Final Report in M.A. No. 1126/2017 In Origincal Application No. 35/2014 (THC) Bhanwara Ram In Ganpat Ram Mirdha V/S State of Rajasthan & Ors.

As per NGT court instructions health Survey was carried out at Koliya & adjoining villages *Bandolai ki dhani, Nake ki dhani* and *Nojala ki dhani*.

Methodology of Survey

The whole population of Koliya and adjoining villages was surveyed by visiting house to house. 20 teams were constituted. Each team had 4 members ANM, Asha worker, anganbari worker & a teacher. ANM or a nursing personnel was in charge of the team. They all were given specific training regarding various questions of the proforma and methodology of the survey.

The proforma used for this survey consisted of a questionnaire, designed to identify symptoms of a patient. The initial part of the questionnaire contained information about the demographic details about a person & his family. It also included the occupation the person, distance of house from the crasher site, level of the education, type housing & type cooking fuel. It also enquired about personal habits like smoking & alcohol use. The final section of the questionnaire had questions relating to the symptoms and disease of a person.

All symptomatic patients, identified in the house to house survey were requested to visit to the PHC of the village. Another proforma was designed for the symptomatic persons coming to PHC for consultation with the doctors. The doctors involved in the clinical examination were specifically trained to use the proforma and make diagnosis of the disease. The suspected cases were also subjected to the investigations such as X Ray Chest, spirometry & complete blood count. The X Rays were examined by the Silicosis board of the district, spirometry was evaluated by a pulmonologist & CBC was evaluated by a physician. In order to evaluate the effect of crasher dust we compared number of disease persons in the population living in 1Km, 2 Km, 3Km & more than 3Km distance from the crasher site. The percentage of patients were compared with the percentage of population living in the corresponding area.

Results

Demographic chacteristics of th Person surveyed (Encl 1)

- In total 8303 persons in *Bandolai ki dhani* 686, Koliya 6925, *Nake ki dhani* 110, *Nojala ki dhani* 582 were surveyed. 904 persons living in Agrot were not included.
- 8303 persons living in 1631 household were surveyed in 4 villages Koliya, Bandol ki dhani, Nake ki dhani & Nojala ki dhani.
- 4344 were male & 3901 were females.
- Young persons less than 20 yr age were 39.6% . Only 15.6% persons were above 50yrs of age. 74% people are less than 40yrs age.
- 33.6% were uneducated & 14.3% were graduate or above. 23.6% were were farmers & 7.5% were workers. Professionals and merchants were less than 1%. 2.9% were government servants & 236 (3.0%) were woking in the stone crashers.
- 22.1% of surveyed persons were BPL.
- Smoking was used by 461 (5.9%) and alcohol by 177 (2.1%) persons.
- 80% persons had LPG connection for cooking. Despite of LPG connection majority (91%) still use biomass fuel.

Crasher sites

The team members also paid a visit to the crasher site. It was found that cloud of dust was generated and workers were exposed to the dusty air which may be responsible for high number of Silicosis cases in the area. **Encl 6**

Level of pollutants in houses: We attempted to find indoor and outdoor values of PM2.5 size particles but could not comment because lack of use of standarised methods.

Disease spectrum in 4 villages (Encl 2)

Silicosis (Encl 3)

Despite of institution of district pneumoconiosis board in 2016 detection of 10 new cases in the survey indicate that sizable number of cases are still remain undiagnosed in the society. All patients had history of working in the stone crasher/mines. In total 12 patients of Silicosis (10 new & 2 old) were examined in this survey, 8 had past or present history of tuberculosis.

Other diseases (Encl 2, table 1 & table 2)

618 sick patients were identified during house to house survey. However, 723 patients reached for medical examination. Many persons who were not sick in questionnaire also reached. After medical examination and testing 479 had some diseases but 244 had no disease.

The most common disease were Asthma, COPD & TB. 166 (2%) had Asthma, 76 (0.9%) had COPD & 55 (0.7%) had new or old TB. 141 had problem of joint pains, 49 had hypertension, 18 had heart disease & 14 had diabetes.

45% asthmatic and 71% COPD patients took oral bronchodilators. 40% asthmatic and 62% COPD patients took oral steroids. 14% Asthmatic patients and 4% COPD patients take inhaler therapy.

Less than 1% patient used alternative medicines like Homeopathy, yoga and Ayurveda therapy.

In order to find threshold of taking treatment a multi-option question was asked. When do you take medicine? In total 566 persons replied. 55% take medicines only at symptomatic stage, 17% take when symptoms exceeds the limit of tolerance and only 28% take it regularly.

Report given by DMHS shows nil patients of asthma, COPD and other respiratory diseases at Kolia PHC in 2017. **Encl 4**

Skiagram chest, CBC & spirometry were done in patients having indication of the tests. **Encl 5**. 193 patients were sent for CBC and 109 (56.5%) had anemia.

Out of 479 patients X Ray was done in 122 patients. 47 had evidence of TB & 34 had Emphysema/COPD & 12 had Silicosis. 32 X Rays were reported normal. 105 spirometry were done but 46 person could not perform adequately, 23 had obstruction, 23 had restriction & 12 were normal.

In order to find effect of crasher dust on occurance of respiratory disease we compared number patients living from different distances. As shown in the table it was seen that number of patients in relation to population are not higher than the main village.

Observations

1. Finding 10 new patients in a population of 8303 person indicate a load of 12 patients in every 1000 population. In situations of non-availability of accurate registers of mines/crasher workers, it will logical to adopt house to house survey of the population residing in vicinity of mines or crasher.
2. In Kolia and adjascent villages Asthma & COPD were the most common diseases. However, Kolia PHC data showed that the cases of respiratory diseases were nil in 2017. Therefore this survey also showed the hidden burden of respiratory diseases such as asthma & COPD. Early detection of asthma & COPD is still more significant in view of recent global burden disease (GBD) publications. It showed that though the prevalence of COPD and asthma is not so high, yet the death rate due to these diseases is highest in Rajasthan. In Rajasthan COPD is top killer even more than the heart disease. In all remaining big states coronary artery disease was the top killer.
3. Majority of COPD & Asthma patients are still using oral steroids and bronchodilator tablets. Inhalers which are better in safety and efficacy are used much less.
4. Unfortunately patients are in habit of taking medicines when they are in agony or unable tolerate symptoms. Only 28% take it regularly that may be the reason of undertreatment & high mortality in patients of COPD & Asthma in Rajasthan.
5. Interestingly smoking prevalence was only 6%. Biomass smoke & dust in people working in crasher may be responsible. Though LPG connection is found in 80% of house holds, yet 90% persons still use biomass for cooking in their houses.
6. Result of our study does not support the notion that respiratory patients are due vicinity of residential area near crasher site. COPD, asthma & TB cases in proportion to population were not higher in 1Km or 2Km radius than living 2-3Km or more than 3Km. Secondly all the Silicosis patients had history of working in the mines/crashers.
7. Though the protective measures such as closed space cutting, wet cutting & crushing is mandatory but visit of our team showed cloud of dust & exposure to the workers as seen in the video. Density of trees was quite sparse.
8. I wish to mention specially some persons involved in the work helped in accomplishing this challenging project. Dr Mahesh Dan is quite devoted a doctor. Dr DK Mangal of

IIHMR solved the biggest hurdle of analysis various aspects of the data. Dr VK Mathur DMHS coordinated various aspects of the survey. Local administration was quite cooperative. Dr Ajeet Singh Shaktawat & Dr Randheer Rao were quite helpful at every step of the project.

Recommendations

1. Since Silicosis is a big threat to the workers working at the crasher site therefore preventive measures must be taken. Firstly intense awareness program should be organized for workers showing harmful effects of inhaling dust and value of using protective measures. Secondly protective measures such as wet cutting, covered crashers etc must be monitored by putting online cameras.
2. Big trees must be planted between areas of mining/crashers and areas of residence to develop a natural biological filter for the dust pollutants.
3. House to house survey should be conducted in Silicosis prone areas on the line of Kolia model to identify undiagnosed patients of Silicosis.
4. Paramedical staff posted in Silicosis prone areas should be given specific training to suspect respiratory ailments. The medical officers posted at PHCs should be trained to enhance diagnostic skills of diagnosing & adequately managing Respiratory patients specially Silicosis, COPD, Asthma & TB. Training may even be organized by video-conferencing which may be quite cost effective.
5. The results of this study uncovers many aspects useful for public and doctors therefore we pray to the court to grant permission to publish these results in the scientific medical journals of India.

Table 1

Showing number of patients of various diseases & % population categorized according to distance of residence from the crasher site

Distance from crasher	<1 Km	1-2 Km	2-3Km	>3Km	No response	Total
% Population living in the area	2123 (25%)	2880 (35%)	2403 (29%)	415 (5%)	482(6%)	8303
Asthma patients n(%)	7 (4.2%)	8 (4.8%)	116 (69.9%)	26 (15.7%)	9 (5.4%)	166
COPD patients n(%)	5 (7%)	4 (5.3%)	52 (68.4%)	9 (11.8%)	6 (7.9%)	76
TB patients n(%)	4 (7%)	4 (7.3%)	40 (72.7%)	6 (10.9%)	1 (1.8%)	55

Table 2

Prevalence of various diseases found in the survey

Disease	Number	Population	Prevalence
Asthma	166	8303	2%
COPD	76	8303	0.9%
TB	55	8303	0.7%
Silicosis	12	8303	0.14%

Table.1: General Health Survey for Case Villages						
Variables	**N**	**Missing/Blank**	**No**	**Yes**	**Valid Case**	**%**
Total household	1631				1631	
Total member in the Household	8303				8303	
Village						
Bandolaikidhani	8303				686	8.3
Koliya	8303				6925	83.4
Nakekidhani	8303				110	1.3
Nojalakidhani	8303				582	7.0
1. उम्र(साल में)	8303	38		8265	8265	
00-20	8265			3277		39.6
20-30	8265			1649		20.0
30-40	8265			1168		14.1
40-50	8265			882		10.7
50-60	8265			613		7.4
60 & above	8265			676		8.2
2. पुरुष=1, स्त्री=2	8303	58		8245	8245	
पुरुष	8245			4344		52.7
स्त्री	8245			3901		47.3
3. शिक्षा(साल में)	8303	294		8009	8009	
No education	8009			2692		33.6
Primary	8009			1500		18.7
Middle	8009			1151		14.4
Secondary	8009			908		11.3
Higher Secondary	8009			613		7.7
Graduation & above	8009			1145		14.3
4. व्यवसाय						
पेशेवर	8303	488	7745	70	7815	0.9
व्यापारी	8303	600	7648	55	7703	0.7
सरकारीकर्मचारी	8303	443	7625	235	7860	2.8
उत्पादनकर्मी	8303	621	7049	633	7682	8.2
किसान	8303	504	5946	1853	7799	23.8
पत्थरखदान के मजदूर	8303	505	7562	236	7798	3.0
अन्यकार्य	8303	906	7069	328	7397	4.4

Table.1: General Health Survey for Case Villages						
Variables	**N**	**Missing/Blank**	**No**	**Yes**	**Valid Case**	**%**
5. वर्तमान में पत्थर खदान में कार्यरत हैं?Yes=1,No=0	8303	583	7508	212	7720	2.7
5a **यदि हाँ**तो कितने समय से कार्यरत है? (साल) Y	212	1		211	**211**	
<5 years	211				55	26.1
5-10 years					53	25.1
10-15 years					35	16.6
>15 years					68	32.2
6. क्या आपने पत्थर तोड़ने वाली फेक्ट्री में काम किया है? Yes=1,No=0	8303	365	7485	453	7938	5.5
6a यदि हाँ तो कितने समय तक (साल) Y	453	1		452	**452**	
<5 years					158	35.0
5-10 years					125	27.7
10-15 years					62	13.7
>15 years					107	23.7
7. यदि आप पत्थर खदान में काम नहीं करते हैं तो आपका घर फेक्ट्री से कितना दूर है?						
Q7A_आपके घर से किमी	7508	445			7063	
<1 km	7063				1834	26.0
1-2 km	7063				2608	36.9
2-3 km	7063				2238	31.7
3-4 km	7063				254	3.6
>4 km	7063				129	1.8
Q7B_आपके कार्य स्थल से किमी	7508	2083			5425	
<1 km	5425				1932	35.6
1-2 km	5425				1570	28.9
2-3 km	5425				1363	25.1
3-4 km	5425				233	4.3
>4 km	5425				327	6.0
8. वार्षिक पारिवारिक आय	8303	5137			3166	
<10000	3166				1673	52.8
10000-20000	3166				64	2.0
20000-30000	3166				90	2.8
30000-40000	3166				357	11.3
>40000	3166				982	31.0
9. परिवार: (बी पी एल /ए पी एल Yes=1,No=0	8303	560	6037	1706	7743	22.0
10. आप कितने समय से इस गांव में रह रहे हैं? (साल)	8303	345			7958	

Table.1: General Health Survey for Case Villages						
Variables	**N**	**Missing/Blank**	**No**	**Yes**	**Valid Case**	**%**
<10					2231	28.0
10-20					2062	25.9
20-30					1343	16.9
30-40					920	11.6
>40					1402	17.6
11. पीने के पानी का मुख्य श्रोत क्या है? Yes=1,No=0						
a.घर में बिछी पाइप लाइन	8303	540	3587	4176	7763	53.8
b.सरकारी नल	8303	595	4223	3485	7708	45.2
c. टूबवेल/बोरवेल	8303	953	7275	75	7350	1.0
d. खुदा हुआकुआँ	8303	879	7351	73	7424	1.0
e. पानी का टैंकर	8303	879	5831	1593	7424	21.5
f. पानी की बोतल	8303	871	7387	45	7432	0.6
g. सामुदायिक आरो प्लांट	8303	956	7171	176	7347	2.4
h. बरसात कापानी	8303	721	2766	4816	7582	63.5
12. खाना पकाने के लिए किस तरह का ईंधन काम में लिया जाता है? Yes=1,No=0						
12a बिजली	8303	870	7228	205	7433	2.8
12b एलपीजी	8303	388	1559	6356	7915	80.3
12c बायो गैस	8303	880	7373	50	7423	0.6
12d केरोसिन	8303	951	7340	12	7352	0.2
12e कोयला / लिग्नाइट	8303	916	7373	14	7387	0.2
12f लकड़ी	8303	403	714	7186	7900	91.0
12g गोबर गैस	8303	969	7118	216	7334	2.6
12h घर में खाना नहीं बनाते	8303	826	7115	362	7477	4.8
13. घर का प्रकार Yes=1,No=0						
13a पक्का	8303	299	818	7186	8004	89.8
13b आधा पक्का	8303	985	6751	567	7318	7.7
13c कच्चा	8303	897	7263	143	7406	1.9
14 क्या आप धूम्रपान करते हैं? Yes=1,No=0	8303	455	7387	**461**	7848	5.9
14a कितना धूम्रपान करते हैं? **बीड़ी=B,**	461	115			**346**	75.1
1-2 Bidi	346				26	7.5
2-3 Bidi	346				3	0.9

Table.1: General Health Survey for Case Villages						
Variables	**N**	**Missing/Blank**	**No**	**Yes**	**Valid Case**	**%**
3-4 Bidi	346				8	2.3
4-5 Bidi	346				20	5.8
>5 Bidi	346				289	83.5
14a कितना धूम्रपान करते हैं? **हुक्का=H**	461	431			**30**	6.5
1-2 Hukka	30				8	26.7
2-3 Hukka	30				0	0.0
3-4 Hukka	30				1	3.3
4-5 Hukka	30				7	23.3
>5 Hukka	30				14	46.7
14b कितने समय से धूम्रपान कर रहे हैं? **(साल)**	461	90			**371**	80.5
<10 years	371				121	32.6
10-20 years	371				128	34.5
20-30 years	371				71	19.1
30-40 years	371				34	9.2
>40 years	371				17	4.6
15 क्या आप तम्बाकू का सेवन करते हैं? Yes=1,No=0	8303	308	7545	**450**	7995	5.4
15a कितने समय से तम्बाकू का सेवन कर रहे हैं? **(साल)**	450	38			412	98.7
<10 years	444				293	66.0
10-20 years	444				102	23.0
20-30 years	444				23	5.2
30-40 years	444				15	3.4
>40 years	444				11	2.5
16 क्या आप शराब पीतेहैं? Yes=1,No=0	8303	328	7798	177	7975	2.1
16a साल में कितने **दिन**	177	13			164	98.9
17 क्या आप बीमार हैं? Yes=1,No=0	8303	444	7241	**618**	7859	7.9

Encl .2: Result of Survey Health Registry for Case Villages

Variables	N	Missing	No	Yes	Valid Case	%
Morbidity	**8303**				**723**	**8.7**
Sex	723	0			723	
Male	420					58.1
Female	303					41.9
Village Name	**723**	**0**			**723**	
Bandolaikidhani	83					11.5
Koliya	559					77.3
Nake ki dhani	20					2.8
Nojala ki dhani	61					8.4
Disease						
RESPIRATORY SYSTEM				284		59.1
MUSCULO-SKELETAL				69		14.4
GIT				31		6.5
CVS				30		6.3
Endocrinology				12		2.5
Skin & VD				9		1.9
ENT				8		1.7
CNS				6		1.3
UROLOGY				5		1.0
OPHTHALMOLOGY				4		0.8
Nephrology & UROLOGY				2		0.4
Miscellaneous				20		4.2
16B. When do you take treatment?						
Q16B_A_ Regularly	723	562		161		
Q16B_B_At symptomatic stage	723	412		311		
Q16B_C_When unable tolerate symptoms	723	629		94		
17. If patient has Asthma, what treatment?						
Q17_A_Oral bronchodilator	723	649		74	166	44.6
Q17_B_Oral Steroids	723	655		68		39.8
Q17_C_Inhaler	723	700		23		13.8

Variables	N	Missing	No	Yes	Valid Case	%
Q17_D_Complimentary medicine like Ayurvedic/ Homeopathic etc	723	722		1		
18. If patient has COPD, what treatment?						
Q18_A_Oral bronchodilator	723	669		54	76	71.0
Q18_B_Oral Steroids	723	676		47		61.8
Q18_C_Inhaler	723	721		3		4.0
Q18_D_Complimentary medicine like Ayurvedic/Homeopathic etc	723	723		0		
19. If patient has TB, what treatment?						
Q19_A_Regular treatment as new case	723	676		46		
Q19_B_Treatment defaulter	723	718		5		
Q19_D_Treatment as MDR	723	719		4		
20. If patient has Silicosis, what treatment?						
Q20_A_Regular treatment	723	712		12		
Q20_B_As needed.	723	723		0		
Q20_C_Treatment with complimentary medicine like Ayurvedic/Homeopathic etc	723	723		0		
Q21_Allergic Rhinits	723	671		52		
Q22_Bronchiectasis	723	719		4		
26. Other respiratory diseases						
Q26_A	723	716		**7**		
Q26_B	723	716		**7**		
Q26_C	723	720		**3**		
Back pain	3			1		
Gastrits				1		
LRTP				1		
27. Other system diseases						
Q27_A_Anemia	723	718		5		
Q27_B_Cancer	723	722		1		
Q27_C_Diabetes Mellitus	723	709		14		
Q27_D_Diarrohea	723	720		3		
Q27_E_Epilepsy	723	719		4		
Q27_F_Eye disease	723	714		9		
Q27_G_Heart Disease	723	705		18		
Q27_H_HT	723	674		49		

Variables	N	Missing	No	Yes	Valid Case	%
Q27_I_Hypothyroidism	723	720		3		
Q27_J_Joint pains	723	582		141		
Q27_K_Kidney disease	723	717		6		
Q27_L_Prostate disease	723	722		1		
Q27_M_Stroke	723	723		0		
Investigations						
INV_1_Skiagram Chest	723	578		122		
INV_2_Spirometry	723	595		105		
INV_3_CBC	723	520		193		

Patients who were diagnosed with Silicosis in X Ray report by Silicosis board

Khema Ram	32	M	Kaliya	Old K Chest with Silicosis
Magharam	62	M	Kaliya (Bera ki Dhani)	Old Silico TB
Deepa Ram	50	M	Kaliya	Old K Chest with Silicosis
Kana Ram	57	M	Kaliya	Old K Chest with Silicosis
Bajrang	50	M	Kaliya	Old K Chest with Silicosis
Ashu Ram	63	M	Kaliya	Silicosis
Prabhu Singh	72	M	Kaliya	Old K Chest with Silicosis
Sharwan Ram	63	M	Kaliya	Silicosis
Gopal	52	M	Kaliya	Silicosis
Jetha Ram	65	M	Kaliya	Old K Chest with Silicosis
Tiloka Ram	55	M	Nojla ki Dhani	Old K Chest with Silicosis
Nema Ram	55	M	Nojla ki Dhani	Silicosis

अनौपचारिक टिप्पणी

विषयः– M.A. No. 1126/2017 In Original Application No. 35/2014 (THC) Bhanwara Ram In Ganpat Ram Mirdha V/S state of Rajasthan & Ors. में माननीय नेशनल ग्रीन ट्रिब्युनल, नई दिल्ली।

सन्दर्भः– आपकी अनौ0 टि0 कमांकः चि.प्र./एनजीटी/2019/49 दिनांकः 13.6.19

उपरोक्त विषय एवं संदर्भित अनौ0 टिप्पणी के कम में अनुरोध है कि वर्ष 2017 की प्राप्त सी0टू0ई0 के आधार पर पीएचसी कोलिया, जिला नागौर एंव राजस्थान मे आउटडोर में आये मरीजों का तुलनात्मक संख्या विवरण निम्न प्रकार हैंः–

S.No.	Particulars	Bronchitis, chronic and unspecified, emphysema and Asthma	Hypertensive Heart Diseases	Ischaemic Heart Diseases-Acute myocardial Infraction	Dibetes mellitus
1	PHC Kolia	Nil	Nil	Nil	Nil
2	District Nagour	122611	118693	5725	50564
3	Rajasthan	3259465	3104631	151082	1757277

अतिरिक्त निदेशक (ग्रा0स्वा0)
मुख्यालय।

अतिरिक्त निदेशक (चि0प्र0)
मुख्यालय।

अनौ0 टि0 कमांकः वीएस/वि.स/2019/138
जयपुर, दिनांकः 19/6/19

Hemoglobin

Less than 8	8-10	11-12	13-14	More than 14	Total
8 (4%)	24 (12%)	77 (40%)	63 (33%)	21 (!!%)	193

Spirometry

Obstruction	23
Restriction	23
Normal	12
Unable to perform adequately	46
Refused	01
Total	105

X Ray

Old K Chest-K chest	**47**
Emphysema	**30**
COPD	**4**
Silicosis	**12**
Consolidation	**1**
Pl Effusion	**1**
Normal	**32**
Total	**122**