The Vulnerable Mining Community

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Abstract

India is a country richly endowed with mineral deposits. In India, the mining sector is a core industrial sector and is crucial for the economic growth of the country. Since almost all the mineral rich districts lie in the backward areas and are inhabited by tribals, tribal labour constitutes a large proportion of the workforce involved in the mining sector. Tribals are mostly illiterate and are easily exploited. This paper provides an insight into the abysmal working conditions in the mines of India. Accidents, inundations and prolonged exposure to mine dust form regular features in the daily life of the miners. Even women and children are not spared, although they are seldom involved in mining directly. The net result is a fall in the life-span of the miners and their family members. The fatal diseases such as anthracosis, silicosis, asbestosis, berylliosis and siderosis, frequently suffered by the mine workers as a consequence of these working conditions and their magnitude have been dealt with in this paper. Case studies have been discussed in detail. Finally, remedial measures have been suggested for the protection of the vulnerable mining community and for the systematic utilisation of mining waste.

Keywords

Mine Dust, Tribals, Miners, Diseases

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1. Introduction

India has a unique blend of manual and mechanised, opencast and underground mines. The mining sector is a core industrial sector in India and is crucial for the economic growth of the country.

In the period between 1993 and 2005, the mining sector showed a compound annual growth rate of 10.7 per cent. However, as indicated in Figure 1, almost all the mineral rich districts in India lie in the backward areas and are inhabited by tribals. Recently, about 60 districts all over India have been identified as mineral-rich, tribal areas. Hence, tribal labour constitutes a substantial proportion of the total workers involved in mining activity. Most of these families are illiterate and lie below poverty line.

There is a huge number of small scale mines all over the country which are operated either as proprietor or partnership ventures and are owned by private entrepreneurs. From the point of view of health and safety, these are of greatest concern. Small Scale Mines (SSM) are defined as manual open cast mines not using explosives, where the average daily employment does not exceed 25. These are mines with a lease area of less than 5 ha and those that do not need Environmental Impact Assessment (EIA). Out of 65 minerals produced in India, about 38 can be mined on a small scale basis. However, working conditions in these mines are abysmal. Major hazards include roof falls in underground mines and incidents of workers being run over by machinery in open cast mines. Inundations have caused some of the most serious disasters in these mines. In fact, contract workers suffer

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accident rates worse than the permanent staff. Most of the accidents go unreported. It is even alleged by unions that the bodies of contract workers killed in open cast mines are sometimes dumped by the roadside, so that it could pass off as death due to road accident.

Accidents apart, the incidence of diseases contracted by mine workers poses a serious threat to this section of the population. Prolonged exposure to mine dust causes Chronic Obstructive Pulmonary Disease (COPD) due to occupational respiratory toxins. The lungs lose their natural flexibility, resulting in progressive respiratory problems. Unless the patient is removed from exposure in the early stages, severe and permanent damage is caused to the lungs. The ultimate outcome is a slow and painful death from suffocation.

The main objective of this paper is to investigate into the conditions under which labourers work in the Indian mines. In the process, environmental damage caused by mining waste has also been looked into. Case studies have been undertaken for the purpose. Remedial measures have been put forward to alleviate the problems of the mine workers and to improve their working conditions. Better utilisation of mining waste is another issue dealt with in the paper.

The paper has been organised into five sections – Introduction, Research Significance, Procedure, Discussion of Results and Summary and Conclusions.

2. Research Significance
The adoption of scientific and systematic mining methods, which include regeneration of the mining blights and minimisation of the damage to social environment, is a must in India. In order to sustain the huge mining community of this country it is essential that they should be protected from the dangers of accidents and lethal diseases. In spite of the
fact that there are about 200 laws related to environmental protection within the country and comprehensive legislation and monitoring systems to regulate mining activities, air pollution from mine dust remains a persistent problem for mine workers. A research into the distressful life of these mine workers will help to bring about awareness and to undertake measures to remedy their problems.

3. Procedure

The research work elaborated here was done with the help of both secondary information and primary data. It went through several steps. In the first place, information about the mining sector of India was gathered from various books and periodicals, including news dailies. Doctoral theses of researchers, dissertations and monographs were consulted. Secondary data was collected from Coal India Limited (CIL), Eastern Coalfields Limited (ECL), the Karnataka State Remote Sensing Applications Centre, the National Environment Engineering Institute (NEERI) and such other organisations.

Primary survey involved field work in different parts of India. Case studies were conducted by the author from time to time and from region to region. The field work was mainly based on questionnaire-schedules. Both random sampling and purposive sampling were resorted to. For purposive sampling, direct interaction took place with the doctors and medical officers of the Health Department, Sanctoria, West Bengal and the Programme Manager, Child Development Programme. Villages such as Ratibati, Satgram, Barachak and Mangalpur, in the vicinity of the Raniganj coalfields, were visited. The mine workers, most of whom come from these villages, were questioned on their health conditions, hours of work, wages received, insurance provided and such other points. The sample size was taken as 200; out of this, 179 was the number of actual respondents. There were both open-ended questions and questions with multiple choice answers. For close-ended questions, a Likert Scale with a range of 1 (strongly agree) to 5 (strongly disagree) was used. There were also structured questions and ranking item questions. Visits were also made to Sandur and Dharampur in the Bellary District of Karnataka and the districts of Bharatpur, Sawai Madhopur, Kota and Chittorgarh in Rajasthan, where field work was carried out with the same technique. The questions administered to the mine workers here were of the same type as those asked in the Raniganj and Asansol Blocks of West Bengal. In special cases, the other members of the households were also interviewed. The other part of the field work involved mainly observations. Relevant photographs were taken in the field to illustrate the findings.

In the next stage, the data collected was compiled and tabulated where necessary. Finally, the data was thoroughly analysed. Maps were drawn as illustrations.

4. Discussion of Results

Respirable quartz in silica dust is associated with the development of silicosis, lung cancer, pulmonary tuberculosis and other airway diseases. The inhalation, in large amounts, of respirable silica dust causes silicosis, a debilitating and potentially deadly lung disease. For instance, in the Aravalli Region, the lure of mineral wealth by the mining and construction companies has greatly affected local communities. The region supplies half the country’s requirements of silica. Habitations constructed for mine workers lie almost adjacent to the mining sites, so that huge amounts of silica dust are inhaled by their families and they develop the deadly disease – silicosis. More than 70% of the local population is badly affected by this lethal disease. The Programme Manager, Child Development Programme, has estimated that while India’s life expectancy rate is around 65 years, in the mining areas of Rajasthan, it is only 45 years, as tuberculosis and silicosis are of frequent occurrence in these areas. Besides, while dry marble slurry causes large-scale air pollution, during the rains, the slurry gets wet and flows into the rivers and local water-bodies, thereby contaminating the water.

Stone dust particles are a major health hazard for those employed in stone quarries. In the Aravalli region stone quarrying is a major form of extraction. Sandstone occurs in the Vindhyan and Trans-Aravalli regions, which extend over 35,000 sq. km. More than 1,700 companies are engaged in sandstone quarrying in the districts of Dholpur, Bharatpur, Sawai Madhopur, Bundi, Kota and Chittorgarh, shown in Figure 2. Since the mining is illegal, there is no question of safety norms, nor are there provisions for compensation. In this area, labourers do not even wear helmets so that they become vulnerable even to minor mishaps like a stone rolling down. Stone dust inhaled by workers leads to lung and liver diseases such as silicosis, bronchitis, asthma and tuberculosis. The silica dust may result in restrictive, obstructive or mixed patterns of lung impairment, which becomes evident only on pulmonary function testing. When respirable silica is inhaled, some become lodged in the lung and embed themselves deeply into the tiny alveolar sacs and ducts, where oxygen and carbon dioxide gases are exchanged. The particles set up an irritation that destroys the lung tissue. This is because a particle of silica dust has many sharp edges. The more the dust inhaled, the more is the level of destruction. Silicosis has been defined by the International Labour Organisation (ILO) as an “incurable lung disease.
caused by inhalation of dust that contains free crystalline silica.” Miners with silicosis gradually lose their ability to breathe and become extremely vulnerable to pneumonia and tuberculosis.

In Budhpura Village, in the Bundi District of Rajasthan, workers in mines and quarries form a high-risk group. In this region, women and children are the worst affected. Increasing mechanisation is taking place in the quarries. Mechanisation generates finer dust particles which remain suspended in the air for a longer period and affect the respiratory system. Quarry workers inhale minute dust particles ranging in size from 0.1 micron to 150 microns and undergo premature death. The life span of a worker in Budhpura is estimated to be 40 to 45 years. Even children develop silicosis.

Coal mining was nationalised in the early 1970s: one of the reasons for taking such a step was the industry’s poor safety record. The presence of 0.3 to 0.5 micron coal dust particles affects the lungs adversely. Inhalation of coal dust is a continuous process which leads to coal workers’ pneumoconiosis (CWP), otherwise called black lung disease or anthracosis. Villagers of Ratibati, Narsamuda, Siarsol, Ninga, Satgram, Barachak, Phatehpur, Mangalpur and Baradhema in the Raniganj coalfield area of West Bengal are severely affected by this disease.

The coal mining area in the Raniganj and Asansol Blocks of West Bengal lies in the Damodar River Basin and is one of the most well-known in the world. The coalfields here belong to Gondwana group of Permian Age. In the Raniganj coalfields (RCF), extensive rapid underground as well as open cast mining (OCM) are going on continuously. All the heat intensive industries including glass, ceramic, refractories, forging, etc. are exclusively dependent on Raniganj coal. India’s entire export requirement of coal is being met by the Raniganj coalfield. In this region, large areas of forest, agricultural land and pastures have been converted into collieries, colonies and fallow lands due to rapid expansion of coal mining activity. The Raniganj coalfields, shown in Figure 3, extend over an area of 240 sq. km. Among the rock formations, the Raniganj and Barakar Series contain some of the thickest and best coal seams in India.
In this belt, apart from air pollution and coal workers’ pneumoconiosis, water contamination by coal dust aggravates the problem of health hazards.

Pneumoconiosis is an irreversible disease. There is no specific treatment. A thorough study has revealed that 6% and 10% of the total households have already been affected by coal dust pollution in the Raniganj and Asansol Blocks respectively. The yearwise cases of pneumoconiosis among the coal mine workers of Asansol and Raniganj Blocks (taken together), obtained by the author from the Health Department of Eastern Coalfields Limited (ECL), is listed below.

Table No. 1. Yearwise Reported Cases Of Disease (Pneumoconiosis) Due To Coal Dust

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Year</th>
<th>Reported cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1994-1995</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>1995-1996</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1996-1997</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>1997-1998</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1998-1999</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>1999-2000</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>2000-2001</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>2001-2002</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>2002-2003</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>2003-2004</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>2004-2005</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>2005-2006</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>2006-2007</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>2007-2008</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>2008-2009</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>2009-2010</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>2010-2011</td>
<td>0</td>
</tr>
</tbody>
</table>

Coal mining is one of the best regulated industries in the country from the safety standpoint. Yet the annual number of deaths in the case of Coal India Limited (CIL) is 190. Many die from exposure to the deadly methane gas that erupts from fissures adjoining the mines. Sometimes, a large body of gas explodes and there is a dearth of oxygen inside the mine for the complete combustion of firedamp; a huge amount of carbon monoxide accumulates in the afterdamp. In many incidences, no protective gears are provided to the workers against accidents. There is no provision for any insurance, neither is there any medical cover.

Asbestos mining is a regular phenomenon in parts of India. In India, asbestos is obtained both by underground and open cast mining, out of which the most common method is open-pit mining. In this country, asbestos occurs in the states of Andhra Pradesh, Rajasthan, Jharkhand, Karnataka, Tamilnadu and Manipur. Andhra Pradesh and Rajasthan are among the largest producers, with a total of about 30 mines. The main cause of environmental pollution in asbestos mining here is due to the rise in the level of asbestos fibre. Obsolete technology in mining operations, inadequacy of compliance to mines and safety act and low content of asbestos fibre in the parent rock are responsible for this high level. Direct and indirect employment in asbestos mines is around 100,000 workers. However, it has been observed that since male workers are involved directly in the asbestos mines and women mostly work in the mills, the latter are more susceptible to pulmonary diseases. The asbestos fibres invade the air as particulate matters directly from the spot of industrial production. The larger particulates are arrested by nasal hairs and other protective means. But the smaller particulates (diameter <0.1µm) enter the lungs and are swallowed by the macrophages. These particulates cannot be destroyed as they are chemically inert, but they can be removed by the macrophages. The particulates with diameter range 0.1 – 3 µm are incorporated in the lungs and stimulate the production of collagen, which is called fibroblast. The enhanced collagen production thickens the walls of the lungs and produce connective tissues at the site of incorporation of the particulates. The net result is impairing of lung functions.
in workers – both directly and indirectly exposed groups. Radiological changes take place, which include parenchymal changes and pulmonary tuberculosis. A wide variety of malignant diseases of the lungs, pleural and gastrointestinal system results from exposure to asbestos fibres. Asbestosis is a progressive fibrotic disease of the lungs, as illustrated in the table below.

<table>
<thead>
<tr>
<th>Grade of severity</th>
<th>Symptoms</th>
</tr>
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<tbody>
<tr>
<td>Grade 0</td>
<td>No fibrosis associated with bronchioles or the airway passages in the lungs.</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Early fibrosis involving walls of at least one respiratory bronchiole, with or without extension into nearby tissue. Fibrosis is confined to alveolated walls of respiratory bronchioles and ducts and not present in more distant alveoli. Inflammation similar to that caused by cigarette smoking may be observed.</td>
</tr>
<tr>
<td>Grade 2</td>
<td>More severe fibrosis involving alveolar ducts and/or two or more layers of adjacent alveoli. Normal lung tissue remains in an area between adjacent bronchioles.</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Fibrosis is advanced and involves alveolar ducts and all layers of adjacent alveoli. All lung tissues between at least two adjacent bronchioles are affected. Some alveoli are completely damaged.</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Honeycomb-like appearance and large (upto 1 cm) dilated spaces largely visible in lung parenchyma or the alveolar tissue.</td>
</tr>
</tbody>
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Malignant mesothelioma is another fatal disease contracted from blue asbestos. EPA (Environment Protection Act) has proved asbestos to human carcinogens on cancer of WHO standard. In a developing country like India, the potential for epidemics of asbestos involved diseases is beyond doubt, very high. Asbestos can cause cancer of the lung, lung lining and abdomen and can take a very long time – about 20 years to manifest (latent period).

Powdered hematite is often the cause of haemosiderosis - a form of iron overload disorder resulting in the accumulation of hemosiderin.

According to the Karnataka State Remote Sensing Applications Centre, Bellary’s mining area has expanded from 230 hectares to 1,508 hectares. However, 80% of this mining is illegal. A study by the National Environment Engineering Research Institute (NEERI) in 2003 found unacceptable levels of heavy metals in water and suspended particulate matter (S.P.M.) in the air. Respiratory disorders are on the rise in Bellary, according to hospital records. The worst affected are the women and child labourers. They suffer randomly from anaemia, tuberculosis and skin diseases.

The Sandur region of Bellary District is the hotbed of mining activity as it contains very high grade iron ore (with above 62% iron). Here, about 20 percent of the children are suffering from asthma because of air pollution caused by rampant mining over the last two decades. A study conducted by the Hyderabad-based Cerena Foundation and the Samaj Parivarthan Samudaya, has indicated high prevalence of asthma among children studying in 3rd standard to 7th standard. Particularly high prevalence of disorder prevails among children below the age of 11.9

In the towns of Sandur and Dharampur, about 20.7 percent of children reported respiratory problems. In the period between 2008 and 2011, when iron ore mining reached its peak in Bellary, Hospet and Sandur talukas, respiratory problems rose sharply. The number of cases of asthma and bronchitis increased more than four times from 1894 in 2008 to 8015 in 2011.9

Again, the iron ore dust that flies in the vicinity of the mining area contains many heavy metals, some of which like hexavalent chromium, cadmium, nickel, present even in small concentrations in the air may cause a toxic and cancer risk to the exposed population. Hence, in addition to asthma, the people in the mining sites have become susceptible to cancer.

In the light of the above situation, it is imminent to take drastic steps for the treatment of mining waste and to protect the mining community of India from unlimited sufferings and a painful death. It is true that while the traditional health hazards are yet to be fully controlled, newer hazards and safety concerns have come in, posing new challenges to occupational health in the mining sector.10

Setting up of green belts around the mining areas, which will act as pollution absorbents, may control the unhealthy situation to some extent. As the only way to reduce pollution is to minimise waste, it is imminent to devise better landuse management policies and practices in the mining sector. Besides, it is necessary to give much greater consideration to anticipating and preventing pollution problems resulting from mine dust. More attention should be paid to respiratory impairment in the initial stage of silicosis and coal miners’ pneumoconiosis. This has been attempted in the Eastern Coalfields Limited after nationalisation and better results have already been achieved as shown earlier in this article in Table No. 1. The coal dust abundantly available on road surface of opencast coal mines may be used as domestic fuel. Hence, collection and utilisation of coal dust accumulated on mine roads would not only reduce air pollution in mining regions but also help in enhancing economic benefit of the coal mining industry by selling waste coal dust as domestic fuel. More accurate and reliable measures of worker exposures and frequent monitoring of such exposures are.
necesary in India. Above all, new medical interventions to halt or reverse disease progression will help in all respects.

5. Summary and Conclusions
From the above discussion, it is obvious that the worst victims of exploitation in India’s mining sector are the poor, tribal mine workers. There is hardly any provision for protective devices and this accentuates the problem of health hazards due to mine dust pollution. However, adequate measures taken by the Government will definitely help to relieve the mining community of India from the present distressful conditions.

Acknowledgements
1. The Health Department, ECL, Sanctoria, West Bengal.

References