Incidence of Health Issues in and around Open Cast Mines: A Case Study of Raniganj Coalfield, West Bengal

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Abstract

Health issues in terms of illness and disease is very common to every industrial sector in our country. Mining industry has always been ranked one among them, which has the most dangerous working environment as well as adverse impact to the surrounding periphery. In this context open cast mining is more hazardous than under-ground mining because the former is more environmentally destructive than the latter. Health issues around open cast mines are not only restricted to the people directly engaged with mining activity but also the people living around the periphery of the mines.

The present study focuses on the health issues of some selected villages adjacent and peripheral area of an opencast mine in Raniganj Coalfield. The study encompasses the issues of point source of pollution transforming in to a non point source of pollution, where taking the Open Cast Project (OCP) as point source of environmental pollution, 5 surrounding villages located at different radius from the mine site have been selected under study. An attempt has been made to assess whether, the health impact of mining activity diminish away from the point source of pollution or not with the increasing distance from the mine site.

For this purpose two target groups have been identified from the selected villages, one is the people directly engaged in mining and related activities and the other is the people who reside in the areas adjacent and peripheral to the mine site. The incidence of health problems are more associated with the people directly working in the mine than the residence who are living surrounding the mine.

Key Words: Incidence of diseases in and around mine, point and non point sources of pollution.

I Introduction: Development, environment and health all are complementary to each other and none of them can be ignored in the interest of development of a particular region or country. Development implies influence in social, cultural and economic aspects for the betterment of mankind and economic development depends on endowment of natural resources. Minerals are one of the very important non-renewable natural resources of which coal have been a part of human needs from time immemorial (Machey, 2012). Coal mine plays a very

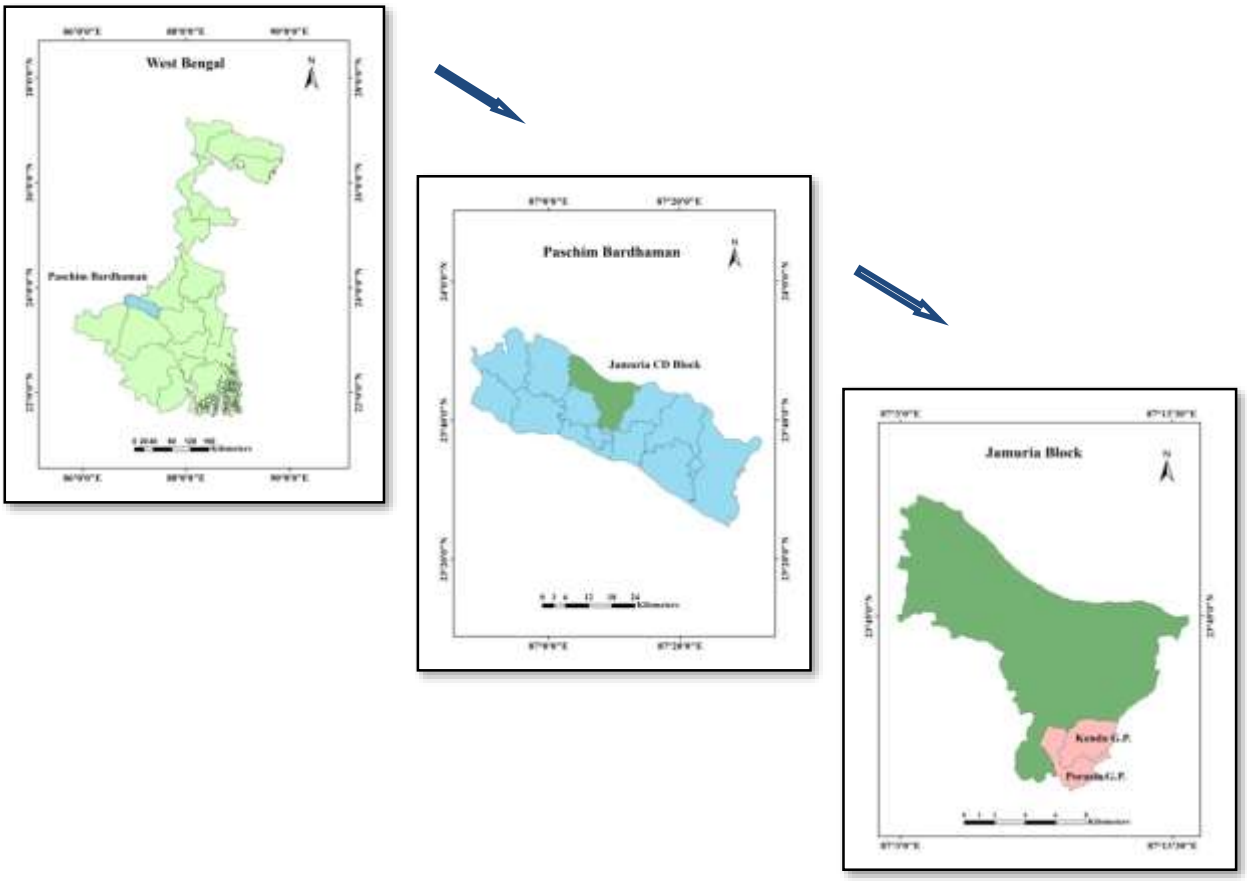
significant role in the industrial development in every part of the world at the same time it acts as a basic source of degradation of environment and health condition.

Based on the types of mining process open cast mining is more hazardous than under-ground mining because the former is more environmentally destructive than the latter. Starting from its inception, Open cast mining involves different stages which begin from removal of overlying vegetation cover and top soil, dumping of overburden material (waste) then exploration of mineral ore and finally windup with reclamation of affected land for post mining land-use. Each stage implicates dissimilar environmental impacts as it comprehends the release of toxic materials, dust, pollution of water & air, degradation of biodiversity and so on. All these are shading negative impacts on the environment which has a direct negative impact on health of every living being including flora and fauna. The present study basically focuses on health impact of mining activity on the adjacent and peripheral areas of the open cast mine site.

II Study Area: The study area i.e., the New Kenda Open Cast Project (OCP), Kenda village and its surrounding habitations (Basti or Para) apart from the ECL colonies which fall under Kenda area of Eastern Coalfield Limited (ECL) and come under the Kenda Gram Panchayat (Kenda Census Town) and Porasia Gram panchayat (Porasia Census Town) of Jamuia CD block in Paschim Bardhaman district, West Bengal. The entire project is a part of West Kenda geological block and is located between 23º 39’17” to 23º 40’50” (N) latitudes and 87º 11’25” to 87º08’46” (E) longitudes.

The area is well connected by rail and road. The proposed OCP is located at a distance of about 25 Km. east of Asansol town and 15 km North from Raniganj Railway Station. The area is well connected by metalled roads and falls 2.5 km away from Raniganj – Suri Road, which leaves GT Road at Punjabi More in Northward direction. The area is covered in Survey of India Topo sheet No. 73 M/2.

Map 1.Location Map of the Study Area



Source: 18th All India Livestock Census, 2001, West Bengal

III Description of the Project & the Area:

New Kenda Open Cast Project (OCP) under Kenda Area of Eastern Coal Field Limitted (ECL) is part of West Kenda geological Block. The entire area of West Kenda Block is covered by two Collieries of Kenda Area of ECL, namely New Kenda Colliery and Lower Kenda Colliery. The proposed OCP form the part of New Kenda Colliery and West Kenda OCP, started its quarrying process for the first time in June, 2016. The total area of Kenda census town and Porasia census town is about 7.95 & 4.49 sq kms respectively of which the New Kenda project area is about 240.00 hectares (CMPDI report for Cluster NO.11, October 2014, Raniganj Coalfield, ECL).

The Kenda Township has a total of 15731 populations and 3223 number of households as well as the Porasia Township has a total of 8894 population and 1822 number of households. The major chunk of the population in this area comprises of Scheduled Caste (SC) and Scheduled Tribe (ST) population. The majority population in the area is dependent for their livelihood either on the coal mines or the nearby brick kilns and works as labour and construction worker. There is hardly any agriculture or allied activities but some of the

households are dependent on animal husbandry. The people residing there face a huge challenge of water scarcity and lack the access to the basic infrastructure facilities (Demographic & Socio-Economic Survey of New Kenda OCP, Paschim Bardhaman District by Indian Institute of Forest Management, Bhopal).

IV Objectives:

a) To determine the diseases prevalence among the local residence surrounding the mine site.
b) To find out whether the health impact of mining activity diminish away from the point source of pollution or not with the increasing distance from the mine site.

V Methods:

a) Data Collection:

The study is based on detail database and information. In order to fulfill the objectives of the study, both primary and secondary types of data have been taken from different sources, which are of both qualitative and quantitative in nature.

For primary data household surveys have been conducted by means of questionnaires and in-depth interview with the PAFs (Project Affected Families) in 5 villages cum paras adjacent to the New Kenda OCP to get the real picture of that area. For secondary data District Census Handbook (2011) & ECL's Area office of Kenda Area has been consulted.

b) Sampling :

The study is done on the basis of Stratified random sampling method. For the convenience of the study 5 villages cum paras surrounding the mine have been taken into account as sample villages on the basis of various distances from the mine site; here the strata of distances for villages are within 500 meters, 500 meters to 1 kilometer and above 1 kilometer from the vicinity of the mine (OCP). That means to ensure spatial coverage two villages are taken just adjacent to the mine site (within 200 Mts.), one village is taken at a distant region from the mine site (above 1 Kms.) and another two villages are taken from the region laying in between the other two. A total of 65 households have been surveyed in simple random sampling method which accounts 15% of the total households (444) of the sample villages.

c) Data Analysis & Representation:

Suitable statistical and cartographic techniques and methods have been used for data analysis and representation. Moreover Arc GIS software has been used for the preparation of maps.

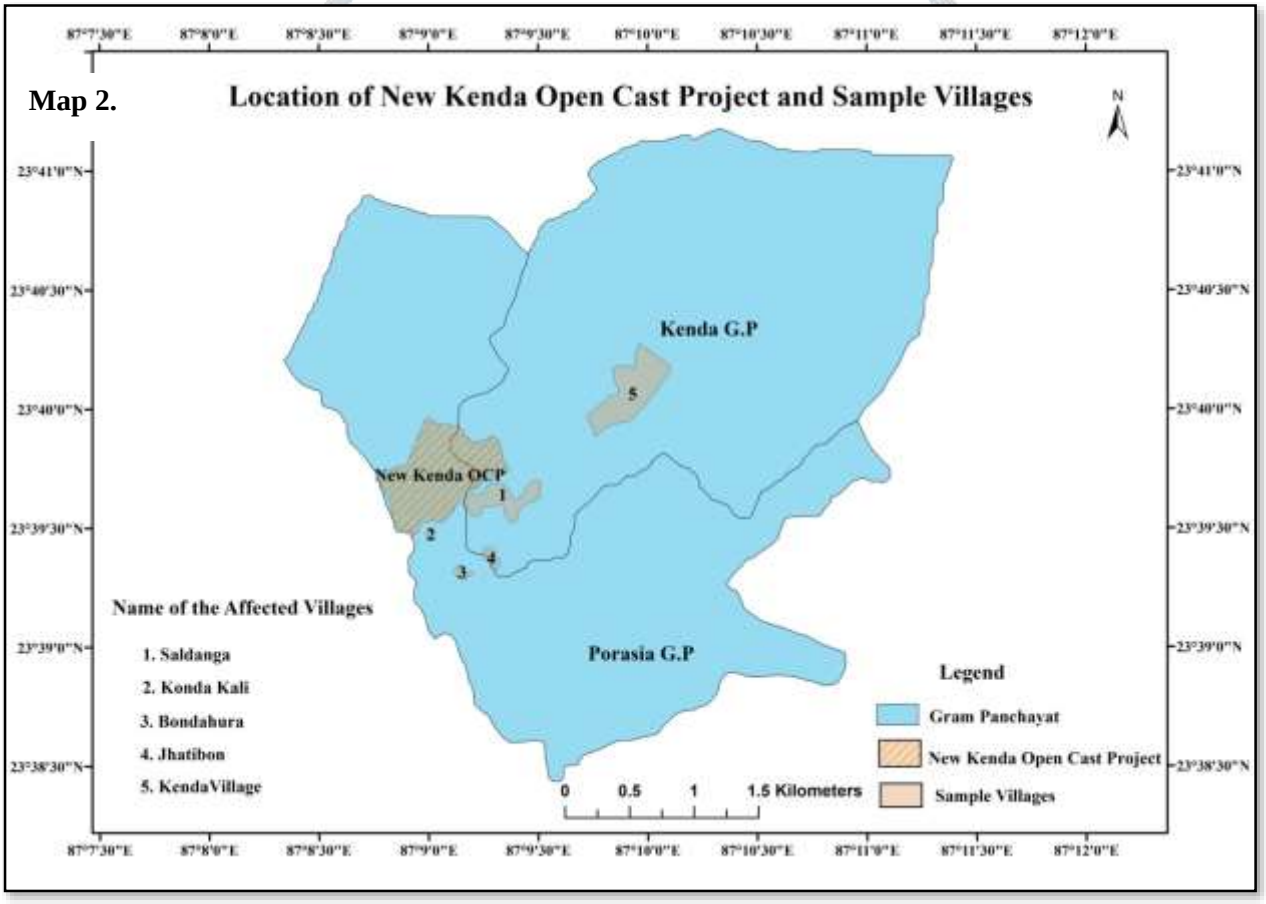
The 5 selected villages around New Kenda OCP are of three category……

i) Tribal dominated villages adjacent to the mine site (within 500 mts.): Saldanga, Kond Kali
ii) Tribal dominated villages in-between the adjacent & distant villages to the mine site (500mts.-1km.): Bondhahura, Jhatibon
iii) Non tribal dominated village located away from the mine site (above 1 kms.): Kenda

Table 1.Sample Villages around the New Kenda OCP:

SL. NO.	Name of the Selected Village/ Para		Distance from the Mine Site	Category	Total House holds	Number of Respondent Population	Number of Respondent Households	Percentage of Respondent households to total Households
1	**Tribal Dominated**	Saldanga	Within 500 Mts.	**Adjacent**	81	44	12	15
2		konda Kali			16	22	5	
3		Bondhahura	500 Mts. - 1 Kms.	**In-Between**	15	17	5	
4		Jhatibon			31	33	8	
5	**Non-tribal Dominated**	Kenda Village	Above 1 Kms.	**Distant**	301	136	35	
Total					444	252	65	

Source: Field Survey, 2019



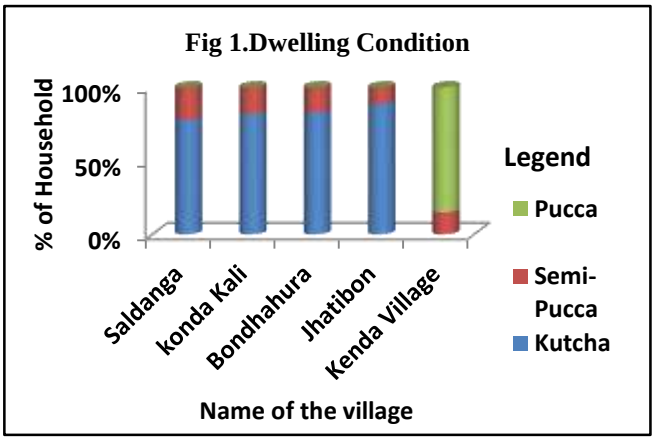
Source: 18th All India Livestock Census, 2001, West Bengal

VI Results and Discussion

A. Living Condition of the Population under Study:

a) Dwelling Condition: There found reverse dwelling condition in tribal and non tribal villages.

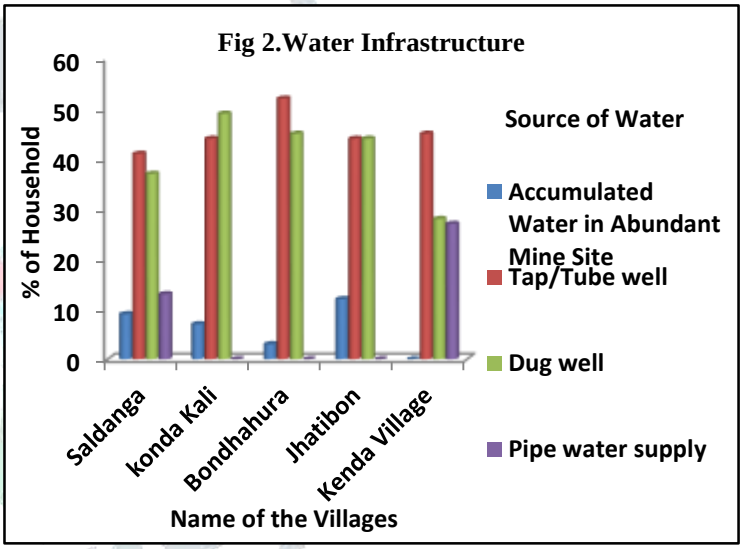
In (figure 1) tribal dominated villages adjacent to mine site has 80% Kutcha and 20% semi-pucca houses. Where as in non-tribal dominated village located away from the mine site have 85% pucca and 15% semi-pucca houses. In case of in-between villages 86% houses are kutcha and 14% are semi-pucca.



b) Water Infrastructure:

It is found (figure 2)that the Main sources of water in both tribal and non tribal villages irrespective of the distance from the point sources of pollution (mine site) are Tube wells and Dug wells but supply is unreliable due to over extraction of ground water. Due to unreliable supply of water, villages adjacent to the mine site use the water accumulated in the abundant mine site for various household purposes although it is unhygienic.

In Saldanga & Kenda village the villagers informed that there is DVC (Damodar Valley Corporation) pipeline for supply of water in the area but it runs for a limited period of time and the quality of water is not satisfactory.



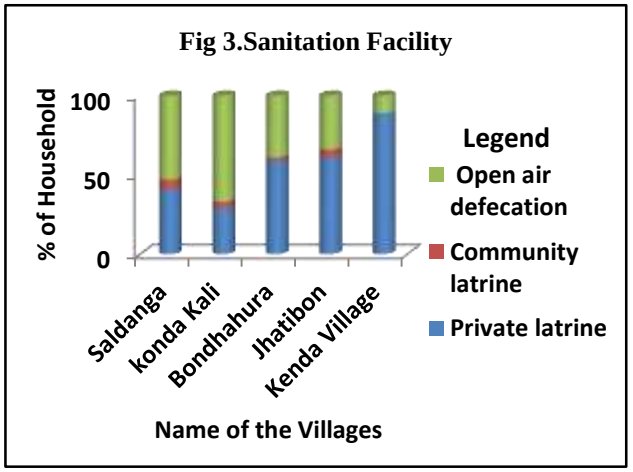
c) Sanitation:

i) Nature of toilets:

In (figure 3) Tribal Dominated Villages Adjacent to mine site very few houses (about 35%) have their toilets, even if they had it was not in use, most of them prefer for open defecation.

In Tribal Dominated Villages in-between to mine site about 60% households have private latrine but most of them are not in use & rest of them use open defecation.

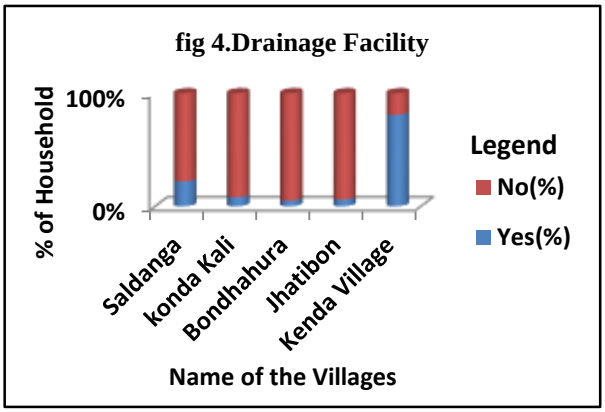
In Non-Tribal Dominated village located away from the mine site 80% Households use toilets basically private latrine and least number of households go for open defecation.



ii) Nature of Sewerage system:

In (figure 4) Tribal Dominated Villages Adjacent & in-between to mine site, averagely 88% households have no sewerage system.

In Non-Tribal Dominated village located away from the mine site have found reverse condition, where 80% houses have the proper sewerage system.



d) Electricity Facility: In this area power supply is not provided by ECL rather in most of the cases tribal dominated villages adjacent to mine site use it illegally from the ECL power line. However the supply of electricity is very erratic with frequent power cuts and voltage fluctuation.

B. Mining and Health:

Health can be defined as a state of complete physical, mental and social well being of an individual, and not merely the absence of disease and infirmity (World Health Organization, 2005). Impacts of mining on health are of both mine workers and the people within the surrounding communities of the mines. Even women and children who are not working in the mines are constantly exposed to various respiratory illnesses due to inhalation of dust particles and experience multifunction of various sensory organs, which has a long-term impact on their reproductive health (Mishra, 2015).

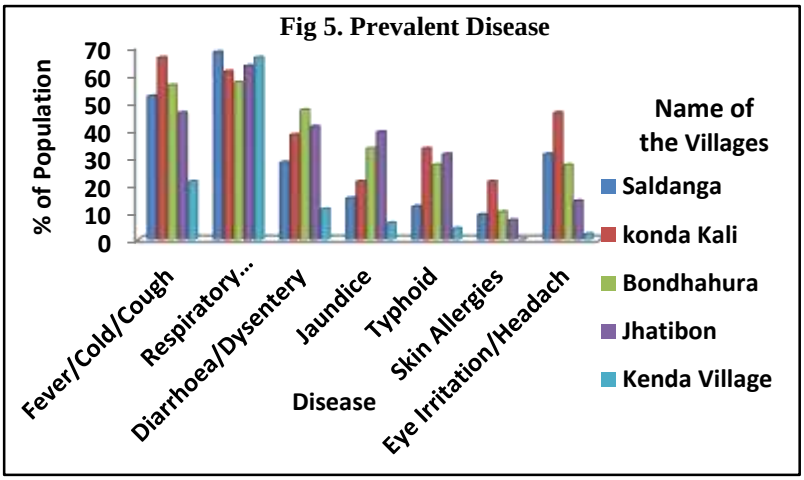
Mining is one of the most dangerous occupations both in terms of short term injuries and fatalities. Studies of mining and health by type of mine process are divided into deep and open cast mines. Deep mines produce severe harms for employees in terms of their risks of high blood pressure; heat exhaustion and nervous system disorders. Studies of surface or open cast mining basically focus on health risks related to dust breathing as well as some air and water borne disease.

Table 2.Health Condition of the Population under Study:

Over all Health Status		
Name of the Village		**Prevalent disease**
Saldanga	Adjacent	Fever, Cold, Diarrhoea, Dysentery, Respiratory disease, Typhoid, Jaundice Eye Irritation, Skin Allergies
konda Kali		Fever, Cold, Diarrhoea, Dysentery, Respiratory disease, Typhoid, Jaundice Eye Irritation, Skin Allergies
Bondhahura	In-between	Fever, Cold, Diarrhoea, Dysentery, Respiratory disease, Typhoid, Jaundice, Eye Irritation
Jhatibon		Fever, Cold, Diarrhoea, Dysentery, Respiratory disease, Typhoid, Jaundice, Eye Irritation
Kenda Village	Distant	Fever, Cold, Respiratory Disease, Typhoid, Jaundice

Source: Field Survey, 2019

a) Prevalent Disease: In (figure 5) the present study New Kenda OCP has shows a discernible picture on various health issues to the surrounding communities of mine site. As per observations made on the field survey, a number of prevalent diseases have been found in the sample villages which are categorized in to two.

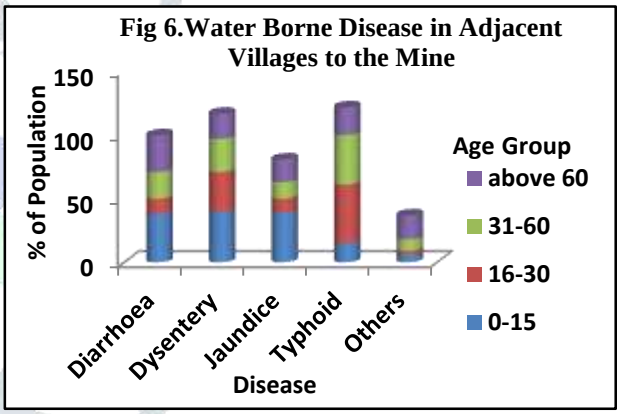


i) Water Borne Disease: Diarrhoea, dysentery, Jaundice, Typhoid.

ii) Air Borne Disease: fever, cough, cold, weak eye vision, Eye irritation, skin allergies, and respiratory illness (asthma, lung infection).

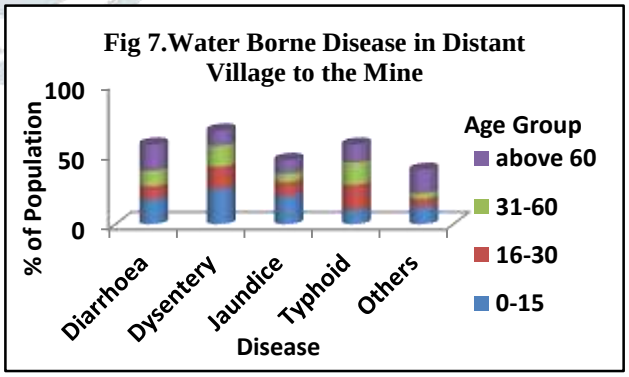
It is clear from the diagram that respiratory disease is very prominent in all the villages both in adjacent and distant, basically due to the transportation of Respiratory Suspended Particulate Matter (RSPM) through air.

b) Water Borne Disease: Here age wise distribution of water borne disease has been shown in the villages surrounding the mine site.



i) Villages Adjacent to the Mine:

Here (figure 6) percentage of people suffering from typhoid is highest. Besides Diarrhoea & Dysentery are also prominent diseases. It is also observed that people belonging to the age group 0-15 suffering from diarrhoea, dysentery & Jaundice while Typhoid is highest, in the age group 16-60 and above 60 age group people are suffering from more or less all type of disease.



ii) Village at a Distant to the Mine:

Here (figure 7) Percentage of population suffering from various kind of water borne disease is much lower than adjacent villages. Here Diarrhoea, Dysentery & Typhoid are the prominent disease. In most of the cases children (0-15) & age old (above 60) population are more affected except Typhoid where middle age people are more affected.

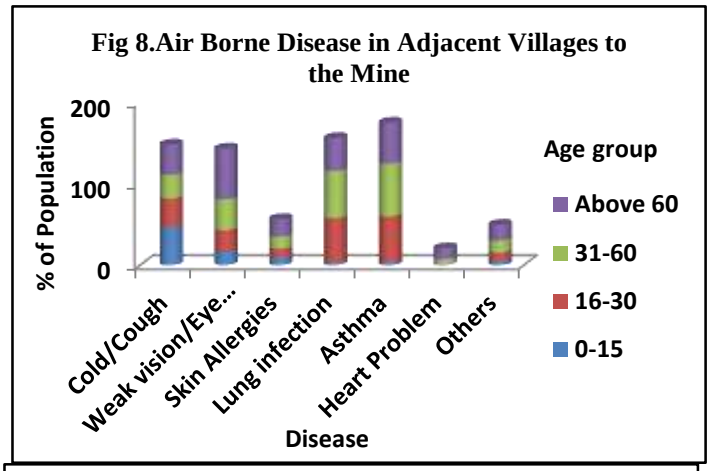
iii) Villages in between the Adjacent & Distant Villages to the Mine:

In in-between villages diarrhoea & dysentery are the main water borne diseases, besides typhoid is quite common here.

c) Air Borne Disease: Here age wise distribution of air borne disease has been shown in the villages surrounding the mine site.

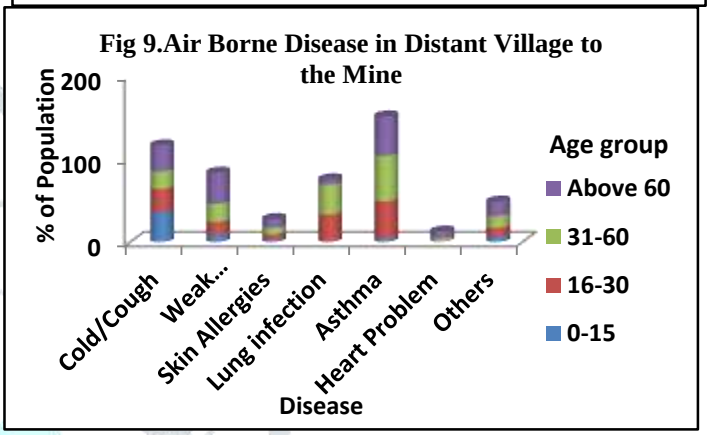
i) Villages Adjacent to the Mine:

It is evident (figure 8) that the percentage of people suffering from respiratory disease is highest. People belonging to the age group 0-15 are suffering much from cold & cough while 16-60 age group suffering from lung infection & asthma on the other hand the people belonging to the age group 60 and above are found much affected in the disease like weak eye vision.



ii) Village at a Distant to the Mine:

In cash of distant villages (figure 9) respiratory disease like asthma, lung infection cough etc. are more profound than other types of air borne disease. Here basically middle age working populations are more sufferer than other age groups due to their more engagement with the mine site.



iii) Villages in between the Adjacent & Distant Villages to the Mine:

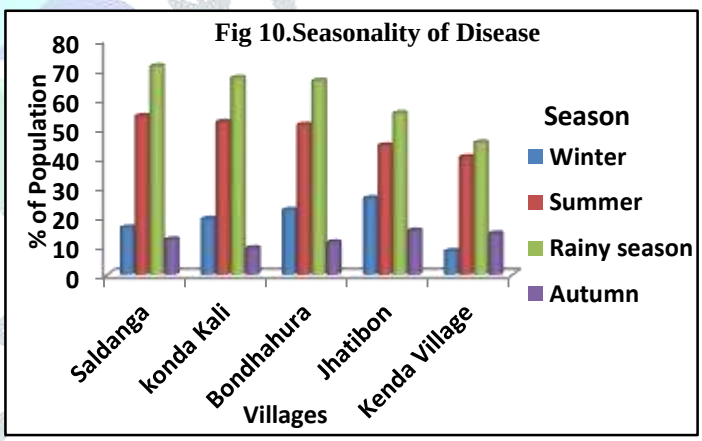
Respiratory diseases are also prominent in cash of in-between villages, besides cold & cough, weak eye vision are profound here.

d) Seasonality of Disease:

In case of seasonality of disease it is seen (figure 10) that in all the villages people are suffering from disease during the month of summer and rainy season.

During rainy season averagely above 60% population suffer from various kind of disease specifically water borne disease due to contaminated water from coal dust.

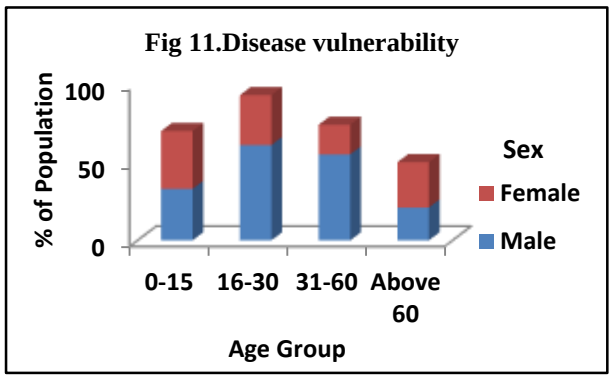
During summer averagely 48% people suffer from skin allergy, dehydration, jaundice etc. diseases.



e) Disease vulnerability to age and sex:

In this respect (figure 11) the most vulnerable are middle age working population due to their more attachment with mine site.

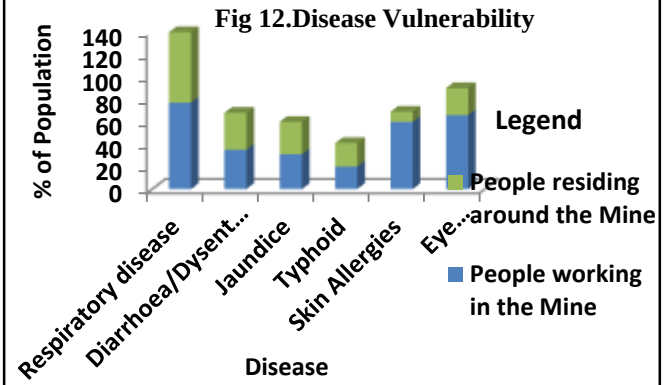
In comparison to female, male are more vulnerable due to their direct engagement with mining.



f) Disease Vulnerability to People working in the mine & residing around the mine:

Here it is clear from the diagram (figure 12) that disease vulnerability is much more in case of the people directly working in the mine than the people residing around the mine site. Among the prevalent diseases respiratory problem, skin allergy & Eye irritation are more prominent to the mine workers due to the emission of toxic gasses, chemicals & coal dust.

Fig 12.Disease Vulnerability



VII Major Findings:

- The majority population in the area is dependent for their livelihood either on the coal mines or the nearby brick kilns and works as mining laborers and construction workers, but the problem is that it is seasonal job and the brick kilns close down in the rainy season. That is why they remain without gainful work.
- There is hardly any agriculture or allied activities as the land become barren but some of the households are dependent on animal husbandry.
- The present study shows a discernible picture of various health issues in the areas surrounding mine site. As per Primary data collected from the sample villages it is found that overall health status of the region is unfavorable.
- The occurrence of various diseases among the households in the villages adjacent to mine is very high compared to the villages which are located away from the mine site which acts as point source of pollution. The male members are more susceptible to the disease compared to those who are residing adjacent and distant villages because they are directly working on the mine. In the village located at distant, most of the diseases reported are air borne, due to transportation of pollutants through air.
- The people residing there, face a lack of access to basic infrastructure facilities as the dwelling, sanitation and drainage condition of the villages are not healthy enough.
- Moreover 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. The wells dry up during summer and the people have to travel miles to get drinking water. The quality of water is also one of the most critical issues and needs urgent attention of the authorities.
- The unfilled abandoned opencast mines get filled by rain water and become the breeding ground for mosquitoes.
- The Kenda village has a Homeopathic doctor and Aanganwadi Centre to care for the health issues of the people of the village. The centre is capable of providing first aid and common health diseases but in case of medical emergency the people have to rush to the nearby government hospital at Bahadurpur which is at a distance of 7-8 Km.
- All these contribute to the unfavorable health conditions of the local residence.

VIII Conclusion:

The study finds that increasing trend of environmental degradation is creating challenges for health of the local residence. Majority of the population is afflicted with various types of diseases associated with contaminated

water and air as a result of pollution emanating from opencast coal mining activity. There found a gradual decrease of disease vulnerability with the increasing distance from the mine site that is considered as point source of pollution. A huge number of people reside in the close vicinity of the open cast project; therefore it becomes legal and ethical responsibility of Eastern Coal Field Limited (ECL) to work for improvement and resettlement of their habitation, lives livelihoods and health. Health protection measures should be given first priority to the villages adjacent to the mine site after then to the distant villages.

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