IMPACT OF MINING ON HEALTH OF WORKERS AT SAMALESWARI OCP, BRAJARAJ NAGAR

Principal Investigator: Prof (Dr.) R. C. Giri, Professor & Head

CO-Principal Investigator: Dr. S. C. Panda, Associate Professor

Dr. S. K. Pradhan, Assistant Professor

Research Assistant: Dr. Ashish Mahapatra

Dr. Debasis Swain

DEPARTMENT OF COMMUNITY MEDICINE,

VSS MEDICAL COLLEGE, BURLA

SAMBALPUR, ODISHA

ACKNOWLEDGEMENTS:

List of Acronyms:

COPD - Chronic Obstructive Pulmonary Disease

DM – Diabetes Mellitus

ECG – Electrocardiogram

Hb - Haemoglobin

HTN – Hypertension

IHD - Ischaemic Heart Disease

MCL – Mahanadi Coalfields Limited

PME – Periodic Medical Examination

PPE – Personal Protective Equipment

SLR - Straight Leg Raise (test)

SOCP - Samaleswari Open Cast Project

STD - Sexually Transmitted Disease

TLC – Total Leukocyte Count

Contents:

EXECUTIVE SUMMARY:

INTRODUCTION: Mining is a job known to have high risk of injury and disease. Miners are exposed to various harmful materials leading to number of diseases as time passes. Though MCL conducts health examination routinely, but to strengthen this process Ministry of Environment & Forest has requested MCL to carry out evaluation by external agencies. In this regard as per the initiatives of MCL, Dept. of Community Medicine, VSS Medical College, Burla came forward to conduct the study entitled "Impact of Mining on Health of Workers of SOCP".

OBJECTIVES: 1. Assess morbidity among mining workers. **2**. Compare present findings with previous ones conducted by MCL. **3**. Propose appropriate and timely corrective measures.

METHODOLOGY: It was a cross-sectional study conducted at field area of MCL. Sample size taken was 110. Detailed health examination was done and recorded in predesigned pretested pro-forma. Necessary Laboratory examinations were done at the hospital. The data collected were analysed in the Dept. of Community Medicine, VSS MCH, Burla.

RESULTS: Common health problems as per the complains of workers were found to be in the form of musculoskeletal problems (38.35% complained of body ache). 12.7% of workers were found to have high blood pressure during

the examination. Skin problem was present in 7.4% of workers. 20% of workers were found to have spirometric findings abnormal (suggestive of obstructive, restrictive & mixed type of respiratory problem). Audiometry findings suggested 5.5% of workers having hearing problem. Platelet count was low in 25.5% of workers. Lipid was raised in 66% of workers. Technical errors in spirometry and x-ray were high.

CONCLUSION & RECOMMENDATION: External evaluation will improve the on-going PME conducted by MCL, and so the health status of workers. As per findings of the study, data compilation as well as dissemination needs to be improved. Laboratory standards for spirometry and x-ray procedures seek special attention.

<u>INTRODUCTION</u>

Mining is a very old occupation, being recognized as a job which has high risk of injury and disease.

Mining is a multi-disciplinary industry, drawing on several professions and trades. To ensure precision in clinical and epidemiological work, it is important to enquire about the details of tasks, as the term 'miner' is relatively non-specific.

Miners are exposed to various potentially toxic or harmful materials or agents like fuels, reagents, solvents, detergents, chemicals, coal dust, silica dust, asbestos, noise, welding fumes, metal dust etc. As a result a number of disorders develop through the passage of time.

Studies of mining and health by type of mine process are divided into deep and open cast mine. Deep mines produce severe problems for workers in terms of their risks of high blood pressure, heat exhaustion, myocardial infarction and nervous system disorders. Studies of surface mining focus on coal, granite and rock mining and health risks related to dust inhalation. In all levels of mining health risks occur with dust exposure. Respiratory impacts are the most studied and problematic of health impacts for workers. Injuries have declined in importance but continue to be an important safety issue in mines. Long-term impacts include cancers, mental health problems and some evidence of genetic disorders.

One of the biggest problems in illness and disease in mining is reporting. Sometimes a miner is aware of the disease or illness, but may be afraid of reporting the disease because of fear of losing his or her job, health insurance, or other job-related benefits. There-fore, the disease or illness is not reported.

Sometime medical attention is received, but neither the attending physician nor the miner associates the disease with the work environment. Again, the disease or illness is not reported. In some cases, the miner has symptoms of a disease, but no medical attention is sought, and the disease or illness is not reported. This again could be because of fear of losing a job, health insurance, etc. Finally, a miner could be affected with a disease, but has no symptoms of the disease.

MCL conducts health examination routinely among its workers with the help of their doctors of different specialties and laboratory facilities; monitors and safeguards their health. However, evaluation by external agencies, strengthen the on-going examination and reporting by any Institution. Further, such external evaluation is conducted without bias and as a result, the examiners of the Institution get an opportunity to know their strengths and weakness. On this background, Ministry of Environment and forest has rightly requested MCL to see that an external evaluation may be conducted on "impact of mining on health of workers". MCL has chosen our department of Community Medicine to evaluate the impact of mining on the health status of workers.After a thorough discussion and in response to their request study was taken up   with the following objectives-

- Assess the morbidity among mining workers

- Compare present findings with previous one conducted by MCL.

- Enable appropriate and timely corrective action to be taken in order to safeguard the health and well-being of mining industry employees

- Provide data for future epidemiological studies.

METHODOLOGY

A cross sectional study was conducted in the field area of MCL near Brajarajnagar. A sensitization workshop was held and study material, technique and sample size were decided. A sample of 15% of 730 (110) workers of Samaleswari Open Cast Project was chosen randomly. On the one week examinations detailed physical examination of health status of a total of 110 workers was carried out and recorded in a predesigned pretested pro-forma. Selected biochemical and laboratory investigations were carried out on the day of examination with the available resources in the hospital. Then data were tabulated, analyzed and were compared with previous findings of medical examinations conducted by MCL.

PREVIOUS PERIODIC MEDICAL EXAMINATIONS HELD BY MCL

INFRASTRUCTURE:

IB Coalfields comprises of Ib Valley Area, Orient Area, Lakhanpur Area, Basundhara Garjanbahal Area and Central Workshop, Ib Valley with total employee strength of 9442.

The bifurcation is as follows.

Ib Valley Area –	1778 (Opencast)
Orient Area -	4614 (Underground)
Lakhanpur Area -	2042 (Opencast)
Basundhara Garjanbahal Area -	827 (Opencast)
Central Workshop, Ib Valley -	221

Samleswari Open Cast Project comes under Ib Valley Area.

Health care units of Ib Coal fields
IB Valley Area-

- ➢ Hospitals   - (One) 150 bedded
- ➢ Dispensary - 3
- ➢ Central Hospital, Ib Valley is the referral hospital of Ib Coalfields and provides specialist services to the employees and dependents of Ib Caolfields.

Details of services are as follows:

Total number of Doctors - 29 - Physician – 2, Surgeons – 2, Orthopaedic surgeon – 1, Gynaecologist – 1, Paediatrician – 1, Dermatologist – 1, Ophthalmologist – 2, Otolaryngologist – 2, Anaesthesist – 2, Pathologist – 1, Radiologist – 1, Psychiatrist – 1, Dental Surgeon – 1, GDMO-10 and Ayush doctor - 1.

Special Equipments:-

500 and 300 MA X-Ray Machine, Ultrasound with colour Doppler, Elisa reader, Semi auto analyzer. Operating microscope, G.I. Video endoscope, Orthopaedic operation table under digital subtracted C-Arm. Spirometer, Pulse oxymeter.

Special Services – Blood Bank, Ayurvedic Dispensary, Occupational Health Service.

Orient Area

Hospitals— (One) 15 bedded

    Doctors – 4

    Laboratory facilities for routine and special tests.

 Dispensary – 1

    Employees of orient and Ib Valley Area reside intermingled in an area of 5 km radius from Central Hospital, IB valley.

Lakhanpur Area

Dispensary- 1 with 5 beds

Doctors – 6 (inclusive of Physician & pathology one each)

Laboratory facilities for routine and special tests.

Basundhara Garjanbahal Area

Hospital – 1
Doctors – 6 (inclusive of Physician & Gynecology one each)

Laboratory facilities for routine and special tests.

300 MA digital X-Ray machine.

(B) Besides the health services available in the company, patients are referred to out side and panel hospital for super specialty treatment.

OCCUPATIONAL HEALTH CENTRE, CENTRAL HOSPITAL, IB VALLEY

The employees of above areas of Ib Coalfields report to Occupational Health Centre, Central Hospital Ib Valley for Periodical Medical Examination.

- OHC man power- Doctors - 2 (including one radiologist), Paramedical staff/ Nurse 1, Ministerial staff—3, Peon – 1

- Special equipments available – Spirometer, Electronic audiometer, 12 lead ECG machine.

- Investigations & examinations are done in respective departments

- Supporting Equipment- Pc 1

Employees reporting for PME, referred to concern specialist as and when required.

RESULTS FROM PREVIOUS PERIODIC MEDICAL EXAMINATIONS BY MCL

SL No.		2009	2010	2011
1	No. of employee	9607	9671	9486
2	No. of PME done	2189	2068	1950
3	Age wise distribution			
	Up to 24 years	27	43	16
	25 years to 34 years	106	157	167
	35 years to 44 years	513	524	451
	45 years to 54 years	1025	875	819
	55 years to 58 years	300	369	378
	59 years +	116	100	119
4	Disease profile			
	Hypertension (New)	241	331	98
	Hypertension (Old)	201	172	287
	Pulmonary Tuberculosis	53	52	17
	Diabetes Mellitus (New)	9	26	1
	Diabetes Mellitus (Old)	138	151	167

	I.H.D.	18	12	25
	Other cardiac disease	31	110	35
	Hansen's Disease	Nil	1	Nil
	Chr. Bronchitis / COPD	113	125	89
	Mental illness	4	3	Nil
	Peptic ulcer	8	33	9
	S.T.D.	Nil	Nil	Nil
	Defective hearing	14	30	8
	Cataract	53	83	58
	Refractive errors	352	485	493
	Colour blindness	29	51	53
	Orthopaedic	9	6	4
	Hydrocele	50	40	7
	Hernia	2	6	1
	Br. Asthma	23	10	17
	Epilepsy	7	3	4
	Sickling	7	3	Nil
	Cancer	2	Nil	Nil
5	No. of Pneumoconiosis Detected (Confirm)	3	4	1
6	Audiometry done	1841	1641	1402
7	Spirometry done	Nil	Nil	79

- The major morbidity was found to be visual problem which included refractive error, cataract and colour blindness. The trend was found to be increasing with time (23.6%-2009, 37.72%-2010, 43.08%-2011).

- The second common health problem was found out to be Hypertension. (New cases detected- 13.1%-2009, 20.2%-2010, 7%-2011)

- This was followed by lung disorders which included chronic bronchitis, asthma and pneumoconiosis (7.5%-2009, 8.4%-2010, 7.6%-2011)

- Remarkable finding was no STD cases were diagnosed in last three years.

- Audiometry has been done for last three years, but Spirometry was done only in 2011.

RESULTS OF PRESENT STUDY:

1. AGE DISTRIBUTION:

TABLE I: AGE DISTRIBUTION				
	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	110	22	61	43.90	8.518

TABLE II: AGE DISTRIBUTION ACC. TO AGE GROUPS

Age Group (in years)	Frequency	Percentage
<24	2	1.8
25-34	14	12.7
35-49	65	59.1
>49	29	26.4
Total	110	100.0

Mean age of 110 workers were 43.9 years with SD of 8.51 years. Coefficient of variation was 19.4 per cent. Majority (59.1%) were between 35 to 49 years.

2. SEX DISTRIBUTION:

TABLE III: SEX DISTRIBUTION

Sex	Frequency	Percentage
Male	108	98.2
Female	02	1.8
Total	110	100

Most of them i.e. 108(98.2%) were males.

3. EDUCATIONAL STATUS OF THE EMPLOYEES:

FIGURE I: EDUCATIONAL STATUS
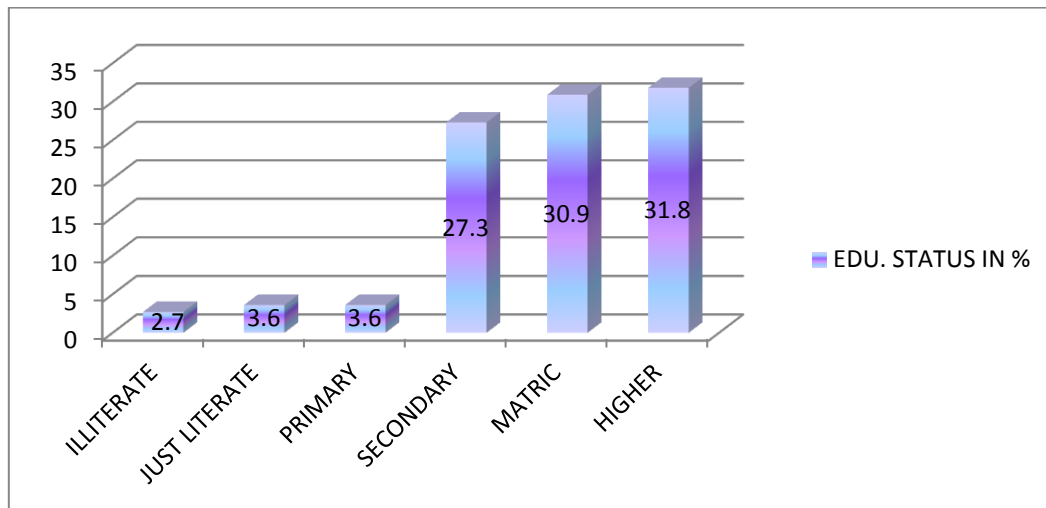
Only 3(2.7%) were illiterate and 4 (3.6%) were just literate. One in 4 was having secondary education, 1 in 3 was matriculate and 1 in 3 was having higher education.

4. MONTHLY INCOME:

FIGURE II: MONTHLY INCOME OF EMPLOYEES
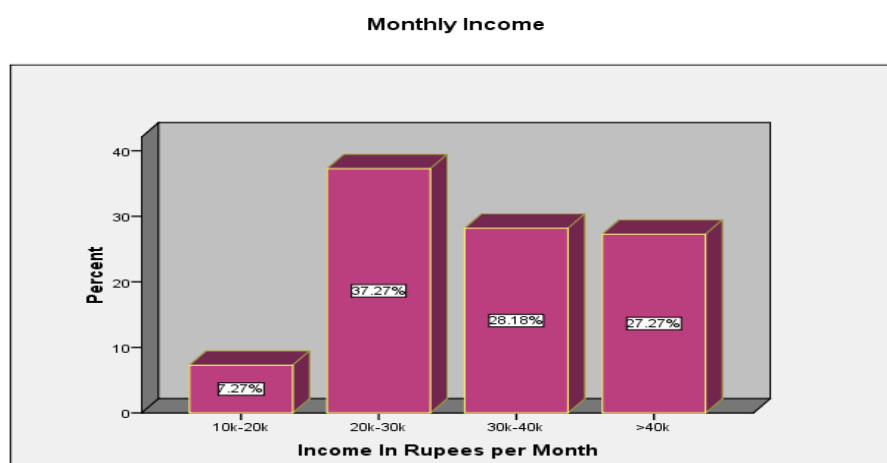
Majority i.e. (37%) earn between 20,000 to 30,000 a month. Average monthly income was around 32,400 rupees.

5. HEAD OF FAMILY

TABLE IV: HEAD OF THE FAMILY

Head of the Family	Frequency	Percentage
self	78	70.9
father	16	14.5
mother	16	14.5
Total	**110**	**100.0**

Workers themselves (70.9%) were found head of the family.

6. DURATION OF JOB

FIGURE III: DURATION OF JOB
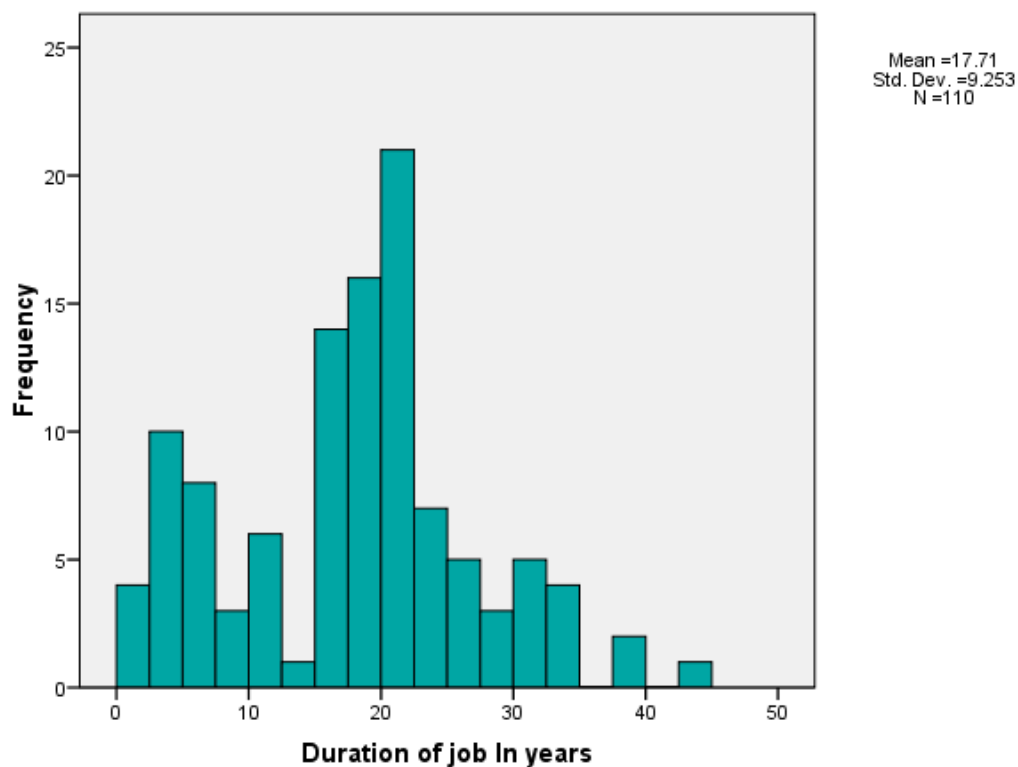
Duration of job in years of the workers was between 1 to 43 years. An average of 17.71 years with SD of 9.2 years was observed.

7. Type of Job

TABLE V: JOB TYPE OF EMPLOYEES

Type of job		
JOB	**Frequency**	**Percentage**
Driver	38	34.5
Mechanical	36	32.7
Gen work	14	12.7
Supervisor	4	3.6
Welding	4	3.6
Others	14	12.7
Total	110	100.0

Two thirds of the workers (74)were drivers (38,34.5%) and mechanics (36,32.7%).

8. Periodic Medical Examination:

TABLE VI-A: PERIODIC MEDICAL EXAMINATION OF THE EMPLOYEES

Ever had medical exam	Frequency	Percentage
Yes	109	99.1
No	1	.9
Total	110	100

Ninety nine per cent workers ever had medical examination.

TABLE VI-B: TIME SINCE LAST PERIODIC MEDICAL EXAMINATION

Time since last med exam held	Frequency	Percentage
<1year	40	36.4
>1year	70	63.6
Total	110	100.0

Two thirds of the workers had their last medical examination held one year before and only 36 per cent (39) had their medical examination less than one year.

9. HISTORY OF PREVIOUS MEDICAL ILLNESS:

TABLE VII: PREVIOUS MEDICAL HISTORY

	COUNT	PERCENTAGE
Admitted to hospital for surgery	35	33
Absent for>2wks for medical reasons	13	12
Currently taking any medication	37	34
Heart disease	04	03
Chest pain	14	13
High Blood Pressure	20	19
Respiratory problem	16	15
Deafness or Ear problem	25	23
Episodes of numbness or weakness	15	14
Psychiatric illness	04	03
Fits or epilepsy	02	02
Tenosynovitis	9	7
Diabetes	17	15
Back ache	39	35
Joint problem	29	26

Neck pain	16	14
Fractures	20	18
Arthritis	09	07
Hernia	04	03
Dermatitis or eczema	12	10
Allergies	14	12

Out of the total workers only 35(33%) had been hospitalized for surgery, 13(12%) were absent from duty for medical reasons and 37(34%) were taking medications.

Common health problems among the workers as per their statement were musculoskeletal symptoms such as Backache (39, 35%), Joint pain (29(26%), neck pain (16(14%) and tenosynovitis 9(7%) besides history of fractures at work site among 20(18%) in the past. As far as cardiovascular diseases are concerned, 20(19%) were known hypertensive, 4 had heart disease and 14(13%) of them have had chest pain in the past. Respiratory problems were present in 16(14%) employees and 17(15%) were known diabetic. Deafness/ear problems were present in 25(23%) workers. Numbness and weakness were experienced among 15(14%) workers. Skin problems such as dermatitis were present in 12(10%) workers and 14(12%) workers had allergies to dust.

10. PERSONAL HISTORY

TABLE VIII: PERSONAL HISTORY

	COUNT	PERCENTAGE
SMOKING	40	36.4
ALCOHOL	41	37.3
ORAL TOBACCO	52	47.3
OTHERS	05	4.5

When asked about their personal habit it was found that majority were habituated with chewing tobacco i.e. 52(47.3%) followed by smoking, 40(36.4%). Consumption of alcohol was 37 percent(41).

11. USE OF PPE (PERSONAL PROTECTIVE EQUIPMENT) BY WORKERS

On probing, it was found that many were telling that though PPE were available, they found it inconvenient and hence were not using it. For example, a driver never use ear muff because it makes them unable to hear any horn or sound from outside. Few of them told they were not provided with any such relevant equipment.

12. MEDICAL EXAMINATION:

TABLE IX: HEIGHT AND WEIGHT

Parameter	N	Minimum	Maximum	Mean	Std. Deviation
Height (in cm)	110	151.00	181.00	165.3455	5.85205
Weight (in kg)	110	40.00	99.00	67.0091	10.56087

Mean height was 165.34cm with SD of 5.85cm and mean weight among the workers was 67.00 Kg with a SD of 10.56 Kg.

TABLE X-A: CVS EXAMINATION

PARAMETERS	NORMAL(In percentages)	HIGH(In percentages)
Blood Pressure	87.3	12.7
Pulse	93.6	6.4
Heart Sound	100	0
Oedema	90.9	9.1
Varicose Veins	99.1	0.9

12.7 per cent of the workers were having high blood pressure at the time of examination. Out of them 11 (10%) were new cases. And only one had varicose veins.

TABLE X-B: ECG STUDY

ECG study	Frequency	Percentage
Normal	97	88.2
Conduction defect	5	4.5
IHD	4	3.6
Cardiac enlargement	2	1.8
Other defect	2	1.8
Total	110	100.0

Five (4.5%) Workers had ECG suggestive of conduction defects, whereas 4 (3.6%) workers had ECG reading suggestive of Ischemic heart disease.

TABLE XI: RANGE OF MOVEMENTS

	NORMAL (In percentages)	ABNORMAL (In percentages)
Low back	96.3	3.7
Post back and gait	98.1	1.9
SLR Test	99.1	0.9
Neck Range of Movements	90.7	9.3
Upper limb	98.1	1.9
Lower limb	94.4	5.6
Reflexes	91.7	8.3

Leading problems of movements were Neck movements 9.3 % followed by abnormal reflexes (8.3%) and lower limbs (5.6%). Low back movements were affected in 3.7 per cent workers.

**TABLE XII: ABDOMINAL EXAMINATION**

	PRESENT (in percentages)	ABSENT(in percentages)
Abdominal Scar	3.7	96.3
Abdominal Mass	0	100
Hernia	0	100

Abdominal scars were observed in 3.7 per cent of workers.

TABLE XIII: DERMATOLOGICAL EXAMINATION

	PRESENT (in percentages)	ABSENT(in percentages)
Eczema/Dermatitis/Allergy	**7.4**	**92.6**
Other Skin Abnormality	**3.7**	**96.3**

Skin problems such as dermatitis, eczema or allergy were found among 7.4 per cent workers.

FIGURE IV: SPIROMETRY
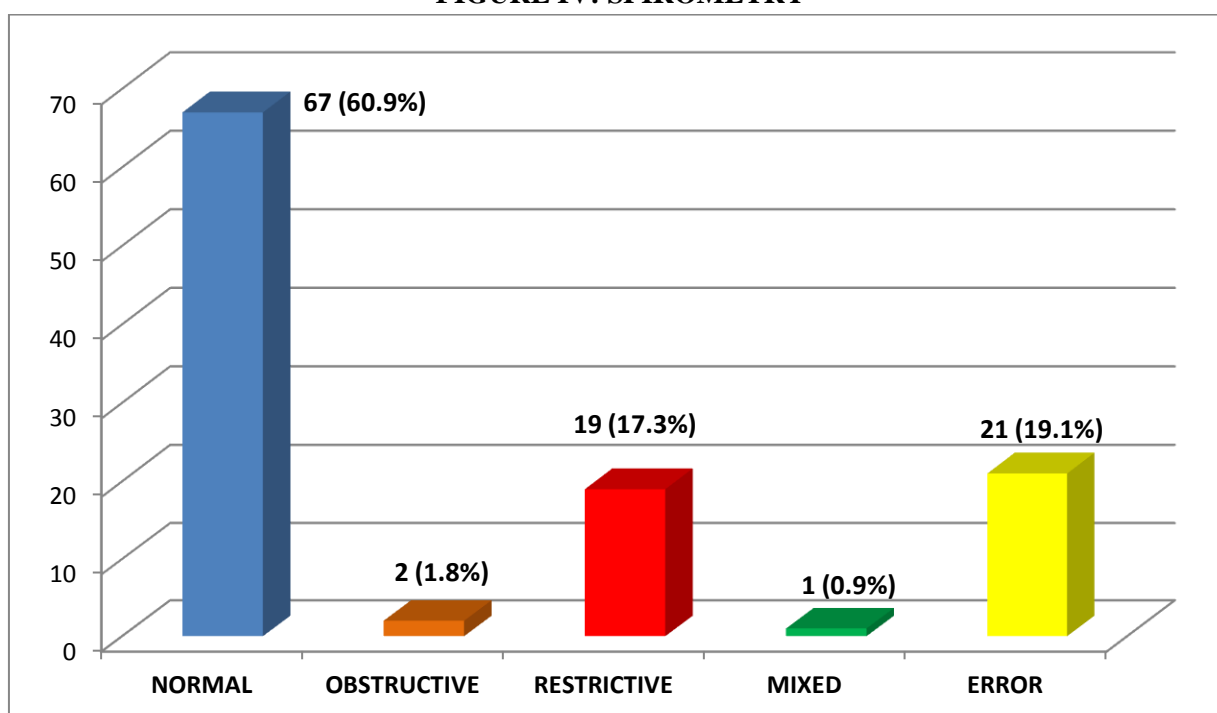
20% of workers were found to have spirometric finding abnormal suggestive of obstructive, restrictive and mixed type of respiratory problem.
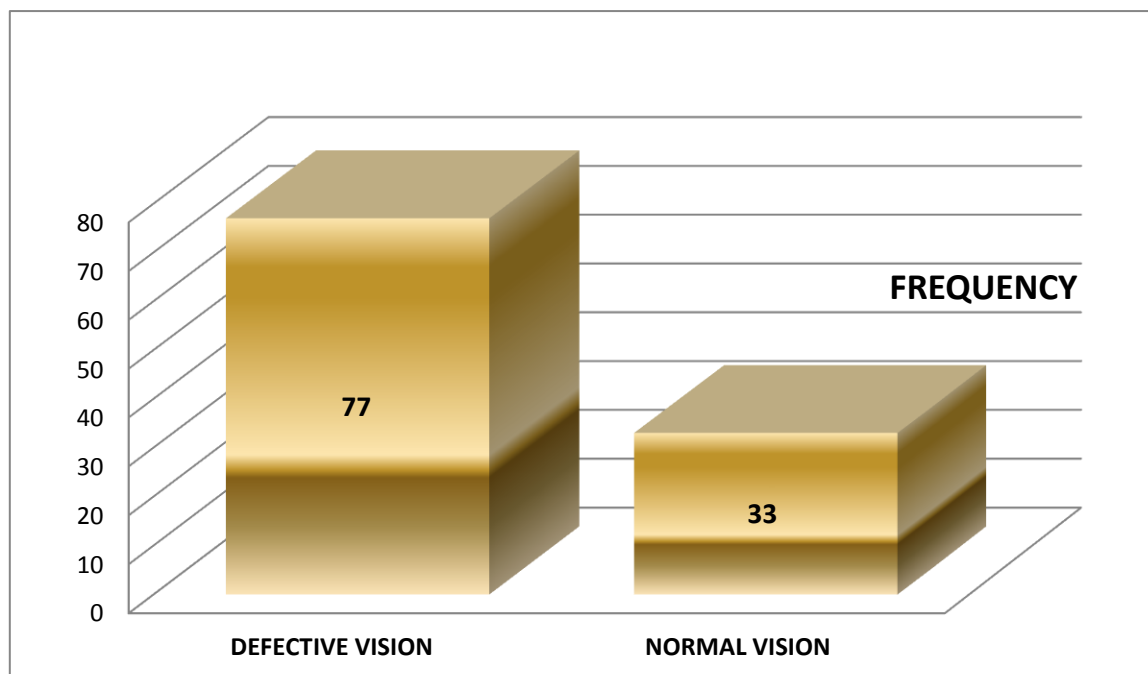
Restrictive type was maximum i.e. 19(17.3%). However, technical error in spirometry was 21(19.1%).

TABLE XIV: CHEST X-RAY (PA VIEW)

X-Ray finding	Frequency	Percentage
Normal	51	46.4
Abnormal	41	37.3
Tech err	18	16.3
Total	110	100.0

On evaluation of chest X-ray quality of 18 (16.3%) films were poor. Abnormality was found in 41(37%) X-ray of workers.

FIGURE V: VISUAL ACUITY

A large proportion of workers (70%) were found to have defective vision which was correctable. Most of them were presbyopic, but almost all were within their age specific range.

TABLE XV: OTHER VISUAL PROBLEMS

VISUAL PROBLEMS	PRESENT (in percentage)	ABSENT (in percentage)
COLOUR VISION PROBLEM	1.8	98.2
CATARACT	0.9	99.1

2(1.8%) workers were found to have colour vision problem and one (0.9%) worker was having immature cataract.

According to periodic medical examinations conducted by MCL the burden of colour blindness was 2.7%.

Audiometry result	Frequency	Percentage
Normal	104	94.5
Abnormal	6	5.5
Total	110	100.0

Only 6(5.5%) workers were found to have deafness according to audiometry.

13. LABORATORY EXAMINATION

TABLE XVII: BLOOD Hb LEVEL

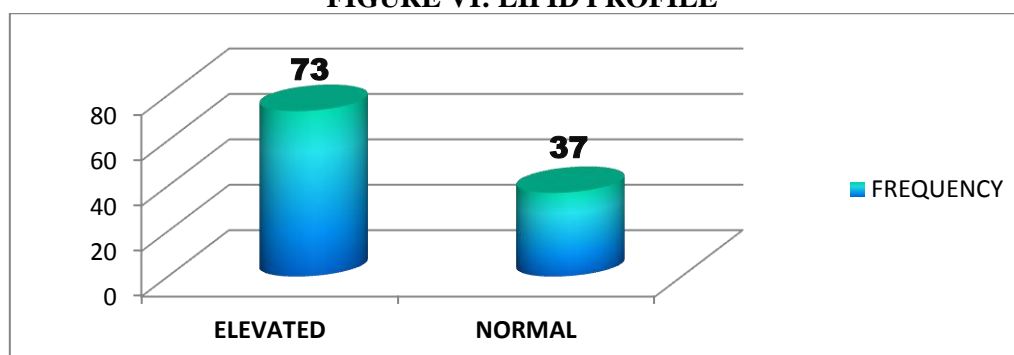| Hb level	Frequency	Percentage
Normal	90	81.8
Anaemic	20	18.2
Total	110	100.0

Prevalence of anaemia among workers was found to be 20(18.2%).

TABLE XVIII: COMPLETE BLOOD COUNT

CBC	Frequency	Percentage
Normal	81	73.6
Elevated TLC	1	0.9
Low platelet	28	25.5
Total	110	100.0

Platelet count was low among one fourth of the workers (28, 25.5%).
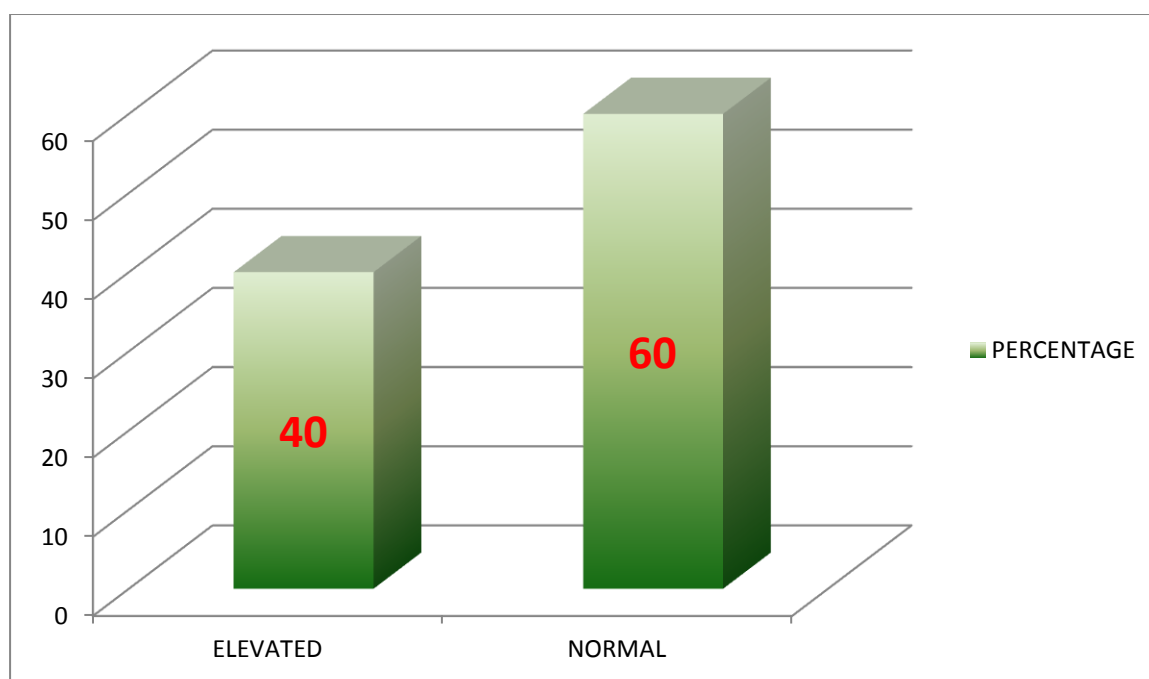
FIGURE VI: LIPID PROFILE

Lipid in blood was raised in two thirds of the workers i.e. 73(66.4%).

TABLE XIX: SERUM UREA CREATININE

Serum urea creatinine	Frequency	Percentage
Normal	109	99.1
Elevated	1	0.9
Total	110	100.0

Only 1 worker was found to have elevated blood urea and serum creatinine.

FIGURE VII: BLOOD SUGAR LEVEL

Random blood sugar was raised above normal range among 44(40%) workers.

TABLE XX: URINE ROUTINE EXAMINATION

Urine	Frequency	Percentage
Normal	107	97.3
Glycosuric	2	1.8
Pus cells	1	0.9
Total	110	100.0

Two were found to be glycosuric and only one was having urinary tract infection.

DISCUSSION:

- In the present study prevalence of hypertension was found to be 28% whereas it ranged from 20% to 24% as per the medical examinations conducted by MCL during last 3 years.

- Random Blood sugar was found to be raised above normal level among 40% of workers.
  Periodic Medical examination by MCL found the prevalence of DM to be 6.7-8.5%.

- 20% of the workers having spirometric finding abnormal (suggestive of obstructive, restrictive and mixed type of respiratory problem). However, this finding may be due to the poor effort during manoeuvre.

  Lung disorders detected (TB, COPD, Chronic Bronchitis) over a period of 3 years (2009-2011) by MCL based on clinical examination showed a decline during 2011.

- As per analysis by experts, it was found that technical error of spirometer was 20 per cent. Again, MCL has started conducting spirometry since last year with the help of a technician and of course post of a doctor qualified in pulmonology medicine lies vacant.

  Behaviour pattern of the workers are different from general population particularly during spirometry i.e. while undergoing spirometry most of them became restless, arrogant and non-cooperative which could have contributed to the errors in spirometry.

- Audiometry examination in this study detected 5.5% of workers to be having defective hearing. But, as per our expert opinion, none of the cases could be attributed to industrial cause of hearing loss. The prevalence of defective hearing according to periodic study by MCL is only 1.06%.

Difference between the studies might be due to following factors.

  o First of all MCL conducted their studies covering their employees in all areas like Ib Valley Area, Orient Area, Lakhanpur Area, Basundhara Garjanbahal Area and Central Workshop, Ib Valley. Our study was limited to Samaleswari Open Cast Project which comes under Ib Valley Area.
  o Present study was a cross-sectional study, whereas data of MCL periodic examinations spanned over last 3 years.
- Technique of chest X-ray was found not to be satisfactory as our expert suggested there was error in as high as 18% of x-ray films.
- Spirometry was not standardized.
- Data compilation and lack of proper documentation makes it difficult to compare its finding.

SUMMARY:

- **Age and sex**
  - Mean age of 110 workers were 43.9 years with SD of 8.51 years. Majority were between 35 to 49 years.
  - Most of them i.e. 108(98.2%) were males.

- **Education**
  - Only 3(2.7%) were illiterate and 4(3.6%) were just literate. One in 4 was having secondary education, 1 in 3 was matriculate and 1 in 3 was having higher education.
  - Majority i.e. 41 (37%) earn between 20,000 to 30,000 a month. Average monthly income was around 32,400 rupees.
  - Workers themselves (78, 70.9 %) were found head of the family.

- **Job period**
  - Duration of job in years of the workers was between 1 to 43 years. An average of 17.71 years with SD of 9.2 years was observed.

- **Type of job**
  - Two thirds of the workers were drivers (38, 34.5%) and mechanics (36, 32.7%)

- **History of medical examination in MCL**
  - Ninety nine per cent workers ever had medical examination.
  - Two thirds of the workers had their last medical examination held one year before and only 36 per cent (40) had their medical examination less than one year.

- **MEDICAL HISTORY**
  - Out of the total workers only 35(33%) had been hospitalized for surgery, 13(12%) were absent from duty for medical reasons and 37(34%) were taking medications.
  - Common health problems among the workers as per their statement were musculoskeletal symptoms such as backache (39, 35%), joint pain (28(26%), neck pain (16(14%) and tenosynovitis 9(7%) besides history of fractures at work site among 20(18%) in the past.
  - As far as cardiovascular diseases are concerned 21(19%) were known hypertensive, 5 had heart disease and 15(13%) of them have had chest pain in the past. Respiratory problems were 17(15%) and equal number were known Diabetic. Deafness/ear problems were

26(23%). Numbness and weakness were experienced among 16(14%) workers skin problems such as dermatitis was 12(10%) and allergies to dust were 14(12%) only.

- o When asked about their personal habit it was found that majority were habituated with chewing tobacco i.e. 52(47.3%) followed by alcohol consumption 41 (37.3%). Smoking history was present in 36.4% (40).

- **FINDINGS OF MEDICAL EXAMINATION**

Anthropometry
- o Mean height was 165.34cm with SD of 5.85cm and mean weight among the workers was 67.00 Kg with a SD of 10.56 Kg.

Health Problems
- o 12.7 per cent of the workers were having high blood pressure at the time of examination. And only one had varicose veins.
- o 5 (4.5%) Workers had ECG suggestive of conduction defects, whereas 4 (3.6%) workers had ECG reading suggestive of Ischemic heart disease.
- o Leading problems of movements were Neck movements 9.3 % followed by abnormal reflexes (8.3%) and lower limbs (5.6%). Low back movements were affected in 3.7 per cent workers.
- o Abdominal scars were observed in 3.7 per cent of workers
- o Skin problems such as dermatitis, eczema or allergy were found among 7.4 per cent workers.
- o 20% of the workers were found to have spirometric finding abnormal suggestive of obstructive, restrictive and mixed type of respiratory problem which may be due to the poor effort during manoeuvre.
- o On evaluation of chest X ray film quality of 18(16.3%) films were poor. Abnormality was found in 41(37%) X ray films of workers.

CONCLUSION:

Data base, documentation along with analysis and action in collaboration with faculty of medical college will strengthen the medical examination process conducted by MCL officers and health status of miners will improve further.

RECOMMENDATIONS:

➢ Pre placement and periodic examinations need to be conducted as per protocol so that maximum workers are covered.

➢ Data base and documentation of each medical examination, its compilation, presentation and analysis is necessary to enable MCL people or any other evaluator to compare, comprehend and do a trend analysis of the health problems of workers.

➢ Employees need to be educated on healthy life style with special focus on reducing the substance abuse practices. Further, they should be appraised about relevant occupational risk factors and should be emphasized to use PPE and take intervention measures to protect themselves from occupational disorders.

➢ There is an urgent need to improve the laboratory standards for procedures like spirometry and X-ray, which can be achieved by more intense training of laboratory technicians and better instrument procurement.

➢ The vacant medical posts should be filled up so as to improve the services.

➢ External evaluation, standardization of equipment and health talks can be taken up with the help of faculty of medical college from time to time. At the end of each medical examination faculty of Community Medicine and Pulmonary Medicine may be involved to interpret data for action.
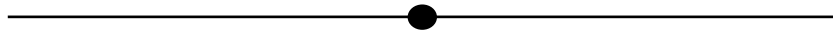
ANNEXURE 1

QUESTIONNAIRE

A STUDY ON "IMPACT OF MINING ON HEALTH OF WORKERS AT SAMALESWARI OCP, BRAJARAJ NAGAR "

Name: -   ID number:- serial number/date

- Age :-   sex:-
- Date of birth:-
- Address:-

- Education status:-
- Monthly income:-
- No of Family members:-
- Head of the family:-

year		Job description
From	to	

- Health related history:-
1. Have you ever had a medical examination- YES/NO
2. If yes , when was the last examination held- YES/NO
3. Have you ever been admitted to a hospital or undergone surgery or an operation- YES/NO
4. Have you ever had an illness or operation that has prevented you from undertaking your normal duties for more than two weeks- YES/NO
5. Are you taking any medications- YES/NO
6. Do you use any hearing protection while working in noisy areas- YES/NO
7. Have you ever smoked- YES/NO
   - Do you currently smoke- YES/NO
   - If yes no of cigarettes per day- YES/NO
8. Do you take alcohol- yes/no
   - If yes what is the frequency-
   - What is the amount-
9. Do you have any other addictions?

- Have you ever suffered from, or do you now suffer from, any of the following?
  1. Heart diseases or heart surgery- YES/NO
  2. Chest pain- YES/NO
  3. High BP- YES/NO
  4. Respiratory problems- YES/NO
  5. Deafness, loss of hearing or ear problems- YES/NO
  6. Episodes of numbness or weakness- YES/NO
  7. Psychiatric illness- YES/NO
  8. Fits , epilepsy- YES/NO
  9. Tenosynovitis- YES/NO
  10. Diabetes- YES/NO
  11. Back ache- YES/NO
  12. Neck injury or neck pain- YES/NO
  13. joint problems- YES/NO
  14. Fractures- YES/NO
  15. Arthritis or rheumatism- YES/NO
  16. Hernia- YES/NO
  17. Dermatitis, eczema or skin problems- YES/NO
  18. Allergies- YES/NO
- Clinical findings?
  1. Height -   weight-
  2. Vision-
  3. Visual acuity
  4. Field of vision
  5. Hearing- using audiogram – NORMAL /ABNORMAL
  6. Cardiovascular system:- normal / abnormal
      A. Blood pressure
      B. Pulse rate
      C. Peripheral pulses
      D. Heart sounds
      E. Evidence of cardiac failure or oedema
      F. Varicose veins
      G. ECG
      H. COMMENTS IF ANY:-
  7. Respiratory System:-

LITRES	OBSERVED	PREDICTED	OBSERVED/PREDICTED%
FEV_1			
FVC			
FEV_1/FVC			

  A. SPIROMETRY:-

B. Auscultation of the chest

C. Chest X ray- findings-

8. Musculo - skeletal system:-

   A. Lower back:-   range of movements

   Posture and gait

   Straight leg raising

   B. Neck – range of movements

   C. Joint movements:-

   - Upper limbs

   - Lower limbs

   - Reflexes

9. Urinalysis and blood sugar:-

   A. Sugar

   B. Protein

   C. Blood

   D. Blood sugar analysis

10. Abdomen :-

   A. Abdominal scars

   B. Abdominal mass

   C. Hernia

11. Skin :-

   A. Eczema, dermatitis & allergy

   B. Skin cancer or other abnormality:-

IMPRESSION:-

Signature of the Employee   Signature of the Research Assistant

Signature of the CO- Principal Investigator   Signature of the Principal Investigator

FINDINGS OF THE EXAMINATIONS:-

1. BLOOD TESTS:-
   - Complete blood count
   - Total lipid profile:-
   - HIV test
   - Hepatitis B test-
   - Serum urea and creatinine
   - Blood sugar-

Signature of the MO I/C   Signature of the pathologist

2. urine analysis:-
   - sugar
   - protein / albumin

Signature of the MO I/C   Signature of the pathologist

3. RESPIRATORY SYSTEM-
   Spirometry:-

litres	observed	predicted	Observed/ predicted%
FEV$_1$			
FVC			
FEV$_1$/FVC			

Radiological:-
   - Date of x-ray taken
   - Quality of film
   - What was the result?

Signature of the MO I/C   Signature of the radiologist

4. VISION:-

    • Visual acuity-

uncorrected		corrected	
right	left	right	Left
6/	6/	6/	6/
N	N	N	N

    • Visual fields:- abnormal/ normal
    • Colour vision tests-

    Signature of the MO I/C   Signature of the ophthalmologist

5. HEARING:-

AUDIOGRAM	500Hz	1000Hz	1500 Hz	2000 Hz	3000 Hz	4000 Hz	6000 Hz	8000 Hz
LEFT								
RIGHT								

    • Audiogram results-
    • Were hearing aids used- yes/no
    • Auditory canals- abnormal/normal
    • Tympanic membranes- abnormal/normal

    Signature of the MO I/C   Signature of the audiologist

6. Cardiovascular system:-
    I.   Blood pressure
    J.   Pulse rate
    K.   Peripheral pulses
    L.   Heart sounds
    M. Evidence of cardiac failure or oedema
    N.   Varicose veins
    O.   ECG
    P.   COMMENTS IF ANY:-

    Signature of the MO I/C   Signature of the physician

ANNEXURE 2

Photo I: Investigators with Officials (MCL)

Photo II: Clinical Examination of Participants

Photo III: Spirometry of participants

PHOTO IV: Interview of the Participants

Photo V: A Case of Chronic Contact Dermatitis

Photo VI: Samaleswari Open Cast Mining Project