

# Original Research Article

## Social and Occupational Impact of mining- A case study

### Abstract

The purpose of the study is to assess the impact of mining activities on occupational and social changes. The area affected by mining activities called **beneficiaries** is compared with the area having no effect from mining activities called **Non-Beneficiaries**. Five villages were selected from each area. With the help of a random sampling method, 24 respondents from each village were drawn. Data were analyzed by using two-point scales (dichotomous scale) along with percentages associated with the 'Yes' response and the whole sample tested by the 'Z' test. The traditional structure of rural communities in this area was also reduced. Caste hierarchy and dominance were replaced by professional hierarchy and dominance. Due to mining, the people are more educated and aware to make themselves economically strong. It was found that the level of aspiration of villagers had increased as a result of mining. The study will be a valuable addition to the field of social science and policymaker to enhance the coping capacity related to the impacts of coal mining on socio-economic life. This study gives an idea regarding the Social Structure of the Dhanbad Coal Field. This study is more fruitful for future research.

**Keywords:** Coal mining, Dhanbad, Impact assessment, Socioeconomic study, Environmental issues

### Introduction

The process of taking out minerals from rocks buried under the earth's surface is called mining. After agriculture, mining may well have been the occupation that took the highest human activities. Mining is an activity defined as the removal of minerals from the earth's crust (Down and Stock, 1977 cited in Acheampong, 2004:1) or selective recovery of minerals and materials. Mining and agriculture still provide all the primary resources which are used by modern man. Cropping, fishing, and lumbering are a part of agriculture while mineral, oil, and gas production are a part of mining. Mining in a wider sense can also include the extraction of petroleum, natural gas, and even water (Wikipedia, 2016) and petroleum product is the next important source of environmental pollution and generation of greenhouse gases. Mining a system of locating minerals and exploitation is a long drawn process involving the following eight steps

- a) Prospecting to locate ore.
- b) Exploration to define the extent and value of ore where it was located.
- c) Conduct resource estimate to mathematically estimate the extent and grade of the deposit.
- d) Conduct mine planning to evaluate the economically recoverable portion of the deposit.
- e) Conduct a feasibility study to evaluate the total project and make a decision as to whether to develop or walk away from a proposed mine project. This includes a cradle to grave analysis of the possible mine from the initial excavation through to reclamation.
- f) Development to create access to an orebody.
- g) Exploitation to extract ore on a large scale.
- h) Reclamation to make land where a mine had been suitable for future use. (Wikipedia, 2006).

The modern mining practice has started taking shape with the increasing demand for minerals and indication of metals and minerals deep under the earth's crust. The petroleum product is being recovered through boreholes while tin nickel nugget mining by dredging in water

**Comment [BW1]:** It would be good to mention in the abstract and keywords that the study was conducted in India. Other researchers could be searching for studies conducted in this specific country so it would help them when searching through databases.

**Comment [BW2]:** Why capital letters at the beginning?

**Comment [BW3]:** What idea? Maybe you meant: "gives insight into the social structure"? Why is social structure written starting with a capital letter?

**Comment [BW4]:** Fruitful? Maybe "inspiring"?

**Comment [BW5]:** ? What do you mean by that?

**Comment [BW6]:** This sentence should start the Introduction instead of the first one which is less precise.

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**Comment [BW8]:** Next after what?

mining or ocean is extending to the deep oceans (Encarta, 2005). Mining has many common stages or activities, each of which has potentially adverse impacts on the natural environment, society and cultural heritage, the health and safety of mineworkers, and communities based close to operations (Moody and Panos, 1997, Akabzaa, 2000). Mining operations always create a disruptive environment whether a small project or big (Chernor Momodu Bah, 2016).

All sources of energy including coal also have numerous negative impacts. On the march of development, the resource-rich earth is being destroyed and the dependence on natural resources is becoming the victim (Sahoo, 2005). Whatever may be its form, it may be an opencast mine or underground mine, involves itself with widespread social, environmental and ecological complications such as pollution of air, water, noise and soil, deterioration of agricultural production, degradation of both physical and mental health, involuntary displacement, breakdown of community ties and social networks, etc. Usually, opencast mines require a larger amount of land and owing to their nature of extraction, it nurtures several socio-economic and environmental hazards (Singh, 2015). The process of mineral extraction (mining activity) has a noteworthy impact on the local communities, landscape and environment on the earth (Down & Stocks, 1997 and bell et. all, 2001) which is causing the disturbance of the ecosystem. Mining in a wider sense can also include the extraction of petroleum, natural gas, and even water (Wikipedia, 2016) and petroleum product is the next important source of environmental pollution and generation of greenhouse gases.

Mining is a major economic activity in many developing countries (Tauli-Corpuz, 1997; UNEP, 1997). Mining is viewed as one of the significant economic activities which have the prospect of contributing to the development of economies and contributes nearly 2.4 per cent of Indian Gross Domestic Product (GDP). In North America, raw mineral production in 1998 was valued at approximately US\$ 70 billion. The industry employs approximately 1 million people (Mbendi Profile, 2004). However, the contribution of the mining sector to the GDP of India is on the decline. The mining sector contributed 3.4% of India's GDP in 1992-93. This declined to 3.0% in 1999-2000 and further to 2.3% in 2009-10. And with the sector contracting in absolute terms in the last couple of years, the contribution of the mining sector to India's GDP has come down to 2% in 2012-13 (FICCI, 2013). The present contribution of the mining industry to GDP varies from 2.2% to 2.5% only.

### Mining Scenario in India

Minerals perpetuate as the pillar of cost-effective endowment for every nation of the world and India has been exceedingly bestowed with this bequest of nature (Das, 2015) with established resources of 87 minerals. The country has an abundance of power grade coal, iron ore, bauxite, industrial minerals like dolomite, limestone, magnetite, mica, barites, etc and an adequate reserve of lignite, chromites, manganese, zinc and rock salt. Authentic source of information describes that the information regarding minerals in India is given in 'Arthashastra' which was unruffled by Kautilya, eminently recognized as Chanakya, between 321 and 296 B.C. This provides an inclusive description vis-à-vis mineral and metals as well as their method of production. Even it contributed a detailed assessment of the fabrication of alloys such as brass, bronze, gold and silver. Besides this, Kautilya also pronounced the assets and credentials which are referred to even by the modern scientists (Bagchi & Ghose, 1980; Singh, 1982). During the medieval ages, India had a healthy metallurgical industry under the control of kings till the Mughals established some regulatory controls on minerals. Some of the princely states such as Rajasthan and Mysore continued their process of mining and also had their safety regulations up till the 18th century.

**Comment [BW9]:** The impact of mining has already been mentioned.

**Comment [BW10]:** Already mentioned!

**Comment [BW11]:** Exactly the same sentence can be found on page 1!

**Comment [BW12]:** Per cent?

**Comment [BW13]:** Could you find more recent data?

**Comment [BW14]:** Shouldn't you give exact name of the source of information?

**Comment [BW15]:** Is this part really relevant to the study?

Coal in India was discovered in 1774 in Raniganj and Mr. S.G. Heatly submitted a petition to Warren Hastings for coal mining. The coal was sent to Calcutta for quality analysis in 1775 but was found to be very poor as compared to sea coal and the permission for mining was denied. Coal mining was however started in 1813 for the use of the army after the discovery of some quality coal seams in the Raniganj coalfield. In the year 1880, M/s John Taylor & Sons Ltd. started mining gold at the Kolar Gold Fields. For the first time in India, oil well drilling was done at Digboi in the year 1866 (IBM, 2014a). However, mining activities continued to be the most aboriginal aspect in India ever since the initial phase of the modern era. Subsequently, with the evolution of the industrial economy, the demand for minerals slowly picked up and after independence; Prior to independence it also ensures its share in the exploration of minerals like copper, iron ore, lead, zinc, bauxite, etc. The Indian mining industry has shown tremendous growth under 3 to 7 successive Five Year Plans and all through the aftermath of the 11<sup>th</sup> Five Year Plan (IBM, 2014b). However, the Indian mining industry is categorised by varied minor to large mines, many small mines active winning in minor minerals remains unrecorded as per safety reports. The number of reporting mines actively involved in the production of minerals on large scale was 1229 in 2020-21 as against 1303 in comparison to the previous year. Of them, most mines were in operation in Madhya Pradesh followed by Gujarat, Karnataka, Odisha, Andhra Pradesh, Chhattisgarh, Tamil Nadu, Rajasthan, Maharashtra, Jharkhand and Goa. The numbers of reporting mines in India are given in Table 1.

Comment [BW16]: Is this relevant to the study?

Table 1: Number of Reporting Mines (As per the, Ministry of Mines/Annual Report, 2020-21,

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Government of India).

Sector	2018-19	2019-20	2020-21
All Minerals*	1427	1303	1229
Metallic Minerals	610	566	545
Non- Metallic Minerals	817	737	684
*Excluding atomic minerals, fuel and minor minerals			

Among all the minerals, India occupied 2<sup>nd</sup> rank in the production of coal and lignite during 2017 in the world (IBM, 2018). Over the years, the growing demand for coal is continuously increasing with the growth of the industry for the production of steel, cement, electricity, fertilizer, sponge iron, etc. To fulfill the demand, both the public and private sector coal companies are putting their continuous effort to mine coal rampantly. Even a sharp increase was professed in the production of both coking and non-coking coal by the coal-bearing states.

### Impact of mine on society

Prosperous mining secures the services of the locals and provides them jobs, promoting the living standards of the community. Revenues generated from activities of mining help in developing schools, hospitals and other social amenities. These activities promote business enterprises in the mining regions. For instance, they promote growth in rental houses to provide accommodation for miners. Growth in businesses, such as hotels, is expected to cater to worker needs.

Comment [BW18]: For?

Mining is a source of mineral resources crucial for maintaining and enhancing living standards. Mining is the process of extraction of non-renewable and valuable minerals or geographical stuff from the earth. Materials that are procured through mining include coal, oil, metal, gemstones, limestone, rock salt, gravel and clay. Mining is practiced to acquire the resources that cannot be manufactured in laboratories or factories or harvested through agriculture.

Apart from the pollution of the natural environment mining also leads to impacts on health, destruction of forms of community subsistence, alteration of social relationships, and life, social disintegration, changes in regional cultures and displacement of other economical activities. Mining has numerous activities or stages that have adverse repercussions on the natural environment, civilization and cultural heritage, the safety and the safety of the miners and communities. As indicated by Noronha (Noronha L., 2001), the social and environmental impacts are much more comprehensive in areas where mining operations are newly established or closing. A noteworthy effect of mining is the migration of the people in the mine area, particularly in the isolated area of the developing countries where mining represents the main economic activity. Precarious substances and waste in the air, soil and water generated by mining may have far-reaching negative impacts on public health. When mining activities are not managed properly the activities of mining can abruptly and instantaneously affect the quality of life of the local communities i.e. their physical, mental and social well-being. Impromptu mining towns many times threaten food availability and safety increasing the risk of malnourishment. Indirect effects of mining on public health can include increased cases of tuberculosis, gastrointestinal diseases and chronic bronchitis.

### Study Area

The Dhanbad district is situated in the state of Jharkhand and lies between 23°37'3" N to 24°4' N latitude and 86°6'30" E to 86°50'E longitude. The district expands in the area of 2886 sq.km between Damodar, and Barakar, Rivers, forming its natural southern and south-eastern boundary.

### Data Collection

This study deals with the rationale, methods and techniques which were used to carry out the present study. The study is intensive fieldwork conducted in Bharat Coking Coal Limited (BCCL) of Dhanbad district, Jharkhand.

To legitimize the socio-economic effect of coal mining in the current examination, an endeavour is made to analyze two regions, one is influenced by mining called Beneficiaries and another is non-influenced by mining as Non-Beneficiaries while choosing the Non-Beneficiary as a benchmark group. It is additionally seen that in the mining-influenced village (Beneficiaries), a few changes happened in the structure of demography because of the inclusion of mining. Be that as it may, in a non-influenced mining village, the segment structure is pretty much the same, and no movement is held here. A concentrated review was led in the chosen territory to gather pertinent data. The respondents were met with the assistance of a structured schedule. These boundaries were mindful to choose the effect of mining.

### Sampling technique

Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population. In the present study, the target population is

**Comment [BW19]:** Study deals with methods used in the study? I do not understand this statement.

**Comment [BW20]:** Identify could be a better choice.

**Comment [BW21]:** This sentence is not clear. Why "choose"? Can you choose the objectively existing effects?

those, who are continuously affected by the mining and continue their stay near mining adjacent areas. A purposive sampling technique was adopted for the selection of sample area (district, village) and a random sampling technique for the selection of respondents. The simple random samplings were used in the selection of households. The method adopted for drawing a representative sample of respondents at various stages is given below.

### *Selection of the locale*

#### *a) Selection of villages*

The researcher prepared a list of affected villages (beneficiaries) within a three-kilometer radius of the mines. The probability of villages getting affected by mining is more in the case of nearby villages. Based on this fact, five affected villages, within a 3-kilometer radius, of the above-mentioned mines were selected. As a part of the non-beneficiaries (control group), five other villages were selected for comparison. Which were situated in the same district and more than 8-18 kilometers away from the mining set-up. It is worth mentioning here that, non-beneficiaries villages are not affected by any kind of industrial intervention and they are still practicing their indigenous means of support.

#### *b) Selection of respondents*

Again with the method of random sampling group of 24 respondents from each of ten comprehensive lists of villages were drawn. Thus, a total of 240 respondents were finally chosen to collect information with the help of a structured schedule.

### **Occupational and social changes**

Occupational and social changes are recognised largely as the change in the activities of the members of a society to earn their source of income. These changes are seen in terms of changes in the distribution of these activities in the socio-economic formation of the society. It is only a step further to describe change by categorisation of activities in terms of role prospects and positions and estimation of these role positions. Details of different factors influencing the occupational and social changes during field investigation are given below:

### **Family System**

For the analysis of the family system of the coal mining area, a format of scheduled was formulated and the response of each selected respondent was collected from the mining-affected and non-mining affected area. The whole respondents were categorised into two categories namely beneficiaries and non-beneficiaries. Responses of each respondent were analysed by using two-point scales along with percentages associated with the 'Yes' response and the whole sample tested by the Z test, which is given in Table 2.0.

Table 2.0: Effect of mining benefit on various aspects of the family system.

Sl. N	Statement	No. of beneficiaries	No. of non-beneficiaries	Effect (%)

**Comment [BW22]:** There needs to be information on the gender, age and education level structures of the respondents and the results need to be presented separately for the different characteristics.

**Comment [BW23]:** All the respondents

**Comment [BW24]:** For this and other tables: without interlines the tables would be smaller and thus easier to read.

<b>o.</b>		<b>(N=120)</b>	<b>(N=120)</b>	
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5(3-4)</b>
1.	<b>Do you think the symbol of status</b>			
	<ul style="list-style-type: none"> <li>• Big size of landholding</li> <li>• Pucca house</li> <li>• Pucca and big house</li> <li>• Car-like SUV</li> <li>• Large family size</li> <li>• Govt. Service</li> </ul>	88 (73.33) 84 (70.00) 90 (75.00) 94 (78.33) 72 (60.00) 105 (87.50)	82 (68.33) 70 (58.33) 86 (71.67) 91 (75.83) 68 (56.67) 101 (84.17)	+5.00 +11.67 +3.33 +2.50 +3.33 +3.33
2.	<b>At the time of marriage</b>			
	<ul style="list-style-type: none"> <li>• Participation of all caste people</li> <li>• Organising a big party</li> <li>• Change in marriage pattern</li> <li>• Increase in dowry for son</li> <li>• Abolishment of endogamy</li> </ul>	91 (75.83) 52 (43.33) 71 (59.17) 87 (72.50) 92 (76.67)	52 (43.33) 46 (38.33) 35 (29.17) 83 (69.17) 87 (72.50)	+32.50 +5.00 +30.00 +3.33 +4.17
3.	<b>Family function features</b>			
	<ul style="list-style-type: none"> <li>• Cultural</li> <li>• Traditional</li> <li>• Religious</li> <li>• Economic</li> </ul>	70 (58.33) 88 (73.33) 41 (34.17) 48 (40.00)	52 (43.33) 92 (76.67) 45 (37.50) 45 (37.50)	+15.00 -3.33 -3.33 +2.50
4.	<b>Aspiration in the society by</b>			
	<ul style="list-style-type: none"> <li>• Family background</li> <li>• Occupation</li> <li>• Social Background</li> </ul>	88 (73.33) 93 (77.50) 85 (70.83)	68 (56.67) 79 (65.83) 78 (65.00)	+16.67 +11.67 +5.83

**Comment [BW25]:** Do you mean: Do you think that a big size of landholding is a symbol of status? And so on?

**Comment [BW26]:** Does it refer to the respondent personally or to the village's customs? The same question applies to the remaining statements.

	<ul style="list-style-type: none"> <li>• Caste</li> <li>• Religion</li> <li>• Age</li> </ul>	102 (85.00)	96 (80.00)	+5.00
		66 (55.00)	56 (46.67)	+8.33
		82 (68.33)	78 (65.00)	+3.33
5.	<b>Change in the family due to the mining industry</b>			
	<ul style="list-style-type: none"> <li>• Family system</li> <li>• Status &amp; position of women folk</li> <li>• Parada pratha</li> <li>• Abolition of polygamy</li> <li>• Abolition of child marriage</li> <li>• Removal of the family by the provision of divorce</li> </ul>	105 (87.50)	92 (76.67)	+10.83
		108 (90.00)	91 (75.83)	+14.17
		80 (66.67)	60 (50.00)	+16.67
		15 (12.50)	18 (15.00)	-2.50
		52 (43.33)	48 (40.00)	+3.33
		36 (30.00)	40 (33.33)	-3.33
	<b>Z</b>	<b>2.13*</b>		<b>P&lt;0.05</b>

Note: Figures in bracket are in percentage.

It may be concluded from the above observation that the good impact of mining on the participation of all caste, at the time of marriage and the marriage pattern has changed. Family background is a status of aspiration in the society and due to the mining industry parada pratha has changed was a good impact of mining.

The calculated value of Z (2.13\*) was significant at 5% level of significance. Hence the significant difference of means found to be in beneficiaries and non-beneficiaries categories about Pucca House, Large Family size, organising of party, traditional and religious family function, parada pratha and social background.

#### ***Caste and social stratification***

To find the outcaste system and social stratification opinion from respondents (beneficiaries and non-beneficiaries), some questions were interrogated and responses on a two-point scale along with the percentage associated with 'yes' response are given in Table 3.

From Table 3 may be summarised that the modernization by mining (education facility easily available in a mining area) higher education has played a key role by which a man can understand and change their mentality, therefore they give only emphasis to choosing sound customs.

Table 3: Effect of mining benefit on various aspects of Caste and social stratification.

Sl. No.	Statement	No. of beneficiaries (N=120)	No. of non-beneficiaries (N=120)	Effect (%)
1	2	3	4	5(3-4)
1.	Do you agree that stratification in society is based on the caste system	93 (77.50)	84 (70.00)	+7.50
2.	Are you take drinking water from a common source	103 (85.83)	96 (80.00)	+5.83
3.	Has caste hierarchy belonged to the following change? <ul style="list-style-type: none"> <li>• Caste status hierarchy</li> <li>• Caste educational hierarchy</li> <li>• Caste occupational hierarchy</li> <li>• Caste political hierarchy</li> </ul>	120 (100)	69 (57.50)	+42.50
		112 (93.33)	106 (88.33)	+5.00
		108 (90.00)	102 (85.00)	+5.00
		78 (65.00)	67 (55.83)	+9.17
4.	Do you observe any	96 (80.00)	91 (75.83)	+4.17

	change in the availability of labours from the lower status of society?			
5.	Do you observe the change in the existing caste hierarchy due to the following reason?			
	• Better occupation	115 (95.83)	65 (54.17)	+41.67
	• Higher education	110 (91.67)	98 (81.67)	+10.00
	• Political contacts	65 (54.17)	56 (46.67)	+7.50
	• Social contacts	69 (57.50)	57 (47.50)	+10.00
	• Urban residence	79 (65.83)	54 (45.00)	+20.83
	• Urban contacts	70 (58.33)	50 (41.67)	+16.67
	<b>Z</b>		<b>2.21*</b>	<b>P&lt;0.05</b>

Note: Figures in bracket are in percentage

The observed value of Z(2.21\*) was significant at 5% probability level hence the significant difference of means was found to be in two categories beneficiaries and nonbeneficiaries on various aspects of caste and social stratifications i.e. caste, education, occupation, status and drinking water from common sources.

#### ***Status of Women in society***

To know the status of women in the society of beneficiaries in the coal mining area and non-beneficiaries (non-affected by coal mining) respondents were interrogated and questioned from a developed structured schedule related to the status of women in society. While respondents were categorised into two categories namely beneficiaries and non-beneficiaries. Questions were interrogated and by using two point scale along with percentages associated with 'Yes' responses are given in Table 4

Table 4: Effect of various aspects of the status of women in beneficiaries (mining-affected) and non-beneficiaries (non-mining affected) categories of villages.

Sl. No.	Statement	No. of beneficiaries (N=120)	No. of non-beneficiaries (N=120)	Effect (%)
1	2	3	4	(3-4)5
1.	Do you think that women should be accorded equal status to men in society?	91(75.83)	63 (52.50)	+23.33
2.	Widow women should be encouraged to remarry	118 (98.33)	75 (62.50)	+35.83
3.	Women should be allowed to move without purdah (curtain).	73 (60.83)	65 (54.17)	+6.67
4.	Women of lower caste families use purdah more than higher caste ones.	25 (20.83)	20 (16.66)	+4.17
5.	A widow is considered inauspicious in the society.	78 (65.00)	90 (75.00)	-10.00
6.	The inclusion of a woman in the community service is desirable.	65 (54.17)	56 (46.67)	+7.50
7.	Education for girls helps in the exposure of her capacity.	103 (85.83)	84 (70.00)	+15.83
8.	Entry of women into the	76 (63.33)	60 (50.00)	+13.33

	political area is the need of time			
9.	Co-education system vitiates the social environments of the villages	20 (16.67)	30 (25.00)	-8.33
10.	The woman's job areas should be limited.	30 (25.00)	38 (31.67)	-6.67
11.	The role of women empowerment in respect of decisions for Family planning/Marriage/Education	85 (70.83)	75 (62.50)	+8.83
12.	Women's best role is to Nurture and socialize the children in family	92 (76.67)	91(75.83)	+0.83
13	Equal rights to women have been accorded in all walks of life	63 (52.50)	81 (67.50)	-15.00
14.	Child Marriage should not exist nowadays	8 (6.67)	13 (10.83)	-4.17
	<b>Z</b>	<b>3.421*</b>		<b>P&lt;0.05</b>

Note: Figures in the bracket are a percentage

**Comment [BW27]:** Without the interlines the table would be smaller and thus easier to read.

It may be concluded that the positive impact of mining on the view of villagers about widows should be encouraged to remarry and the status of women should be equal to men in society. They give importance to education for girls helps in the exposure of her capacity and also positive impact was seen on entry of woman in the political area, the role of woman empowerment in respect of decision for family planning/marriage/education, the inclusion of a woman in the community service is desirable, purdah (curtain) is not required to woman and process nurturing and socialization of children, this modernization (view changes) came in villagers as an impact of mining.

The calculated value of Z (3.421\*) was found to be significant at 5% probability level. Hence a significant difference of means arises between beneficiaries and non-beneficiaries categories concerning various aspects of women's status i.e. job area, political area, education and equal rights.

### **Religions and Social Values**

India is a very religious nation. The majority of Indians say they belong to a particular faith and large percentages agree with statements about key religious beliefs and behaviors. Religions affect different areas of life if the religious human being allows that to happen. One of these areas is the area of social values. Many people choose to have very moral and social values and their way of thinking has nothing to do with their religion. Others have a decent, clean social life because of what their religion has educated them. There are several ways that religion can affect the social values that a person has. Modernization (due to mining) plays an important role in religious values. In urban regions higher is the rate of modernization more flow in social and religious values contrary to it in rural areas higher the rate of modernization more vigorous adoption of religious and social values. The impact of mining on the social and religious values of the beneficiary and non-beneficiary categories of villages is given in Table 5. Given social and religious values the opinion of a respondent using two point scale along with percentages associated with a 'Yes' response are given in Table 5.

Table 5: Effect of mining on social and religious values of beneficiaries and non-beneficiaries categories of villages.

<b>Sl. No.</b>	<b>Statement</b>	<b>No. of beneficiaries (N=120)</b>	<b>No. of non-beneficiaries (N=120)</b>	<b>Effect (%)</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>(3-4)5</b>
1.	Cleanliness and sanitation of the house are good for normal health.	120 (100)	102 (85.00)	+15.00
2.	Rituals are helpful in the proper development of the personality of the individuals.	67 (55.83)	61 (50.83)	+5.00
3.	Religious institutions are quite	70 (58.33)	67 (55.83)	+2.50

	vital for the social control.			
4.	Worshipping and propitiation of god and Goddess help in the attainment of peace of mind.	101 (84.17)	84 (70.00)	+14.17
5.	Religious beliefs and practices lead the path to heaven.	57(47.50)	50 (41.67)	+5.83
	<b>Z</b>	<b>0.068</b>		<b>P&gt;0.05</b>

Note: Figures in bracket are in percentage

The observed value of Z was found non-significant at the 5% level. Hence no significant difference of means was found to be in the social and religious values of beneficiaries and non-beneficiaries categories.

#### **Role of Education**

Education has an important role in the social well-being of society. Food, clothing and shelter, it is a basic requirement for the upliftment of human values. To study the effect of education on respondents beneficiaries and non-beneficiaries categories of villages questions were asked and by using two point scale along with percentages associated with 'Yes' response are given in Table 6.

Table 6: Effect of mining on education on beneficiaries and non-beneficiaries categories of villages.

Sl. No.	Statement	No. of beneficiaries (N=120)	No. of non-beneficiaries (N=120)	Effect (%)
1	2	3	4	5 (3-4)
1.	Education encourage for better way to understanding.	108 (90.00)	84 (70.00)	+20.00
2.	Education is a basic necessity for the upliftment of human	103 (85.83)	92 (76.66)	+9.17

	values.			
3.	By education people quickly aware/understood about new scheme/ new technology/ plan	107 (89.16)	92(76.66)	+12.50
4.	By education, men know more ways to earn more money.	106 (88.33)	97 (80.83)	+7.50
5.	By education men get regards in society	102 (85.00)	98 (81.67)	+3.33
	<b>Z</b>		<b>4.631*</b>	<b>P&lt;0.05</b>

Note: Figures in bracket are in percentage

The overall effects of education remained positive in all the above statements. The highest effect was observed that it helps to a better way to understanding and minimum effect percent was observed in by education men get regards in society.

There is still enough scope for education in coal mining areas. Thus in the process of beneficiation, the role of education may be further enhanced by educating millions of people residing in thousands of non-beneficiaries groups of villages.

The observed value of Z (4.631\*) was significant at 5% level of significance. Hence the statistically significant difference of means found to be in effect of mining on the education of beneficiaries and non-beneficiaries categories i.e. educated person know about earning, education as a primary requirement of human and educated person has a better response in society.

### **Quality of Life (QOL)**

Quality of life (QOL) is the general well-being of individuals and societies, outlining negative and positive features of life. It observes life satisfaction, accompanied by everything from physical health, family, education, employment, wealth, religious beliefs, finance and the environment. The social impacts of large-scale mining projects are controversial and complex. Mineral development can create wealth, but it can also cause a huge disturbance. Mining projects may create a common facility for life quality improvements like jobs, roads, schools, and hospitals and increase the demands for goods and services in remote and impoverished areas. To study the effect of mining on the common facility for life quality improvement of beneficiaries and non-beneficiaries categories of villages questions were asked and by using two point scale along with percentages associated with 'Yes' response are given in Table 7

Table 7: Effect of mining on the common facility for life quality improvement of beneficiaries and non-beneficiaries categories of villages.

Sl. No.	Statement	No. of beneficiaries (N=120)	No. of non-beneficiaries (N=120)	Effect (%)
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>(3-4) 5</b>
1.	The benefit of the local market.	102 (85.00)	91 (75.83)	+9.17
2.	Benefit Road and vehicular movement facility	110 (91.67)	98 (81.67)	+10.00
3.	Street light, road maintenance and cleaning is good	105 (87.50)	30 (25.00)	+62.50
4.	Drinking water facility is good	98 (81.67)	40 (33.33)	+48.33
5.	Power supply( for household purpose and light tool operation)	101(84.17)	56 (46.67)	+37.50
6.	Scope of skill-developing (weaving, stitching, carpentry, etc.)	50 (41.67)	25(20.83)	+20.83
7.	Village is free from environmental problem (Noise, vibration, air and water pollution)	18 (15.00)	110 (91.67)	-76.67

8.	Human health is not effected by any pollution	22(18.33)	107(89.16)	-70.83
9.	Medical dispensary facility near village	92(76.66)	48(40.00)	+36.66
	<b>Z</b>	<b>2.37*</b>		<b>P&lt;0.05</b>

Note: Figures in bracket are in percentage

It is evident from Table 7, that the highest effect of mining on beneficiaries was observed for a common facility for life quality improvement was found for street lights, road maintenance and cleaning and drinking water facility in the society.

The Calculated value of Z (2.37\*) was significant at the level of 5% concluding that common facility for life quality improvement of beneficiaries and non-beneficiaries categories like power supply, skill development, road maintenance and good environmental facility. Therefore, it was finally found that there was a significant impact on a common facility for life quality improvement except some.

## Findings

It was observed that there is a good impact of mining for participation at the time of marriage by all caste (+32.50 percent) and the marriage pattern has also changed (+30.00 percent). Family background is a status of aspiration in the society (+16.67 percent) and parda pratha (+16.67 percent) has changed due to the mining industry.

- It was found that higher education played a key role in which a man can understand and change their mentality and thus the man can give the importance to choosing sound customs.
- In the beneficiaries group, the positive impact of mining was seen because villagers about widows should be encouraged to remarry (+35.83 percent) and the status of women would be equal to man in society (+23.33). The villagers residing near the mining area are also giving the importance to the education of girls to help in the exposure of her capacity and the positive impact was seen on entry of women into the political area is the need of time, the role of women empowerment in respect of decision for family planning /marriage/ education, the inclusion of women in the community service is desirable, purdah (curtain) is not required to woman and women's best role is to Nurture and to socialize the children, this modernization (view changes) came in villagers as an impact of mining.
- Religious institutions were believed to be an important measure of social control. The respondent had faith that worshipping and propitiating god and goddess helps in the attainment of worldly pleasure and eternal peace.
- In the mining area, the highest positive (+20 percent) effect was observed in the statement "education encourages a better way of understanding" and a minimum of +3.33 percent effect was observed in the statement "educated men get respect in society" in beneficiaries group. There is still enough scope for education in coal mining areas. Thus, in the process of

beneficiation, the role of education may be further enhanced by educating millions of people residing in thousands of non-beneficiaries groups of villages.

## Conclusions

Based on the overall experimental findings, it can be concluded that mining is beneficial for local people residing near the mining area in terms of economic expansion and decreasing poverty. The society in the mining area has got employment opportunities, education facilities, medical facilities, transportation facilities, the establishment of new infrastructures and initiated a crusade against poverty in the mining area. It is found that the mining activities improve the modernization in the society and people residing in the mining area and also change their thoughts. People, residing in the mining area, are leaving their traditional culture and adopting new ideas/technologies. The traditional structure of rural communities in this area was also reduced. The caste hierarchy and dominance were replaced by professional hierarchy and dominance. Due to mining, the people living in this area are more educated and aware to make themselves economically strong. It was found that the level of aspiration of villagers had increased as a result of mining.

Coal mining creates employment and attracts investment. The people residing in the mining area have got mining jobs and the additional employment due to increased infrastructures, which is beneficial for the local and regional communities especially; in case of significant under-employment, new jobs in the mining sector had increased the income, which in turn improves qualities of life.

Based on the above findings, it is also concluded that the introduction and inclusion of coal mining have provided the atmosphere for the economical gain of villagers. It had also increased the different employment as well as a business opportunity in comparison to the non-beneficiary villages. The mining had provided the scope for financial upliftment of the people living in the mining area. But, there is a significant negative impact on agriculture, social structure and health aspect of the residents of colliery people. Even after better infrastructure, it has created favourable conditions for air, water and noise pollution. Although the provision of medical assistance is available, which is restricted to the employees of Bharat Coking Coal Limited (BCCL), a subsidiary of Coal India Limited (CIL). People other than BCCL employees are not fortunate enough to avail the facility of medical assistance.

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Comment [BW28]: Why "experimental"?

Comment [BW29]: A bizarre statement: what do you mean by that?

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