*IOSR Journal of Economics and Finance (IOSR-JEF)*
*e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 4, Issue 4. (Jul-Aug. 2014), PP 23-26*
*www.iosrjournals.org*

# Impact of Iron Ore Mining on Human Health in Keonjhar District of Odisha

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***Abstract:*** *The objective of this paper is to analyse the health status of mining people in keonjhar district of Odisha. The study is based on primary data collected from mines worker in Banspal block of Keonjhar district of Odisha, India. Mines have some positive impact, such as employment opportunity and infrastructural development but their impact on health is negative , which can occur through both environmental and occupational health channels. The people closureto the mine is associated with higher incidence of waterborne diseases, typhoid and fever – most likely associated with changes in water quality and distribution, whereas employment in the mines is clearly associated with acute respiratory infections as might be expected from working in dusty conditions with no protection. Thus, a compensation mechanism should be designed in order to achieve a sustainable development in Odisha.*
***Key Words****: Disease, Iron ore,Health Impact, Mining, Typhoid*

## I. Introduction

Odisha is known as one of the most mineral-rich states of India.According to Directorate of Mines, Government of Odisha, there are more than 26 types of minerals available in the state. But the state Government has identified 13 minerals such as iron ore, bauxite, chromite, coal, limestone, dolomite, fireclay, china clay, nickel ore, mineral sand, manganese, graphite, quartz/quartzite/silica, as major minerals. The mineral resources of the state are widely distributed covering 25 districts out of 30 districts. In odisha there are top 6 districts, where mining activities are being undertaken rampantly include Keonjhar (31.28%), Sundergarh (20.03%), Angul (10.24%) followed by Jharsuguda (8.87), Koraput (6.3%) and Mayurbhanj. There are a total of 605 mining leases covering an area of 99,931.55 Ha in the state which have been granted with mining leases before 31st Dec 2005. The iron ore deposits of Orissa are found in five distinct geographic zones; (1) Bonai-Keonjhar,( 2) Gandhamardhan, (3) Tomka-Daitari, (4) Gorumahiasani-Badampahar (5) Hirapur.

The district Keonjhar is occupying important place in mineral profile of the state, Odisha. There is a huge reserves of high-grade Iron ore, Manganese & Chromites along with other minerals such as Limestone, Dolomite, Nickel, Granite, Pyrophylite, stone, Gold, platinum etc. The district is also playing a significant role in fulfilling the iron ore demand of both domestic and world markets. The reserve of iron ore deposit approximated as more than 1000 million tonne and places of deposits are found at Joda, Thakurani hills, Banspani Hills, Sasangoda hills and Gandhamardhan hill range. The Singhbhum-Keonjhar-Bonai mining belt passes through the district. Iron ore formations occupy most part of the district which can be traced from the Jharkhanda Border in the North to the Jajpur district boarder in the South of the district. According to Indian Bureau of Mines, 2005, the Keonjhar district itself contains 75% of the iron ore reserves of Orissa. The number of total mines has increased over 50 per cent from 76 in 2001 to 119 in 2005. During the past decade, the total value of iron ore mined in Keonjhar was valued at over Rs. 50,000 crores ($US 110 billion), or 21% of India's total production (Firoz, 2008).

## II. Review of Literature

Subroto S Nandi, Sarang V Dhatrak, Debasis M Chaterjee, and Umesh L Dhumne, (2008),in their article "Health Survey in Gypsum Mines in India" explained Mining is a hazardous occupation in which workers are exposed to adverse conditions. This study shows that there is high morbidity amongst miners, indicating the need for regular health checkups, health education, use of personal protective devices, and engineering measures for control of the workplace environment.

Mary Abraham (2008), in his research paper "Mining, Gender and Sustainable Livelihood" highlighted the gender issues involved in the mining sector. . Research studies in the iron ore mines of Goa highlighted that mining operations vastly and disproportionately increase the hardships borne by women in their role as caretaker of food, water and health of the family as well as their livelihood.

G-IE Ekosse (2011), in his article "Health status within the precincts of a nickel-copper mining and smelting environment" explained mining and smelting activities affect the biophysical environment and human health. This paper elucidates on the human health status of residents close to a nickel-copper mine and

concentrator/smelter plant. A link between health status and environmental pollution due to mining activities was thus inferred.

AL. Ramanathan And V. Subramanian (2001), in their article "Present Status of Asbestos Mining and Related Health Problems in India —A Survey" explained health effects (such as fibrosis, sequelae, bronchogenic cancer, and malignant mesothelioma) on the Indian mine workers caused due to asbestos mining related activities with respect to their present day condition.

A. M. Donoghue (2004), in his article "Occupational health hazards in mining: an Overview" outlined the physical, chemical, biological, ergonomic and psychosocial occupational health hazards of mining and associated metallurgical processes. Mining remains an important industrial sector in many parts of the world and although substantial progress has been made in the control of occupational health hazards, there remains room for further risk reduction. This applies particularly to traumatic injury hazards, ergonomic hazards and noise. Vigilance is also required to ensure exposures to coal dust and crystalline silica remain effectively controlled.

Isaac Agyemang (2010), in his journal "Population dynamics and health hazards of small-scale mining activity in the Bolgatanga and Talensi-Nabdam districts of the upper east region of Ghana" explained upsurge of small-scale mining activity in the Bolgatanga and Talensi-Nabdam districts of the Upper East Region following the discovery of gold bearing rocks around the Nangodi and Pelungu areas of the districts. This study attempts to relate population size and health hazards in the study area to the activity of small-scale mining. Based on the findings from field work it was deduced that the prevailing increase in population size and spread of communicable diseases as documented in the Regional Bio statistics service are related directly and indirectly to the activities of the small-scale mining.

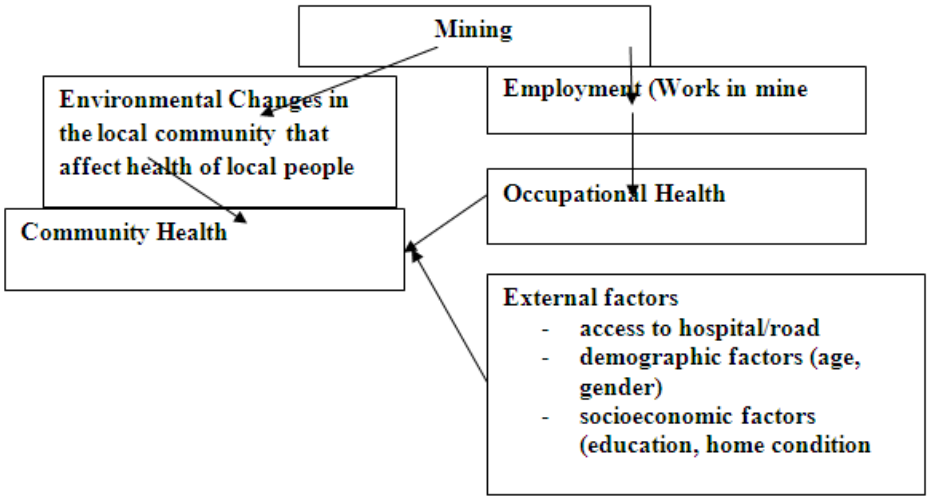
Eisler R (2004), in his research paper "Mercury hazards from gold mining to humans, plants, and animals" explained Mercury contamination of the environment from historical and ongoing mining practices that rely on mercury amalgamation for gold extraction is widespread. Contamination was particularly severe in the immediate vicinity of gold extraction and refining operations; however, mercury, especially in the form of water-soluble methylmercury, may be transported to pristine areas by rainwater, water currents, deforestation, volatilization, and other vectors.

**Health Status of People in Mining area of Keonjhar District**

The state of Orissa lies along the eastern coast of India with the largest reserve of superior quality hematite iron ore in the country. Situated along the Northern border of the state, Keonjhar district was selected for this study because of the concentration of iron ore mines in Joda block within the district5. 31% of the total mining employment in the state of Orissa is concentrated in the district of Keonjhar indicating the importance of the mining industry in the region. Mining for iron ore in the district began in the 1950s, and much of the planned expansion and liberalization of the mining sector in Orissa will open up new mining areas in this region. The recorded forest area in Orissa in 2003 was 4.84 million hectares, which constituted 31.06% of the geographic area and ranked fourth among Indian states in terms of total forest cover6. However, in comparison with 1999, forest cover had decreased by almost a million hectares.According to Forest Survey of India, 1999The district had a relatively high percentage (42.7%) of forest cover in 1999. But, in the two blocks selected for this study, analysis of the classified land cover data reveals that 13.4 square kilometers of vegetative cover were replacedby expanding mining areas between 1989 and 2004.

While mining is beneficial to the economy, both in terms of its own economic impact and the value to other industries of its product, it almost always has adverse environmental impacts and eventually health impacts. Although more than hundred billion tonnes of iron ore has been produced from Keonjhar 62% of Keonjhar's population still lives below the poverty line. While poverty and economic development are key concerns, the issues of health and environmental degradation from mining also matters to the people of Keonjhar. Keonjhar residents have suffered from various health issues regarding to environmental degradation. Mining-related deforestation 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 concerns are challenging and required urgent attention.The conceptual framework of health status of mining is presented in below:

**Fig-1 Conceptual Framework**




**Income Analysis in Banspal Block of Keonjhar District**

The income source of people in the study area is mines and agriculture, but most of people depend on mining. Monthly Income of mine worker is divided into 4 categories.

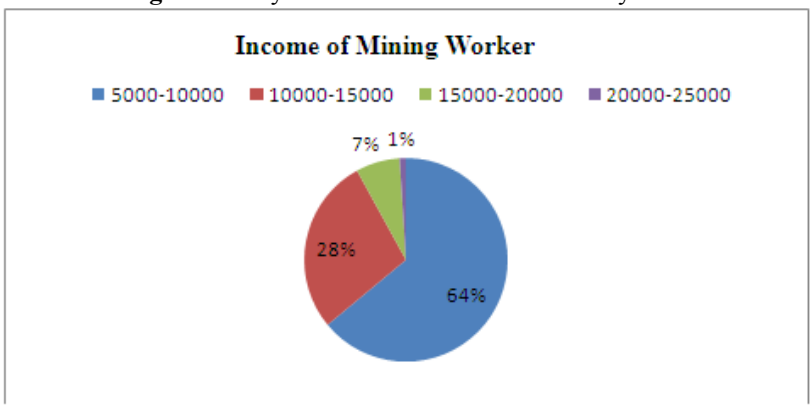
**Table-1** Monthly Income of Mine Worker

| Income from Mining | No. of Households working in mines |
|---|---|
| 5000-10000 | 96 (64 %) |
| 10000-15000 | 42 (28%) |
| 15000-20000 | 10 (7 %) |
| 20000-25000 | 2 (1%) |

Source- field study

The table shows that most of people come under the first category of income i.e. between Rs 5000-Rs.10000. It was 64%. Only 1% people lies in the income group Rs 20000-25000. 42 people that is 28%, earn Rs 10000-Rs.15000 per month and 10 people lies in the income group Rs. 15000-Rs.20000. It is cleared from the table that income of mine worker is not sufficient to compensate their expenditure on treatment.

**Fig-2** Monthly income of mine worker in study area




Health of all the members of the family is studied by asking question regarding the health problemthey have in the last one year. Accordingly, scores was given. Families who have person suffering from common diseases like Malaria, ARI, Water borne Diseasea like loose stool, cholera and diarrheaetc are 40.93%, 28.92% and 14.21% respectively. Families having persons' suffering from severe diseases like TB, Blood pressure are below 5% and such families come in the average category. In families, when the members do not suffer from any major disease come under fair group. The different types of disease reported in the study area is presented through a table:

**Table:2** Disease reported in the study area

| Disease | No. of Individuals | % of disease |
|---|---|---|
| Malaria | 167 | 40.93 |
| ARI(Acute Respiratory Infection) | 118 | 28.92 |
| Water Borne Disease | 58 | 14.21 |
| Fever | 39 | 9.55 |
| Typhoid | 17 | 4.16 |
| Blood Pressure | 5 | 1.22 |
| TB | 3 | 0.73 |
| Jaundice | 1 | 0.24 |

Source- Field Study

**Relation between Expenditure on Treatment and PerCapita Income**

Expenditure on treatment is directly related to per capita income of a mine worker. The persons working in mines and living within or surrounding mines suffers from various diseases. They have also not sufficient income to mitigate their expenditure on treatment of their family.

**Table-3** Regression Results

| Expd. On Treatment | coefficient | Standard Error | t | p> \|t\| |
|---|---|---|---|---|
| pcy | -.0228444 | .0133523 | -1.71 | 0.089 |
| constant | 7784.458 | 290.5498 | 26.79 | 0.000 |

This is clear that expenditure on treatment negatively correlated with per capita income. P value is 0.089 which is significant at 10% significant level.

## III. Conclusion

This study is one of the first attempts towards comprehensive analyses of health impacts of mining on the local population, an important stakeholder in the public policy debate surrounding the proposed expansion and privatization of the mining industry in Orissa. We find consistent environmental health impacts as villagers living in close proximity to mines have higher incidences of ARI and lose more workdays due to malaria. The paper provide important insights on the full impacts of mines, encouraging policy makers to look beyond the obvious positive economic impacts of mining. Of course, these may not be inevitable impacts of mines, but rather, possible to mitigate with appropriate regulation and enforcement, imposing accountability for local environmental and health quality.

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