

Health Impacts of Iron Mining: A Case Study from Keonjhar District of Odisha

Devasish Murmu, Rojali Maharana, Nabin Kumar Dhal

Received 2 March 2018; Accepted 5 April 2018; Published on 25 April 2018

Abstract Mining is an extreme economic activity in many developing countries. Operations, whether small- or large-scale, eventually causing destruction to the environment, producing enormous quantities of waste that can have detrimental impacts for a long period. Although the mining activities cause environmental pollution, however, it leads to the growth of social and economic conditions. The mining activity in Nandihi iron mining areas of Keonjhar districts is involved in the extraction iron ore. These iron and its compounds present as pollutants in the atmosphere can cause deleterious effects on humans, animals, and materials. Iron concentrations in body tissues must be tightly regulated because excessive iron

leads to tissue damage, as a result of the formation of free radicals. This study has undertaken to assess the health impacts of mining in Keonjhar district. The potential health diseases include malaria, acute respiratory infection, Water Borne Disease, Fever, Typhoid, Blood pressure and Jaundice.

Keywords Health impacts, Iron mining, Keonjhar district, Environmental pollution, Health disease.

Introduction

Keonjhar district occupies a significant place in the mineral capability map of northeastern India. The high quality of iron and manganese ore deposits are found to be located under large tracts of forestland, rich in bio-diversity and use of mineral resources is fundamental to human well-being as they are essential to virtually every sector of the economy, are they basic for human-built environment, and provide desired services (Shields 1998). Mines many be proposed in area where extraction is not a preferred land use such as adjacent to or beneath an existing community or an environmentally sensitive area. Because these practical aspects have not always been well managed, they are causes where the extraction, use, and disposal of mineral resources have negatively impact societies and the environment. Mining as an economic activity could provide an important structure for the development of countries that are endowed with rich minerals. It can establish new communities and de-

Devasish Murmu*, Rojali Maharana, Nabin Kumar Dhal
Environment and Sustainability Department,
CSIR-Institute of Minerals and Materials Technology,
Bhubaneswar 751013, Odisha, India
e-mail : debasismurmubiotech@gmail.com
 rojalimaharana111@gmail.com
 nkd.radha@gmail.com

*Corresponding author

Table 1. Communities by village and gender.

Name of village	Tribes											
	Munda		Gond		Bhuniya		Bhumija		Mundari		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Nuangaon	2	2	6	2	1	1	1	1	1	8	11	14
Kendudihi	2	4	3	4	1	4	2	2	4	4	16	18
Panli posi	1	1	2	1	0	0	2	1	0	0	5	3
Gandhar pada	1	1	2	1	0	0	1	0	1	0	5	2
Guali	2	2	1	1	1	0	2	1	0	0	6	4
Topai	1	2	4	5	1	1	1	2	0	0	7	10
Barapada	2	1	5	7	2	3	1	1	1	0	11	12
Total	11	13	23	21	6	9	10	8	7	12	59	63

velop the existence ones, but it can also result in considerable disturbances in the region (Mining Minerals and Sustainable Development (MMSD) 2002). Mining cannot be done without unduly interfering and damaging the environment. This has in turn badly affected the lives of the local communities (Ezeaku 2012, Monjezi et al. 2009). Almost all the iron ore mines and deposits in Odisha are located in the scheduled areas of Keonjhar and Sundargarh districts. Keonjhar is predominantly, a small rural district of Odisha, India, occupies an important place in the country with a high concentration of Scheduled Tribes population. The situation in these scheduled areas are already extremely disturbing, with massive mining leading to displacement of tribal's, destruction of their livelihood support system including forests and water sources, large scale air and water pollution, and cultural genocide through massive influx of outsiders. There are few studies about tribal people of mental health of miners in comparison to studies of other overall occupational health problems. Studies that do exist are principally, once again from Northeastern India's state of Odisha in Keonjhar district. They cover mental health in isolated mining communities where evidence on poor mental health for miners in this situation is disputed over time (Burvill 1975, Neil and Brealey et al. 1983). They had a significantly higher prevalence of symptoms associated with mining related exposures when compared with the population controls—over twice as high for some symptoms (Friis and Carter et al. 1998). For communities related to mine operations, or non-occupationally exposed populations; mining activities can impact on health at various levels. First, there are adverse health effects that

result from environmental exposures to air, water, soil, and noise pollution. Second, and equally important for community health, are non-environmental exposure such as mining disasters and pit closures, which can affect the community indirectly and directly. Mental health problems are one example of the adverse health effects in the tribal community. The main objective of this study is to analyze the relationship between large-scale mining activity and their affected local tribal communities in particular area. The health status of the different tribal groups is observed to be far from satisfactory in comparison to their sister counter parts of urban and rural areas of India (Sen Gupta 1980, Mahanty and Sahu 1991, Hanumantha et al. 1993, Meera and Leelathy 1997). The incidence of angular stomatities, glossitis, night blindness, photophobia, malnutrition and non-nutritional disorders like scabies, dental caries and malaria are found to be

Table 2. Population distribution by age and sex.

Age group	No. of male	No. of female	Total
0–5	25	28	53
5–15	48	61	109
15–25	75	79	154
25–40	61	49	110
40–60	45	49	94
60 and above	53	37	90
Total	307	303	610

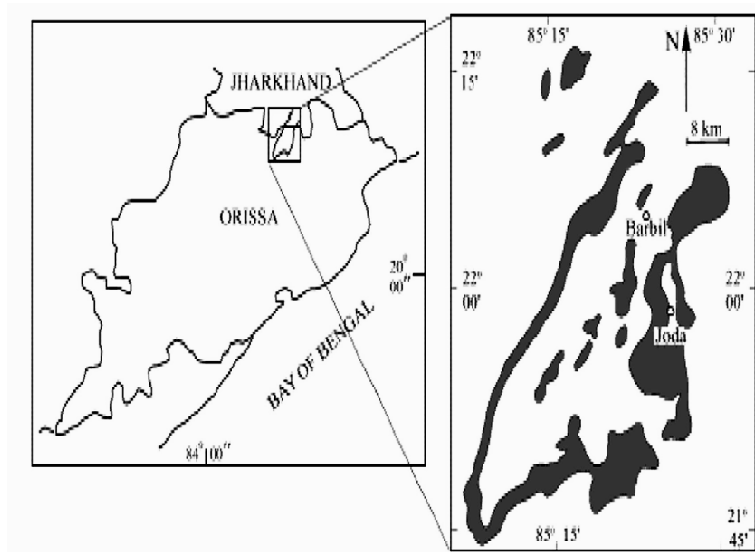


Fig. 1. Map showing the study area figure (S.K. Das et al. 2010).

high in the tribes of Andhra Pradesh, Central India and other parts of India (NIN 1973, Pingale 1973, Sharma 1971, Ali 1978-79). Various study in India, indicated that unhygienic living conditions of the tribal are the major cause of skin infection and gastric disorder (NIN 1973, Pingale 1973, Ali 1978-79).

Study area

The RAAMTA COMPANY Iron Ore Mines of M/s B.I.CO Mines (P) Limited is a large capacity mine within the Odisha state in India and carrying out mining activity since 2001. The mine is located in parts of Nadidhi and Kendudih village and adjoining reserve forest of Joda Range, Keonjhar Forest Division. Figure 1 depict the topographic view of the B.I.CO Iron ore Mines. The minerals extraction through mining processes at Joda associated with different peripheral environmental problems like dust traffic road communication, contamination of soil, damaging agriculture lands, loss of biodiversity, lowering of groundwater and other related issues. The disease pollution resulting from leakage of minerals also affects the health of the local population. The large-

scale sufferers of this change are Forest and the sharp increase in wasteland which is putting negative implication on the livelihood of tribal's. The study area located is Guali Gram panchayat under the Joda block of Keonjhar district in Odisha, India. It is situated 22 km away from sub-district headquarter Rugudi, and 88 km district headquarter Keonjhar was selected to carry out the study. In this area, hematite iron ore mining is extensive, and four of the largest surface mine concessions in Guali panchayat that is K.J.S Ahluwalia, R.P. Sahoo, Iron Urbance and B.I.O.COM are cited here (Armah et al. 2016). According to Kuma and Younger (2004) as Keonjhar district falls under Fifth Schedule Area and more than 60% populations are tribal, and their living condition is not much developed, it help us in understanding their health problem. Guali is one of the tribal-dominated sub-division in this district where more than 75% people belong to tribal communities. Here tribal communities like Gond, Mahakud, Kolha, Bhuiya, and Mundas are found. The mining was selected for study in Keonjhar district: Joda block, with a high concentration of mines, and block, which has no iron ore mines but is potentially affected by mining in neighboring blocks. All of the sample villages fall within the peripheral development

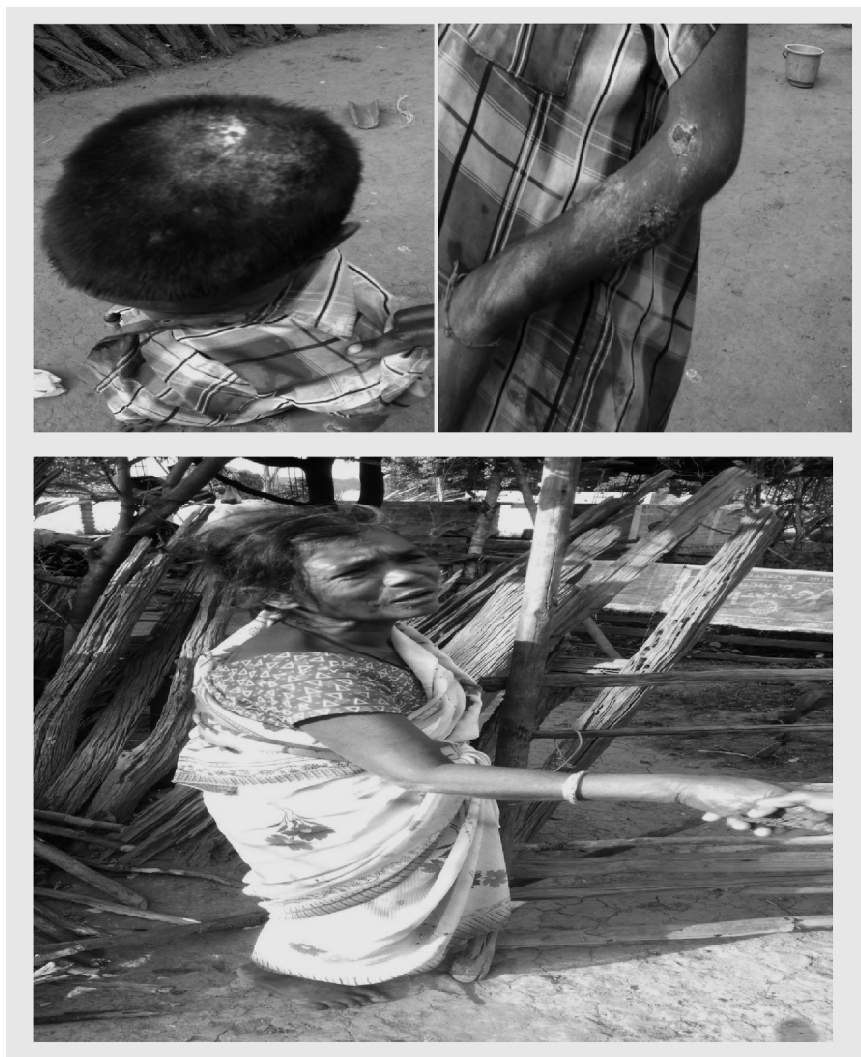


Fig. 2. Health and economic class of local people.

zone of 50 km from the mining area.

Sampling procedure and data collection

Data for the case study were obtained from both primary and secondary sources. Primary data were obtained using a combination of methods, including participatory rural appraisal (PRA) tools and tech-

niques, participant observations, and informal and formal surveys. Observations based on schedules, questionnaires. Secondary sources include various reports, records, literature, documents, maps, charts, and photographs, collected from various public and private organizations. The first study area comprises a large scale of ongoing developmental activities including mechanized iron ore mines and crusher and in some places this area consists of large deposits of iron ore covering with dense forest.

Table 3. Preference of treatment of diseases.

Disease	Treatment approach			Total	Percentage
	Private doctor	Village medicine man	Govt. Doctor		
Malaria	25	24	9	58	17.79%
ARI (Acute Respiration Infection)	18	15	11	44	13.49%
Water Borne Disease	34	31	17	81	24.84%
Fever	36	34	22	92	28.22%
Typhoid	5	3	2	10	3.06%
Blood pressure	3	2	4	9	2.76%
TB	3	1	4	8	2.45%
Jaundice	6	10	7	23	7.05%
Total	130 (39.87%)	120 (36.80%)	76 (23.31%)	326	100

Results and Discussion

Socio-economic characteristic of respondents

Agriculture is the primary means of livelihood of the tribal people of this area. 78% of the total workers depend solely on agriculture. They consider it more stable, independent and regular than the allied activities. The agricultural income of the tribal is not that secure due because their techniques are elementary. Agriculture is exposed to the vagaries of nature, and the modern method of protecting crops against nature's caprices and destruction by insects, pests and wild animals are not known to them. Due to geographical condition and traditional method of cultivation, the average yield is low. The second crop is unthinkable without assured irrigation facility. In the tribal villages, the households live spread apart in hamlets rendering contacts by extension workers difficult. The main source of income of these native tribal women comes from making and selling rice bear. Women constitute about one-third of the total mining workers in these areas. Many of men and women are employed as casual workers under the contractor. Mining contractors make use of child labor along with women as casual laborer's in mining areas of Bansapal, Joda, and Barbil, in violation of The Mines Act 1952.

Tables 1 and 2 reflect that around 33.3% households are female dominated. While the highest female-headed households were observed among the

Gond tribe, the lowest was observed among Bhuniya.

Tribal people problem by mining

Most of the mining areas of the district are in the forest that is inhabited by tribal populations who are heavily dependents open forest for their livelihoods. After the commencement of mining, the family income has been found to have reduced significantly as a less number of people are dependent on mining, and their crop field has been wasted due to mining activities which were previously used for cultivation. It has been found out that the agricultural lands surrounding the mines have become infertile due to air, water pollution and deposition of the huge amount of overburden. The people have a very limited safety and secure place as frequent accidents, crimes, and diseases which are affecting normal life of people. Although more than two hundred billion tons of iron ore has been produced from Keonjhar more than 65% of Keonjhar's population still lives below the poverty line.

Health status of tribal people in mining area of Keonjhar district

Mining extracted mineral may have indirectly led to spread of malaria. Moreover, prolonged inhalation of dust from mining operations is another concern, due to potential lung damage, and respiratory disease.

Hence, all of these interests are challenging and required urgent attention. The conceptual framework of health status and their treatment due to mining is presented in below (Table 3).

The health of all the members of the tribal's family has studied by asking the question regarding the health problem they have in the last one year. Accordingly, scores were given. Families who have person suffering from common diseases like Malaria, ARI, Waterborne Disease like loose stool, cholera and diarrhea are 39.87%, 36.80%, and 23.31% respectively. Families having persons' suffering from severe diseases like TB, Blood pressure are below 5%, and such families come in the average category.

Some of the health impacts of iron mining with concerned persons are represented by Fig. 2.

Kabiraj also known as village medicine man, they provide some herbal medicines for all short common diseases. Kabiraj also reveals some interesting procedure for the diagnosis of the disease. Kabiraj of this village provides medicines for malaria, jaundice, stomach pain, joint pain. He used to go to the forest and collect some fruits and roots of the trees and prepare some medicines as per his knowledge.

Conclusion

In this study is one of the first attempts towards comprehensive analyses of health impacts of mining on the local population. We found consistent environmental health impacts as villagers living in proximity to mining areas. The maximum people are suffering from fever (28%) followed by Water Borne Disease (24%) due to the contaminated soil and water condition and least affected by blood pressure and TB @ 2% each. The poor financial condition is another important factor, which makes most of the villagers vulnerable to taking health care. Even they are suffering from the severe chronic disease they are avoiding to visit the doctor due to their poor financial condition. Appropriate regulation and approach are a need for mitigation of mining impact. The facility should provide to encourage the village vaidyas as maximum people are getting benefit from them.

References

- Ali A (1978-79) Health and genetic problems of Kutiakondha of Burlubaru village, Phulbani district, (Orissa). *Adibasi* 17 : 56—62.
- Armah FA, Boamah SA, Quansah R, Obiri S, Luginaah I (2016) Working conditions of male and female artisanal and smallscale goldminers in Ghana: Examining existing disparities. *Extractive Industries Soc* 3 : 464—474.
- Burvill PW (1975) Mental health in isolated new mining towns in Australia. *Aust NZ J Psychiatry* 9(2) : 77—83.
- Das SK, Das B, Sakhivel R, Mishra BK (2010) Mineralogy, Microstructure, and Chemical Composition of Goethites in Some Iron Ore Deposits of Orissa, India. *Mineral Proc and Extractive Metallurgy Rev. An Int J* 31 (2) : 97—110.
- Ezeaku PI (2012) Evaluating the influence of open cast mining of solid minerals on soil, land use and livelihood systems in selected areas of Nasarawa State, North-Central Nigeria, *J Ecol Nat Environ* 4 (3) : 62—70.
- Friis L, Carter et al. (1998) Self-reported health problems among Swedish miners one year after unemployment. *Occup Med (Lond)* 48 (5) : 297—301.
- Hanumantha R (1993) Assessment of nutritional status of jenukurabas-a primitive tribe of Karnataka. *Ind J Nutr Diet* 30 : 66—71.
- Kuma JS, Younger PL (2004) Water quality trends in the Tarkwa goldmining district, Ghana. *Bull Eng Geol Environ* 63 : 119—132.
- Mahanty AK, Sahu PN (1991) Food habits childhood mortality growth and nutritional status of the Rural Kisans of Sambalpur, Orissa. *Man in Ind* 71 (4) : 601—610.
- Meera S, Leelavathy KC (1997) Impact of nutrition training on food consumption pattern of Santhal Tribal women of Bihar. *Ind J Nutr Diet* 34 (4) : 99—101.
- Mining Minerals and Sustainable Development (MMSD) (2002) Breaking new ground, Report by International Institute for Environment and Development., London, available at: www.iiied.org/mmsd-final-report.
- Monjezi M, Shahriar K, Dehghani F, Namin FS (2009) Environmental impact assessment of open pit mining in Iran. *Environm Geology* 58 (1) : 205—216.
- National Institute of Nutrition (NIN) (1973) Annual report. *Ind J Med Res Hyderabad*, pp 105—108.
- Neil CC, TB Brealey et al. (1983) Deligitimization of mental health myths of new remote mining communities in Australia. *Commun Hlth Stud* 7 (1) : 42—53.
- Pingale U (1973) Some studies in two tribal groups of central India: Part-1, dietary intake and Nutritional status. *Pl Foods Man*, pp 185—194.
- Sen Gupta PN (1980) Food consumption and nutritional tribes of India. *Ecol Food Nutr* 9 : 93—108.
- Sharma K (1971) The Kondhs of Orissa (An Anthropometric study). Concept Publishing, New Delhi, pp 27—43.
- Shields DJ (1998) Nonrenewable resource in economic, and environmental sustainability Nonrenewable Resource, spl. Issue: Sustainability for renewable resource- Alternative perspective 7 : 251—261.