve ensuring that the silicosis patients immediately withdraw from minework and engage in alternative vocations. Minimising exposure to dust needs to be attempted at to extend the lifespan of the patients. This would, invariably mean



creating opportunities that may be availed by the mineworkers within their vicinity, and are not as stressful and strenuous as work in mines. As most of the mineworkers have migrated from rural places to work in the mines, creation of employment opportunities in the rural areas to prevent migration needs to be adopted as a longer term strategy.

National and State Social Security Boards set up under The Unorganized Worker's Social Security Act, 2008 have a specific role in recommending welfare schemes to be formulated for the welfare of the unorganized workers who are at the risk of contracting silicosis as well as those already affected and their families, subsequently to some other vulnerable groups, and workers at risk of contracting silicosis and their families. There is also a need to relook at the compensation offered to a silicosis patient's family. The formula used to arrive at the compensation amount must factor in wage and DALY lost.

A number of preventive and response strategies may be explored and adopted to protect the lung health of mining communities in the Thar. Many of these strategies, especially their implementation depends entirely on the policies of the government, willingness of the mine owners to invest in improved technologies and the awareness levels of mineworkers themselves. Past couple of years have witnessed some encouraging development on the policy front after the issue of silicosis being an incurable disease came into the light. With the intervention of the Apex court, concerned govern departments including health and mining, have flung into action. Recommendations from the National Human Rights Commission (NHRC) have been reviewed by the relevant agencies and possibilities for their implementation are being further explored. Recent years have also seen enhancement in the social security benefits – compensations, pension and other support – for the silicosis patients and their families. All these developments definitely represent a positive trend and hope against the deadly disease.

All these developments do not, unfortunately, neutralize the damaging outcomes that originate from the lack of investment in clean machinery, safety and protective gears for the mineworkers, reluctance in adaptation of wet methods as compared to dry ones, and lack of monitoring by the relevant agencies. A large proportion of patients having lung issues, do not get certification from the appropriate authorities and only a minuscular minority actually received the compensation meant for them. Families, very often aren't aware about the benefits available to them in case of loss of life of the primary breadwinner. Silicosis patients continue to die slow and painful deaths in the absence of any medical facilities and nutrition available to them because of afford ability issue.

Organisation having bandwidth and technical expertise like that of GRAVIS, need to continue engaging with the prevention as well as rehabilitation of mine working community. GRAVIS must also continue its efforts to seek reforms in the policy as well as operational systems. Direct health support and capacity development should also continue given the need to raise awareness and sensitise people at various levels. Impoverished, and most unskilled people of the Thar the Desert turn to minework in desperation of finding a means for survivals. It is an irony that their desire for survival takes them close to the life-threatening environments in the mines.

It is, how much ever impractical it may seem, needs to be noted that increase in the number of people with lung health issues, be it TB, silicosis or any other respiratory disorder, have a direct and proportionate link with the market demand for the stones that are mined. Until the unlimited mines with largely unregulated work environment continue to cater to the demands of stones for construction of luxurious buildings, breathless mineworkers will continue to risk their lives in quarries and mines in the Thar.



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Acronyms

DALY	Disability Adjusted Life Years
GRAVIS	Gramin Vikas Vigyan Samiti
ICORD	International Conference on Occupational Respiratory Disease
ILO	International Labour Organisation
NHRC	National Human Rights Commission
NIOH	National Institute of Occupational health
OHSC	Occupational Health and Safety Conference
PRASAR	Peoples' Rights and Social Research Centre
TAI	Tuberculosis Association of India
VHW	Village Health Worker



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Gramin Vikas Vigyan Samiti (GRAVIS) or Center of People's Science for Rural Development is a non-governmental, voluntary organization that takes a Gandhian approach to rural development by working with the poor of the Thar Desert to enable them to help themselves. Since its inception in 1983, GRAVIS has worked with over 68,000 families across over 1,600 villages reaching a population of over 1.6 million, and has established over 3,800 Community Based Organizations (CBOs).

GRAVIS is registered under Rajasthan Societies Registration Act and under section 80 (G) and has tax exemption under section 12 A of IT Act, 1961 of Govt. of India.