

Coal Mining Environment and Health Problems: A Case of MCL affected Households at Talcher, Odisha (India)

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Abstract: Coal- fossil fuel found in the earth's crust has been the most significant mineral for energy production and economic prosperity in the modern world. However, its mining methods, especially the opencast coalmining undermine the environmental sustainability and disrupt local people's sense of ecological harmony in the mineral rich regions. The coal polluted environment grossly violates mental, physical and social well-being of the people who cannot help living in the coalmining locality. Our study reveals that the questions of health rights, health equity and health justice have been largely neglected in the coalfields area. The Mahanadi Coalfields Limited (MCL)- the Mini RATNA under Coal-India Limited (CIL) located in Odisha is no exception to these facts. It has been the most profit making coal subsidiary in India. However, its negative externality and physical adversity have made MCL Talcher locality one of the most critically polluted zones in India. The unavoidable truth of coalmining caused disaster has been the cause and consequences of human, social and environmental problems in the locality. The paper taking pre- and post-displaced scenario of affected/displaced villages explains the dynamics of infrastructure based-community health against coalmining environment. The inadequate social amenities and their no or least maintenances, pollution at their sources, etc have been the ongoing disrupting factors in the process of achieving people's health in Talcher locality. Our study reveals that the coal-based pollutants are alarmingly increasing the scale of displacees' morbidity and mortality in the coalfields locality. The polluted environment and disturbed ecology resulting concomitant effect on local people's physical bodies, minds and societies in a detached circumstantial settings warns a unique pessimism of no returns. The qualitative inquiry through quantitative factors and dimensions of mining environment and health problems in the paper certainly proposes a perspective resolution.

Keywords: Coal Mining Environment, Health Hazard, Health Perception, Health Situation, Coal Caused Diseases, Village Health Amenity

I. Introduction

Mining the minerals has been most the profitable business and established economy worldwide. Of all minerals coal has been the most valuable mineral and viable means for rapid growth of capitalistic economy worldwide. In the energy driven world the contribution of coal is indispensable and hence, its extraction is unavoidable although it is increasingly proved to be the most polluting mineral. The Coal-India Limited (CIL) since 1970 has been the most dominating and profit making public sector unit in India. In term of coal production and profit generation the coal mining industries makes miracle worldwide. In this context, the method of opencast coal mining is promising comparison to the methods of underground coal mining. But comparison to latter the former methods acquires more lands, damages more land surface, destroys more forests, disturbs more environments and severely destabilizes ecological settings, involuntary displaces more people, and so on without much concerns and correction. The overviews on coal mining impact reflect three contradictory viewpoints such as coal mining versus local people, coal mining versus local environment and interrelationship between mining, environment and people (see, Goswami, 2013; Garada, 2013a, 2013b, 2012, 2011, 2009 and 1995; Mathur, 2008; Oommen, 2006; Oommen, 2004; Meher, 2003; Pandey, 1998; Warhurst, 1998; Patel, 1990; Bose and Singh 1989, Bandyopadhyay, and Shiva, 1988). It also gives a critical reflection of the ideologies emerging like the pro-mining and anti-people, anti-mining and pro-people and pro-people and pro-mining together (see, Goswami, 2013; Garada, 2013, 2012, 2011 and 2009, Pandey, 1998). In fact, the last category brings a win-win dialogue for the people and mining project together. But even after the implementation of the better rehabilitation and resettlement policy (R&R policy) and of corporate social responsibility (CSR) the environmental and social health hazards caused by coal mining operation cannot be rectified. The coal workers suffer from long-term respiratory ailments and industrial bronchitis in the coal mining area. The sulphur dioxide, dust particulates, ozone, etc caused by coal mining operation reduces our life expectancy. Coal dust creates black lungs and its dust particulates and carbon monoxide cause congestive heart failure. The non-fatal cancer, renal dysfunction, ataxia, etc are caused by the coalmining caused pollution. The

coal dust particulates and ozone cause asthma attacks, chronic bronchitis, etc., coal released mercury damages memory and nervous system, coal-caused sulphur dioxide, acid deposition and dust particulates degrade buildings, coal caused carbon dioxide, nitrous oxide and methane cause global warming and so on. These are the established facts worldwide. There are many quantitative data sources for coal mining caused health effects worldwide but hardly any source of their qualitative analysis is found to be there (see, Guha,2014; Chakroborty and Narayan, 2014, MCL, 2014; Garada, 2013a, 2013b, and 2012; Goswami, 2013a and 2013b ; Singh and Gupta 2012; Reza, Jain, and Singh,2010; Reza, Jain, and Singh,2009; MCL Archives, 2007; Lahiri-Dutt,2007; Oommen,2006; XIX,2005, Banerjee, 2004; Sachs,1997; Ramaiah,1995;Gadgil and Guha,1995; Ramaiah, 1995; XIX,1994; <http://www.mcl.-gov.in/Others/ecoalfields.php>, Tiwary and Dhar, 1994; Areeparampil,1989; Bandyopadhyay and Shiva, 1988; Chadwik,1987; Sagan, 1974). The coal mining operation in India and Odisha also more or less cause similar health hazards in the mining area (Das and Mishra,2015; Garada 2013 and 2012; Padel and Das,2008). The questions of illness, sickness and diseases caused by coal mines are highly controversial and a matter of concerns in Talcher coalfields at present. Mahanadi Coalfields Limited (MCL), one of the profit making coal subsidiaries of the Coal-India Limited (CIL) has been undergoing many such challenges in mining area of Odisha.

II. Area of Study and Sampling Design

Mahanadi Coalfields Limited (MCL) is the second highest coal producing and profit making coal subsidiary in India. It is situated at Talcher coalfields in the district of Angul in Odisha. Talcher coalfields are located in the flood plain of Brahmani River. The mighty river Brahmani along with its tributaries namely Tikira, Singida and Nandira flowing in the area are increasingly being polluted by the coal mining operation. The available coal from this area is mainly used as fuel in the industries and thermal power plants of Haryana, Punjab, Tamil Nadu, Andhra Pradesh, Karnataka and Delhi. It is increasingly being used in power plants, textile mills, paper mills, railway trains, iron plants and steel plants in the country. There are five coalfields areas namely Jagannath area, Lingaraj area, Bharatpur area, Talcher area and Hingula area in which many opencast and underground coalmining are operating in the MCL Talcher area at present. The Jagannath opencast coal mine and Bharatpur opencast coal mine selected for the study come under Jagannath area and Bharatpur area respectively. The Jagannath area is located in the Talcher coalfields 12 km away from the nearest railway station Talcher and the Bharatpur area is located 5 km away from Talcher railway station. The study has covered 7 villages, displaced/affected by these two opencast projects in Talcher coal belt. In case of Jagannath opencast project, four villages namely Nakhtrapur-80, Balanda-411, Chandpur-64 and Purunia-7 and in case of Bharatpur opencast project three villages namely Baidesar-50, Anantabereni-250, and Lachhmanpur-49 were displaced by coal mining projects. Except Lachhmanpur village all villages were completely displaced. Out of total 911 households displaced/ affected by these two projects 109 households were selected for the study by taking 12 per cent from each village through simple random sampling method.

Table1: Sample Frame

Affected/Displaced Households	Universe	%	Sample
Project affected/displaced households- MCL	911	12%	109

II.I.Objectives and Analysis

The paper dealing with coal mining environment and health problems projects a comparative picture of pre-displaced and post-displaced situation in the Talcher coalfields. The major objectives of this paper include- to explicate the coal mining caused negative externalities and health problems, to study the dynamics of social amenities and health status during pre-and post-displaced period, to assess health situation and health perception and to critically reflects upon mining caused illness, sickness and diseases among local people. The paper has modestly applied a descriptive design and used simple quantitative method in its analysis.

Table2: Demographic Profile of Pre and Post-Displaced Households

SL.No.	Sex	Pre	Post
1	Male	606 (51.31)	499 (50.56)
2	Female	575(48.69)	488 (49.44)
Total		1181(100.00)	987(100.00)
3	Sex Ratio	949	977.95
4	Average Family size	10.83	9.05

NB: Figures in Parenthesis denote percentage.

Source: Household Survey 2007-08.

The Table-2 reflects that there is no substantial change found in the demographic profile of displaced households. Though the average family size has been reduced such as from 10.83 persons during pre-

displacement period to 9.05 persons during post-displacement period there are still many people living in the joint family structure as few of eligible male got job and left many at home to stay at MCL quarters. The average sex ratio of the population has been increased from 949 in the pre-displacement period to 977.95 females per 1000 males in post-displacement period. Our study reveals that it is because; the traditional mindset of the people as the birth of female child is encouraged till the birth of a boy child in the locality. This is also true that the numbers of unmarried girls and of widows have been increased during post-displacement period. Increasing dowry demand also led to the increasing numbers of unmarried girls. It is also fact that that due to eligibility criteria of rehabilitation and resettlement package and of cash compensation the marital status has been increased during post displaced period.

III. Coal Mine Environment and Health Problems

The mining overburden and coal mines released waste and hazardous substances into rivers which ultimately come on the earth degrade the plain and agricultural lands. The elder land oustees argue that coal dusts, fly ashes and other pollutants decrease the productivity of agricultural lands. There are many cases where the unfilled abandoned opencast mines get filled by rain water and become the breeding ground for mosquitoes. The abandoned opencast mines and inadequate filling of land holes also cause land depression. The mining overburden covers up agricultural land, encroaches on forest land and causes top soil loss. It also affects water table, soil micro-organism, vegetation coverage, drainage, etc. The sounds of blasting, motor vehicles and coal loaded trains on merry go round railway lines have been causing noise pollution in the affected locality. Blasting sound has been causing ground vibration, land slide, joint factures and cracks in mining area. It also adversely affects the health of insects, birds, animals and human beings those who are living in the locality. The air pollution is caused by coal dusts which are more often released into air by mining operation during transportation of coal by vehicles, train and conveyor belt, loading and unloading of coal by trucks at coal depot, coal burning in thermal plant, domestic burning of coal at home, blasting of dynamite and releasing of toxic gases like sulphur dioxide, nitrogen oxide, carbon dioxide, etc. The entire Talcher belt is increasingly being polluted day by day due to extensive coal mining and thermal power plants operation at present. The existing water bodies including big river like Brahmani are now highly being polluted by opencast and underground coalmine activities as stated earlier. The opencast method of mining coal has been proved to be risking the environment and leading to the process of massive deforestation of the coalfields. The affected people argue that it causes excessive heat during summer and drying up ground water sources in the locality. The contaminated ash contained waters, released wastes from open cast and underground mines, coal washeries, surface runoff, etc, released, other industrial toxics released from other nearby industries and the coal dust emission (containing iron, sodium, copper, nickel, chromium, aluminium, zinc, etc) into the streams of rivers pollute the water sources of MCL area. As a result, the existing water canal, springs, dug well, tube well, etc have been severely polluted. The affected and displaced villagers cannot help depending upon the MCL water tanker facility for their drinking water need. But this tanker facility is also irregular, meagre, and usually gets affected by the pollutants. Other than closing the coal mining operation there is no viable option is left for regenerating the water sources as clean and fresh for animal and human habitation in the Talcher locality. The affected, displaced and mining engaged people in and around the coal mines usually experience acute shortage of drinking water during summer season. The increasing scale of coal extraction, mining operation and frequent powerful blasting in the coal mines the localities not only draw water from the deepest recesses but also drink polluted water as stated earlier.

The coal polluted lands, airs and waters are leading to the growth of environmental related diseases among the local people, birds and animals. The diseases like malaria, jaundice, scabies, diarrhea, asthma, respiratory tract infection, tuberculosis, etc have almost become endemic in the Talcher locality. The other non-communicable diseases like diabetes, heart problems, hypertension, arthritis, cancer, rheumatism, paralysis, etc, are increasingly visible and perceivable among the people in the locality. The people argue that their annual and per capital health expenditures are increasing. Since people fall sick more often they fall into the debt trap because they cannot afford to treat their increasing sickness and morbidity at present.

IV. Physical Infrastructure and Health Status in Resettlement Sites

The availability of basic physical infrastructure indicates the health prospect of displaced villagers in their present resettlement sites, colonies and clusters. In this context, we can observe from the Table-3 that the four displaced villages were found to have kutchra and pucca road whereas three displaced villages were found to have only kutchra road before displacement. After displacement almost all resettlement colonies and clusters have been connected with pucca road. However, except central colony the conditions of road in other colonies and clusters are hardly maintained and left rough and top. The displaced people argue that neither MCL mining project nor government authority takes adequate care of the roads at present. The Balanda displaced villagers argued that till 2005, there was no pucca road in their Pabitrapur cluster, and however after 2005 a pucca road

without drain was constructed by the mining authority. The railway line passing close to cluster has become obstacle to approach road toward village. In case of Handidhua resettlement site it is observable that MCL project provided plot, road, well, pond and school are hardly maintained and other important infrastructures like medical, post office, telegraph office, bus stop, etc, are still not there.

Table3: Transportation and Communication Particulars

Displaced villages	Pre-displaced period			Post-displaced period			
	Road	Distance to Railway station	Mode of Transportation	Resettlement sites	Road	Distance to Railway station	Mode of Transportation
Balanda	Kutch and Pucca	11 km	Thella, bullock cart, Cycle, Bus	Pabitrapur Cluster	kutch and pucca	10 km	Train, Thella, bullock cart, Motor Cycle, Bus/ rickshaw
Chandpur	Kutch and Pucca	13km	Thella, bullock cart, Cycle	Handidhua Colony	kutch and pucca	6 km	Thella, bullock cart, Cycle, Motor Cycle, Bus/ rickshaw
Purunia	Kutch	13 km	Thella, bullock cart, Cycle	Central Colony	Pucca	10 km	Train, Thella, bullock cart, Cycle, Bus, rickshaw Buses /car/jeep
Nakhtrapur	Kutch	12km	Thella, bullock cart, Cycle	Kuijungle Resettlement Site	Pucca	6km	Train, Thella, bullock cart, Cycle, Motor Cycle, rickshaw, Bus
Anantaberini	Kutch	17km	Thella, bullock cart, Cycle	Rodhasara Cluster	Kutch	5km	Train, Thella, bullock cart, Cycle, Bus, rickshaw Buses /car/jeep
Lachhamanpur	Kutch and Pucca	22km	Thella, bullock cart, Cycle				
Baideswar	Kutch and Pucca	13km	Thella, bullock cart, Cycle				

Source: Household Survey 2007-08.

The Table3 also explains that except pre-displaced Anantaberini and Lachhamanpur villages the distance of other pre-displaced five villages to nearby Railway station is found to be within 13 km. But in case of self-settled clusters and resettlement colonies the distance to nearby Railway station has been reduced as it ranges from 5km to 10km. This has disrupted the traditional mode of transportation like bullock cart, Thella, Cycle, etc. Thus, in self-settled clusters and resettlement colonies besides this traditional mode of transportation train, motor cycle, bus, rickshaw, car, jeep, etc are increasingly used by the resettlers. But how the present mode of transportation infrastructures contribute to the health of resettlement environment is a matter of inquiry. Many displaced oustees argue that the increasing numbers of vehicle plying around the colonies and clusters highly pollute the environment. The railway line carrying coals pollute the environments without check. About 2500 to 3000 vehicles every day plying on the roads from coal depot to railway siding pollutes the entire vicinity at Talcher. About 100 per cent of displaced households argue that besides environmental pollution the new mode of transportation open up the flood gate of outsiders' entry which develops the ultra-modern culture like drinking foreign liquor, smoking, etc and other problems like gambling, prostitutions, etc. The senior oustees also argue that their people do not remain fit and healthy because they hardly walk for a mile everyday as they used to do even more than that before displacement. Thus, they argue if they do not remain physically active and exposed to vehicular and coal pollution their physical health will not be improved.

IV.I: Electricity Facility and Health Status

The electricity connection in the clusters and colonies indicates the health prospect of the displaced households. However, this was differently reflected in colonies, clusters and resettlement sites. The Table-4 reflects that the pre-displaced villages- Balanda and Anantaberini and affected village Lachhamanpur had electricity connection. And there were neither daily power cut nor frequent low voltages before displacement. But after displacement all resettlement clusters and colonies have electricity connection. However, in the clusters and colonies the supply of electricity is very erratic with frequent power cuts and voltage fluctuation. This is an everyday phenomenon. The displaced oustees argue that the electricity connection in the clusters and colonies does not make any major difference in their life.

Table4: Electricity Facility

Pre-displaced period					Post-displaced period				
Name of the Villages/Sites	Connect ed to househo lds	Conne cted to streets	Power cut	Low volt age	Resettlemen t Sites	Connect ed to househo lds	Connect ed to streets	Power cut	Low voltage
Balanda	Yes	No	Weekly	No	Pabitrapur Cluster	Yes	Yes	Everyday	Yes
Chandpur	No	No	Everyday	NA	Handidhua Colony	Yes	Yes	Everyday	Yes
Purunia	No	No	NA	NA	Central Colony	Yes	Yes	Everyday	Yes
Nakhtrapur	No	No	NA	NA	Kuiojungle Resettlemen t Site	Yes	Yes	Everyday	Yes
Anantaberini	Yes	No	Weekly	No	Rodhasara Cluster	Yes	Yes	Everyday	Yes
Lachhamanpu r	Yes	No	Weekly	No					
Baideswar	No	No	NA	NA					

Source: Household Survey 2007-08.

They also argue that the MCL making huge profit from coal excavation but why it cannot provide them street light in free of cost. Our study reveals the fact that in the beginning MCL had given the street light facilities in the Kuio Jungal colony. But the CESCO disconnected the street light from the colony on non-payment of electricity bill by the MCL authority. They argue that they have to live in dark and suffer from sunstroke on summer. The fortunate few MCL employees use air cooler and conditioners but left out land oustees in clusters who cannot afford suffer a lot. Thus, it is clear that electricity connection to clusters could not bring visible health prospect for the resettlers.

Table 5: Sanitation Facility

Pre-Displaced villages	Private latrine	Drainage facilities	Space for open air defecation	Resettlement Sites	Private latrine	Drainage facilities	Space for open air defecation
Balanda	No	No	Yes	Pabitrapur Cluster	Yes	Yes	Yes
Chandpur	No	No	Yes	Handidhua colony	Yes	Yes	Yes
Purunia	No	No	Yes	Central Colony	Yes	Yes	Yes but no or restricted space
Nakhtrapur	No	No	Yes	Kuiojungle Resettlement Site	Yes	Yes	Yes
Anantaberini	No	No	Yes	Rodhasara Cluster	Yes	yes	yes
Lachhamanpur	No	No	Yes				
Baideswar	No	No	Yes				

Source: Household Survey 2007-08.

The Table-5 reflects a comparative picture of sanitation problems between pre-displaced villages and the clusters and colonies of post-displacement times. The pre-displaced villages did not have private latrine and drainage facilities but had enough space for open air defecation. In the colonies and clusters private latrines, drainage facilities and space for open air defecation are differently available. Since the villagers do not feel comfortable at private latrines largely prefer open space for defecation. The displaced people's health through private latrine and drainage infrastructure is yet to be practiced in the self-settled clusters and resettlement sites. However, the mining employed people living in MCL quarters and central colony do not prefer open air defecation.

IV.II. Water Facilities and Health

The drinking water points/ facilities provided in the villages indicate health status of the villagers. It is observable that the villagers face acute shortage of drinking water throughout the year. The existing water infrastructures are polluted by coal dusts but hardly maintained by the coalmine projects in the present resettlement locations. The water tanker service provided by the MCL is too poor and meagre to meet the drinking water needs of displaced people.

Table 6: Water Infrastructure

Pre-Displaced Villages	Pond	Dug well	Tube well/Hand Pump	Pipe Water Supply	Tank	Water Harvesting Structure	Resettlement sites	Pond	Dug well	Tube well/Hand Pump	Pipe Water Supply
Balanda	8	27	7	0	0	0	Pabitrapur Cluster	1	10	3	0
Chandpur	0	0	0	0	0	0	Handidhua Colony	0	5	4	5
Purunia	0	1	0	0	0	0	Central Colony	0	5	4	0
Nakhetrapur	0	1	0	0	1	0	Kuijungle Resettlement Site	1	14	5	0
Anantaberini	12	25	6	0	0	0	Rodhasara Cluster	0	5	1	0
Lachhamanpur	0	5	5	0	1	0	Total	2	39	17	5
Baideswar	4	4	0	0	0	1					
Total	24	63	18	0	2	1					

Source: Household Survey 2007-08.

The Table- 6 shows that the pre-displaced villages had more numbers of water points for the domestic use and drinking comparison to those new villages. For instance, there were two tanks and one water harvesting structure, 63 dug wells, 18 tube wells and 24 ponds in the old pre-displaced villages. However, at present resettlement colonies and clusters there are only 39 dug wells, 17 tube wells, two ponds in the old pre-displaced villages. Unfortunately, many of them are in dysfunctional conditions. The displaced people argue that the present pond is very small comparison to previous ponds in their pre-displaced villages. The existing tube wells are also remaining dysfunctional and are also drying during summer season. Some of the displaced families have their own private dug wells for domestic purpose. But there is no mechanism to keep these wells free from the pollution of fly ashes, coal dusts.

IV.III.Dwelling Structure

The Table-7 reflects that number of Kutcha house with thatched roof has been drastically reduced from 57.80 per cent during pre-displaced situation to 3.67 per cent during post-displaced situation. However, number of Kutcha house with tile roof was not reduced substantially as it was only one per cent decline. Similarly the numbers of semi-pucca house was not substantially increased as it was 11.01 per cent and 14.67 per cent before and after displacement respectively. But it is true that as much as 56.88 per cent of displaced households were found to have pucca house with concrete roof after displacement. However, present dwelling infrastructure to what extent caters to the survival needs of affected households is a matter of research question. The status of dwelling amenities reflected in the Tables-8 explains that clearly.

Table 7: Dwelling Condition of Surveyed Households

SL.No.	Type of House used	Pre-Displaced	Post- Displaced
A	Kutcha		
1	Kutcha with Thatched Roof	63(57.80)	4(3.67)
2	Kutcha with Tile Roof	28(25.69)	27(24.77)
B	Pucca		
3	Pucca Thatched Roof	3.67	0(0.00)
4	Pucca with Concrete Roof	2(1.83)	62(56.88)
C	Semi-Pucca		
5	Semi-Pucca Thatched Roof	0(0.00)	06(5.50)
6	Semi-Pucca Tile Roof	12(11.01)	10(9.17)
	Total	109(100.00)	109(100.00)

NB: Figures in Parenthesis denote percentage.

Source: Household Survey 2007-08.

IV. IV.Dwelling Amenities and Health

The land oustees argue that now they largely feel shortage of rooms for their habitation and feel congestion and suffocations in the colonies and clusters. Except bed room the number of kitchen rooms and store rooms/extra rooms has been decreased by 8 to 10 per cents and the number of drawing rooms has been increased by 9 per cent respectively in the post-displacement period. There is a variation to this statistics as in case of Central colony the resettled families feel like head loading since there is no scope for extra allotment of

quarters with required rooms and spaces whereas in case of Kuio-jungle resettlement site the people cannot afford to go for big size dwelling structure. However, in the Pabitrapiur cluster the people cannot construct extra building because they cannot do so due to their unaffordability and of their young generation's unwillingness to settle down there for their future. In case of Rodhasore cluster the displaced families also do not have adequate homestead lands for building better dwelling structure. Some of the resettlers from Handidhua and Anatabereni colonies argue that they cannot afford to reconstruct better dwelling structures in the allotted resettlement sites.

Table 8: Basic Dwelling Amenities

Sl. No.	Amenities	Pre- Displaced	Post- Displaced
A	Dwelling Rooms		
1	Bed Rooms	109(100.00)	109(100.00)
2	Kitchen Room	105 (96.33)	98 (89.90)
3	Drawing Rooms	70 (64.22)	80(73.39)
4	Store Rooms/Extra Rooms	71 (65.14)	35 (32.11)
B	Hygienic Infrastructure		
1	Bathroom	15 (13.76)	71 (65.14)
2	Toilets	14 (12.84)	70 (64.22)
3	Drainage	14 (12.84)	28 (25.69)
D	Light and Water Supply		
1	Electricity	92 (84.40)	99 (90.83)
2	Water	5(4.58)	30(32.7)
E	Space & Security Infrastructure		
1	Backside Space	104 (95.4)	22 (20.18)
2	Garden Land	64 (58.72)	14 (12.84)
3	Fencing/ Wall	35 (32.11)	30 (27.52)

NB: Figures in Parenthesis denote percentage.

Source: Household Survey 2007-08.

The only affected Lachmanpur villagers who are at present neither able to shift to anywhere but in the process of leaving the villages since it has been highly polluted by coal mining operation. Thus, except, Lachmanpur village, the self settled clusters do not provide scope for developing better dwelling structures after displacement. In case of hygienic infrastructure available in the pre- and post-displaced households the Table-8 clears that there has been significant change at present as for instance, the number of bathroom, toilets and drainage facilities has been increased (to almost 65%, 64 % and 26%) in the post-displaced period. It is found that as much as 35 to 36 per cent of the oustee households do not yet have bath room and toilet facilities. Many oustees (74%) argue that they do not have required drainage to their households in their resettlement sites and colonies. Our study reveals that the household electricity connection and water facility have been increased after displacement but it has not been better. It has been stated earlier that due to power fluctuation and low voltage the electricity connection does not have any value to their households. Except Central colony the water supply are not observable in the resettlement sites. In case of space & security infrastructure, there are no any visible things in the post-displaced households.

Table 9: Fuel Consumption Pattern of Displaced Households

Sl. No.	Type of Fuel Used	Pre- Displaced	Post- Displaced
1	Gas	0 (0.00)	33 (30.28)
2	Coal	23 (21.10)	42 (38.53)
3	Kerosene	0 (0.00)	6 (5.50)
4	Wood	83 (76.15)	13 (11.93)
5	Cow- dung	1 (0.92)	0 (0.00)
6	Others	2 (1.83)	15 (13.76)

NB: Figures in Parenthesis denote percentage.

Source: Household Survey 2007-08.

The garden land has been increased but size of back space has been drastically decreased. The size of fencing/wall has also been decreased after displacement. Thus, the overall dwelling structures are not conducive for good health of land oustees after displacement. In pre-displacement period as much as 76.15 percent of households used to use wood as cooking fuel in their kitchen against 11.93 per cent at present. Now there are 30.28 per cent and 38.53 percent of displaced households using gas and coal for their cooking purposes respectively. Thus, the Table-9 clears that use of Kerosene, coal and LP Gas has been increased in the affected villages. In fact, the use of LP Gas has not completely replaced the use of wood and coal at present. The

increasing use of coal as cheap fuel energy for domestic and non-domestic purpose further pollutes the environment in the locality.

V. Discussion

V. Perceived Situation on Mining Environment and Health Hazards

Taking into account the survey data analysis and field observation the perceived situation on mining environment and health hazards may be deconstructed into three different categories i.e. objectively perceived situation, subjectively perceived situation and evaluatively perceived situation at present scenario of Talcher locality. The objectively perceived situation reflects two important concerns- one includes environmental pollution and another includes pollution caused health hazard in the mining locality. There are two contradictory responses to these concerns- perception of people and perception of project authority. The former blames the latter as the sole culprit of environmental pollution and health hazard whereas the latter blames former as traditional ridden and do not change their health concepts and practices. As a result, the traditional conceptions of illness, sickness and disease still remain intact among the displaced people in the locality. The MCL authority provides health camp and supply free medicines to the affected households in the MCL locality. The government has been rendering health service through three health wings namely medical wing, public health wing and family welfare wing in Angul district. The medical wing treats largely common diseases like malaria, diarrhoea, leprosy, respiratory tract infection, scabies, etc free of cost at government health institutions whereas public health wing deals with epidemic diseases like gastroenteritis, bloody dysentery, acute respiratory infection, etc, treated through national anti-malaria programme (NAMP), enhanced malaria control programme (EMCP), etc. Family welfare wing deals with care of pregnant women, reduction of infant mortality, immunization facility, etc. But the resettled people in resettlement clusters and colonies argue that these facilities hardly solve the health problems created in the polluted coal mining environment. In the objective perceived situation it is observable that the entire coal mining belt is highly polluted, and it is natural that health problems are there among the people due to pollution. It is true that health problems could be resolved through medical facilities in the MCL area. It is also not untrue that the government and MCL authority neither completely rectify the pollution problems nor could wipe out the pollution caused illness, sickness and diseases in the locality.

The subjectively perceived situation of mining environment and health hazards reflects that the illness, sickness and diseases are differently perceived in different time. In pre-displaced periods diseases and sickness are either biologically determined or caused due to poverty, malnutrition and blind beliefs and superstitions. Their rescue from illness, sickness and diseases are largely determined by their culture, traditions and religious practices. At present they neither forgo their traditional conception of illness, sickness and diseases nor could follow the modern method of treatment whole heartedly. There are two contradictory views on these points. The displaced oustees' view that they are suffering from pollution caused illness, sickness and diseases because their deity structures of the old villages and their earlier sacred houses where their forefathers died there who used to save them in crisis are completely destroyed and acquired by the coal mining authorities. But now this belief system could not be revived again in the present resettlement sites and in the coal polluted environments. Other argue that there is no any logical connection between displaced temple structures, the displaced sacred houses, etc before displacement and present problems of illness, sickness and diseases after displacement. Rather, they argue that both project and people are held responsible for their illness, sickness and diseases. Like a psychosomatic disorders one's body and mind together become defective in maintaining health in the mining belt. Now one's health and illness are reproduced as usual and normal and perceived as if no more pathological in the coal belt.

The evaluatively perceived situation of mining environment and health hazards reflects that the illness, sickness and diseases are outcome of capitalistic economy and polluted atmosphere caused by the coal mining operation. In the name of profits the MCL did not spare the ecology, environment and people's health in the locality. There are also contradictory views on such evaluatively perceived situation. One group as humble servants of MCL do have faith that mining induced economic prosperity would solve people's economic problems in the locality. The application of pollution free technology, compensatory plantation, etc can gradually solve the problems of environmental pollution in the MCL area. The medical facilities increasingly rendered by MCL authority and government initiatives of strengthening the health infrastructures in the Talcher-Angul area will solve the problems of mining caused health hazard in the locality. However, the other groups those who have not employed but affected and displaced by the mining operation staying mostly in the peripheries- resettlement sites, clusters and colonies have different and contradictory views in the mining area.

They argue that they have been living in false consciousness, and with promises made by the mining and government authority are proved to be false too. The mining employed people can access to all medical facilities and get reimbursed the required amount for the treatment of diseases in the big hospitals in

Bhubaneswar. Thus, they access to the medical facilities, and consequently the private medical make huge profit negotiating the patient and project in mean time. They also argue that increasing money incomes get drained toward urban centre in term of consumerist consumption and unproductive expenditures. They argue that their health problems of illness, sickness and diseases are centred on their consumerist life styles, working class atmosphere and increased number of pollutants in the locality. The women are deprived of their bodily health in the absence of pollution free atmosphere and green vegetables that they used to access in the past. Now many of them reveal the fact that the cases of female infanticide and killing of female foetus are caused due to both increasing money economy as some parents afford to go for such accessible practices but profitable medical practioners. The affected villagers cannot adequately access to the facilities of government hospital, Anganwadi centre, Ayurvedic dispensary, homeopathic dispensary private medical practitioner, etc available at district headquarter.

VI. Conclusion

We can conclude that the unavoidable coal mining caused health problems are natural and mounting day by day in the MCL locality. The mining impacts and externalities are empirically observable and logically verifiable in and around the open-cast coal mines at present. The air, water and land pollution are the negative externalities whose costs borne by the local people are not compensated by the very mining projects that have caused it differently. The displaceds have been suffering from coal-caused pollution and health hazards without being the cause of pollutants. However, there is positive externality of social utility, for instance, the CSR activities and infrastructural developments are promoted by the MCL authority and state government respectively in the locality. Our study reveals of the infrastructural and situational dimensions of mining caused impact and externality and health hazard in the study area. Our study reveals that the variation in transportation and communication facilities in the resettlement colonies, clusters and sites not simply reflects the inadequate infrastructure and their maintenance problems but how the available infrastructure and modes of transportation affect the environment and social health in the MCL locality. Thousand of vehicles every day plying on the roads from coal depot to railway siding pollutes the entire vicinity in Talcher coalfields. Besides environmental pollution the new mode of transportation open up the flood gate of outsiders' entry which develops the ultra-modern culture like drinking foreign liquor, smoking, gambling, prostitutions, etc. Thus, beside pollution caused physical health problems there has been social health problems in MCL area at present. The other infrastructural dimension like electricity supply is so erratic with frequent power cuts and voltage fluctuation at present that the electricity connection in the clusters and colonies does not make any difference for good health after displacement. Our study reveals that the villagers face acute shortage of drinking water throughout the year. The existing water infrastructures are hardly maintained in the resettlement sites. The water tanker service provided by the MCL is too poor and meagre to meet the drinking water needs of displaced people. The displaced people's health through private latrine and drainage infrastructure is yet to be practiced in the self-settled clusters and resettlement sites. Our study also reveals that the dwelling infrastructure and amenities hardly cater to the survival needs of the affected households at present. It makes them to feel congestion and suffocations in the colonies and clusters at present. This entire infrastructural lacuna significantly contributes to the human problems of illness, sickness and diseases during post-displacement periods.

At present scenario of Talcher locality the mining caused impact and externality and health hazards reflect three important situations such as objectively perceived situation, subjectively perceived situation and evaluatively perceived situation. In case objectively perceived situation the people blames the project and its negative externalities whereas project blames the people' irresponsibility of health and their traditional health concepts and practices against project made health facility and positive externality like that of MCL provided CSR. In case of subjectively perceived situation of mining environment and health hazards there are two contradictory views on the logical relationship perceived between people's physical health status of illness, sickness and diseases and their societal health conception and practices. Accordingly they produce and reproduce their illness, sickness and diseases in the society. Our study also reveals that in subjectively perceived situation both project and people are held responsible for people's illness, sickness and diseases at present. Like a psychosomatic disorders one's body and mind together become defective in maintaining good health in the mining belt. One's health and illness are reproduced as usual and normal and perceived as if no more pathological in the coal belt. The evaluatively perceived situation of mining environment and health hazards reflects that the illness, sickness and diseases are being deliberately made capitalistic outcomes and polluted atmosphere of coal mining. In the name of profit the MCL did not spare the ecology, environment and people's health. However, the application of pollution free technology, compensatory plantation, etc and the MCL and government initiatives for modern health infrastructures in the Talcher-Angul area will solve the mining caused health problems in the MCL Talcher area. But a state of complete physical, mental and social well-being or health in coal mining area is rarely practicable. Therefore, health rights, health equity, and health justice in the mining area are largely missing.

References

- [1] S.Goswami, Coal Mining, Environment and Contemporary Indian Society,(Global Journal of Human Social Science, U.S.A (B) (Volume 13 Issue 6 Version 1.0), 2013a)
- [2] R.Garada, Contextualizing the Emerging Issues and Dilemmas of Displaced Ecosystem People: A Case of Coal Mining Industry at Talcher (IOSR Journal of Humanities and Social Science (IOSR-JHSS), 12 (4), 2013)
- [3] R.Garada, Dynamics of Coal Mining Caused Environmental Crisis Versus Displaced People's Question of Survival: A Case of Talcher Coal Belt,Odisha (India),(Global Journal of Human Social Science, Geography, Geo-Sciences, Environmental Disaster Management, Volume 13 Issue 6 Version 1.0 Year 2013, USA)
- [4] R. Garada, Industry versus Regional Development: A Case Study of Odisha, (Deliberative Research, V-15, Issue-15, July to Sept.2012a)
- [5] R. Garada, Opencast Coal Mining Induced Land Acquisition: A Study on Land Oustees at Talcher Coalfield, Odisha (India), (Germany: LAMBERT Academic Publishing AG & Co KG, 2012b).
- [6] R. Garada, Myth of Compensation for Land Acquisition: A Case of Displaced People of Talcher, Odisha, (The Fourth World, Volume-29&30, No.30: 58, Oct.2011- April 2012).
- [7] R. Garada, Development Induced Displacement: Rehabilitation and Resettlement in the Mining and Industrial Projects of Orissa (PhD Thesis, Utkal University, 2009)
- [8] H. M. Mathur, "Mining Coal, Undermining People: Compensation Policies and Practices of Coal India" in Cernea, M.M., Mathur H.M. (eds.), "Can compensation prevent impoverishment? Reforming resettlement through investments and benefit sharing", (Oxford University Press, New Delhi, 2008)
- [9] T.K. Oommen, Coping with Development Pathologies: Resistance to Displacement, Sociological Bulletin, 55(2), 2006,
- [10] T.K. Oommen, Development Discourse: Issues and Concerns, (New Delhi: Regency Publications, 2004).
- [11] R.Meher, 'The Social and Ecological Effects of industrialization in a Tribal Region: The Case of Rourkela Steel Plant', (Contributions to Indian Sociology (n.s.) 37(3), 2003)
- [12] B.Pandey, Depriving the Underprivileged for Development, (Bhubaneswar, Orissa: Institute for Social and Economic Development, 1998).
- [13] R. Garada, Development and Underdevelopment in Orissa: A Sociological Study, (M.Phil diss., Jawaharlal Nehru University, New Delhi, 1995)
- [14] S. Patel, 'Baliapal Agitation: Leadership Crisis', (Economic and Political Weekly, 25(23), 1990)
- [15] Nabanita Das and Niharrajan Mishra Assessing the Impact of Coal Mining on Diversified Sources of Rural Livelihoods: A Case Study in the Ib Valley Coalfield Area of Western Odisha, India, (Vol. 4(6), Int. Res. J. Social Sci. International Science Congress Association June ,2015)
- [16] U.K. Chakroborty and B. Narayan, Socio-Economic Issues and Dilemmas of Mining Induced Displacement: A Case of Coal Mining Industry (Journal of Economic & Social Development, Vol. -X, No. 2, December 2014)
- [17] D. Guha, A case study on the effects of coal mining in the environment particularly in relation to Soil, Water and Air causing a Socio-economic Hazard in Asansol-Raniganj Area, India,(International Research Journal of Social Science, 3(8), 2014)
- [18] S.Goswami, "Need for Clean Coal Mining in India", (Environmental Research, Engineering and Management, No. 4(66), 2013)
- [19] T.N. Singh and M.L. Gupta (2012): "Clean coal initiatives", (C.M.R.I., Dhanbad, India, Scientific publishers, Jodhpur, 2012)
- [20] R.Reza, M.K. Jain, and G.Singh, Impact of mining activities on surface water Quality in Angul-Talcher region of Orissa (India: Mining Engineer's Journal. 10(11): 2009,)
- [21] R.Reza and G.Singh, Assessment of Heavy Metal Contamination and its Indexing Approach for River Water, (International Journal of Environmental Science and Technology. 7(4) 2010,)
- [22] K.Lahiri-Dutt, Illegal coal mining in Eastern India: Rethinking legitimacy and limits of justice, (Economic and Political Weekly, 2007, December, 57-66)
- [23] Xavier Institute of Social Service (XISS), Report of the Survey at Parej East Open Cast Project, (CCL of 73 PAPs and 121 PAFs. Sponsored by World Bank, Ranchi: Conducted by XISS, 2005)
- [24] S.P. Banerjee, Mineral Availability and Environmental Challenges- A Vision 2020 Statement, (Prof. S.K. Bose Memorial Lecture, Dhanbad: Indian School of Mines,2004)
- [25] W.Sachs, Environment, (Orient Longman Limited, 1997)
- [26] S.Ramaiah, 'Health Implication of Involuntary Resettlement and Rehabilitation in Developmental Projects in India (Volume 1, New Delhi: Society for Health Education and Learning Packages, 1995)
- [27] M.Gadgil and R.Guha, Ecology and Equity- The Use and Abuse of Nature in Contemporary India, (New Delhi: Routledge and Penguin Books India, 1995)
- [28] R.K.Tiwary & B.B. Dhar, Effect of coal mining and coal based industrial activities on water quality of the river Damodar with specific reference to heavy metals, (International Journal of Surface Mining, Reclamation and Environment Volume 8, Issue 3, 1 994)
- [29] Xavier Institute of Social Service (XISS) 'Study on Impact of Mining on People: A Case Study of West Bokaro (Coalfields, Ranchi: XISS, 1994)
- [30] M. Areeparampil, Industries, Mines and Dispossession of Indigenous People: The Case of Chotanagpur, in W.Fernandes and E. Ganguly Thukral (eds.) Development, Displacement and Rehabilitation: Issues for a National Debate, (New Delhi: Indian Social Institute, 1989).
- [31] J.Bandyopadhyay, and V.Shiva, 'Political Economy of Ecology Movement', (Economic and Political Weekly, 23(24),1988)
- [32] L.A. Sagan, Health Costs Associated with the Mining, Transport, and Combustion of Coal in the Steam-Electric Industry. (Nature, 1974)
- [33] http://www.imwa.de/bibliographie/13_34_001-009.pdf
- [34] <http://www.rainwaterharvesting.org/Crisis/River-Damodar10.htm>
- [35] <http://www.mbandi.com/indy/ning/coal/as/in/p0005.htm>
- [36]