

Special Protection and Provision of Rest during Work and Occupational Health Hazards: A Survey among Steel and Power Industry Workers in Odisha, India

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ABSTRACT

Introduction: In India, there are many labour laws implemented for the legal provision of working hours, services, and employment conditions of workers. Special protection and rest provision plays a pivotal role in occupational injuries and illness.

Aim: To determine the special protection and various provision of rest at the workplace.

Materials and Methods: A survey was conducted among steel and power industry workers in Odisha, India. The study was conducted with 425 male respondents by adopting the population proportion sampling technique. The primary data was taken from a Steel and Power limited industry situated in Angul district of Odisha from February 2019 to October 2019. Statistical Package for Social Sciences software (SPSS version 25.0) was used in the analysis process by using the univariate and bivariate models to assess the objectives.

Results: The study showed 92.5% of respondents were provided rest, and 59.1% of respondents were in the employment contract.

More than 43.3% of respondents reported they received compensation during occupational injury and diseases, whereas 45.6% didn't get any compensation in the event of occupational diseases. Out of the 393 workers got rest, a vast majority (95.4%) of respondents reported that they were allowed night rest, and 84.5% were allowed for meal breaks during work. More than 59% of respondents receive short breaks during work, and 52.9% were entitled to weekly breaks/rest. Religion, caste, education, technical education, occupation, type of work, and the number of working hours were strongly associated with the respondent's characteristics.

Conclusion: Special protection provisions are critical factors for the treatment of occupational health hazards. It has been confirmed that night rest and meal break rest were provided to the workers. Except for the shift work rest and extended workload rest, the provision of rest was sufficiently provided at the workplace. Special protections are expected to strengthen the occupational health of workers and stay away from medical expenses.

Keywords: Employment contract, Industrial accidents, Workmen compensation, Workplace hazards

INTRODUCTION

Special protection and legal provision for workers make them accessible for occupational health services. Legal provisions for occupational health and safety are implemented in very fragmented ways with limited objectives to cover occupational health issues of workers [1]. Factories act provided periodic medical examinations, monitored hazardous industries' work environments, and provided employment to the working population. The Mines Act also follows the provisions given by Factories Act. The Factory Act covered only 13 million workers, which is applicable in those factories employing 10 or more employees. These Acts are not fully functional and do not provide adequate provision to workers during their occupational hazards [2].

The study considered employment contracts and the provision of rest as special protection for workers' occupational health. Employment contract and compensation claims are very complex and bureaucratic in developing and underdeveloped countries. The long administrative process demotivates the workers to get adequate compensation. Various labour laws such as the Workmen Compensation Act in India, Uganda compensation Act, Work injury benefit Act of Zimbabwe, Kenya, and many Southeast Asian countries' labour laws found the negligence of occupational health compensation [3-6]. As per the observation of the International Labour Organisation (ILO) and World Health Organisation (WHO), 2018 occupational health and safety services are yet to be included in the national labour laws of various countries [7]. The labour legislation needs to be strengthened, and outdated and irrelevant

provisions must be eliminated. It should address the needs for best occupational health and safety practices [8].

Provision of rest at the workplace is significantly associated with the workers' occupational health and hazards [9]. Exhausting work condition leads to fatigue and increases the risk of harmful health hazards. Continuation of work at a long time results in sleep disturbance, increasing the risk of gastrointestinal diseases, mental disorders, accidents, fatal and non fatal injuries, cardiovascular diseases, and musculoskeletal disorders [10,11]. Provisions of rest breaks permit the workers to refresh themselves and spend time with family and personal work. Evidence have found that workplace stress and fatigue can be reduced by rest. Sufficient amounts of breaks can reduce occupational health risks and encourage productive work [12]. The provision of rest breaks is workers' right. A study by Park S et al., has mentioned about 15 minutes breaks per four hours of work and 30 minutes breaks in every eight hours of work provided at the workplace [13]. The provision of rest is an important factor in enhancing work performance, increasing workers' mental health, and minimising risk related to cardiovascular and musculoskeletal diseases [14,15]. A report obtained a significant relationship between the long working hour and work-related diseases resulting from insufficient rest. It has found fewer work-related diseases among workers who were given more rest during work than those given fewer rest breaks [16].

In the Indian constitution, the Directive Principles of State Policy (DPSP) protected the health and safety of the working population. Legal provisions provide justice and humane conditions of work at

the workplace. The National Policy on Safety, Health, and Workplace Environment's primary function was to eliminate risk from workplace injuries, diseases, and fatalities [17,18]. All occupational health provisions aim to change the occupational health status of the working population. It also co-ordinates with national efforts for clear national objectives to reduce occupational health hazards among the workforce [2]. All the evidence argues that apart from the various occupational health-related provisions and labour legislation, the special protection and rest need to be prioritised.

This paper aims to determine the provision of rest and special protection of steel and power industry workers. The paper also addresses special protection such as employment contracts, compensation of injuries, and prevention of workers during occupational hazards.

MATERIALS AND METHODS

This study was carried out at steel manufacturing and power plant industrial pockets in Odisha, India. The survey was conducted at a Steel and Power Limited in Angul district of Odisha. The approval for ethical clearance was taken from the Institutional Ethics Committee (IEC) (Sl. No. 2018-19/19).

Inclusion criteria: The study recruited the workers from various worksites such as power plant, bar mill, process boiler, Coal Gasification Plant (CGP), Direct Reduced Iron (DRI), switch word, rolling mills, and plate mills. The study population was working under contractors, sub-contractors, manpower supply units in various worksites. The data had been collected from the contractual and informal labourers, rigger, fitter, welder, helper, mechanic, supervisors, and technical staff. The study included male industrial workers for data collection. Work in steel and power plants is a male centric occupation. Males are performing risk and dangerous work in the steel and power industries. Regularly, they are in contact with various toxic substances and hazardous agents. So they are frequently exposed to different occupational health hazards [19].

Exclusion criteria: The current study excluded the female workers to justify the objectives. The logistic and hospitality manpower were not included in the study.

The primary data collection started from February 2019 to October 2019. The study report was submitted at December 2021 to Tata Institute of Social Sciences, Mumbai, Maharashtra, India. Only steel and power plants workers were considered for data collection.

Respondents were clearly explained the purpose of the study before conducting the interview. Informed consent was taken from all respondents after explaining the nature and purpose of the study. Each participant had the right to withdraw or refuse to give information at any time or for any question during an interview. The confidentiality and anonymity of information were rigorously maintained.

Sample size calculation: The study population was calculated by considering 60% work-related morbidity of steel and power industries in central India [20]. In this sampling frame, 425 samples were included. The Probability Proportion to Size (PPS) technique was adopted for the sample respondents. The manpower supply agencies and site contractors were identified to track the industrial workers. The study had given greater probabilities to the large clusters (where above 100 households are residing) and selected less number of respondents from the small clusters (less than 100 households) through this method, a predetermined number of individuals were interviewed in each selected unit.

Study Procedure

A survey was conducted to assess the special protection and provision of rest among steel and power industry workers. A semi-structured interview schedule was employed for the industrial workers' status about the protection of occupational health. The interview schedule was divided into two sections: socio-demographic of the

respondents and special protection for occupational health hazards [Annexure-1]. As per the ILO guideline for steel and power workers occupational health provisions [1], the researcher constructed the variables.

STATISTICAL ANALYSIS

A referring coding key was prepaid for quantification and verification of the collected data. The coded data were computed in SPSS 25.0 software for data processing and analysis. Frequency and percentage of respondents demographic variable, provision of rest and special benefits was drawn by Univariate data analysis. Bivariate data analysis was justified by cross-tabulation and Chi-square values. Respondents' individual characters and their household characteristics were analysed with the outcome variables. Chi-square analysis had shown the association of outcome variables with the calculated p-value. The significance level was considered as $p < 0.01$, $p < 0.05$.

RESULTS

The study's demographic profile shows that the mean age of respondents was 34.72 years. The age of respondents was distributed in four categories, where a majority 119 (28%) of respondents were in the age group of 30-34 years. Majority 269 (63.3%) of respondents were Hindu, similarly a majority 149 (35.1%) of respondents were Other Backward Classes (OBC), and 99 (23.3%) were of general category. As per the educational qualification of respondents, 6 (1.4%) did not receive any formal education. A majority 190 (44.7%) did not get any technical education. Based on the monthly household income, a majority 258 (60.7%) of the respondents earned between 7000-14000 INR. The demographic characteristics of the respondents are given in [Table/Fig-1].

Special protection for occupational health hazards: The variables such as employment contracts and provision of rest were considered as the special protection of occupational health. [Table/Fig-2] gives details of special protection covered for occupational health hazards as per the respondent's characteristics. A total of 393 (92.5%) of respondents got to rest during their occupational health hazards while only 251 (59.1%) of respondents were under an employment contract.

A huge majority 143 (96%) of respondents from the general and OBC category were covered by an employment contract and rest. All respondents from the graduation and above educational background had been covered by special protection. Technical education of respondents showed those who had engineering, diploma, ITI, and other certificates courses got rest during occupational hazards. Skilled workers reportedly had more special protection as compared to semi-skill and unskilled workers. Religion, caste, education, technical education, occupation, type of work, and the number of the working hour were strongly associated ($p < 0.01$) with the special provisions provided for occupational health hazards.

[Table/Fig-3] explains the special protection covered for the occupational hazards as per the respondent's household characteristics. Respondents from the high-income group were given more special protection as compared to the respondents from the low-income group. One-fourth of the respondents residing within 5 km from the health institution were covered under an employment contract, and nearly 97.8% got adequate rest at the workplace. Infrastructure and household income were highly associated ($p < 0.01$) with the special protection of the respondents.

[Table/Fig-4] illustrates the special benefits for occupational injury and disease. More than 184 (43.3%) of respondents got compensation during occupational injury and diseases, and 194 (45.6%) didn't get any compensation in the event of occupational diseases. Only 47 (11.1%) of respondents didn't know about the compensation during occupational injury and diseases. A total of 135 (31.8%) of respondents reported that they got special provisions for prevention

Variables	Category	N	%
Age (years)	≤29	84	19.8
	30-34	119	28.0
	35-39	109	25.6
	≥40	113	26.6
	Mean age	34.72	
Religion	Hindu	269	63.3
	Muslim	73	17.2
	Christian	83	19.5
Caste	Scheduled Caste (SC)	85	20.0
	Scheduled Tribes (ST)	92	21.6
	Other Backward Classes (OBC)	149	35.1
	General	99	23.3
Education	Illiterate (Don't received any formal education)	6	1.4
	Primary (up to 5 th)	29	6.8
	Secondary (6 to 10 th)	212	49.9
	Higher secondary (11 to 12 th)	137	32.2
	Graduation and above	41	9.7
Technical education	Not getting	190	44.7
	Engineering	26	6.1
	Diploma	56	13.2
	ITI	117	27.5
	Any other certificate course	36	8.5
Occupation	Skilled workers	100	23.5
	Semi-skilled workers	115	27.1
	Unskilled workers	210	49.4
Current living place	Urban	112	26.4
	Rural	313	73.6
Ownership of house	Own house	241	56.7
	Rental house	92	21.7
	Labour camps	57	13.4
	Housing colony	35	8.2
Infrastructures	Kachha	57	13.4
	Semi-pacca	143	33.7
	Pacca	225	52.9
Household monthly income (INR)	Low income level (7000-14000)	258	60.7
	Middle income level (14001-24000)	138	32.5
	High income level (24001 and above)	29	6.8
	Mean of household income	14425.88	
Working nature	Regular/General (9.00 am to 5.00 pm)	190	44.7
	Shift Work (A shift, B shift and Night shift)	152	35.8
	Over time/Extra working hours	83	19.5
Number of working Hours	8 Hours	186	43.8
	12 Hours	174	40.9
	14 Hours	65	15.3
Distance to nearest hospital	Within 5 km	93	21.9
	Within 6-10 km	203	47.8
	11 km and above	129	30.3
Type of family	Joint	158	37.2
	Nuclear	267	62.8

[Table/Fig-1]: Demographic profile of study population (n=425).

and rehabilitation for occupational health hazards. More than 51% of respondents did not get any special provision for the prevention and rehabilitation and 73 (17.2%) didn't know about the special provision.

[Table/Fig-5] shows the % distribution of various provision rest/break respondents got at the workplace. A vast majority 375 (95.4%) of

Individual characteristics	Special provisions provided for occupational hazards						Total (n)
	Employment contract			Provision of rest			
	Number (n)	Percentage (%)	p-value	Number (n)	Percentage (%)	p-value	
Age group (years)							
≤29	43	51.2	0.163	74	88.1	0.232	84
30-34	73	61.3		113	95.0		119
35-39	72	66.1		103	94.5		109
≥40	63	55.8		103	91.2		113
Religion							
Hindu	198	73.6	<0.01	264	98.1	<0.01	269
Muslim	24	32.9		63	86.3		73
Christian	29	34.9		66	79.5		83
Caste/Tribe							
SC	20	23.5	<0.01	75	88.2	<0.01	85
ST	19	20.7		76	82.6		92
OBC	117	78.5		143	96.0		149
General	95	96.0		99	100.0		99
Education level							
Illiterate and primary	9	25.7	<0.01	17	48.6	<0.01	35
Secondary	69	32.5		198	93.4		212
Higher secondary	132	96.4		137	100.0		137
Graduation and above	41	100.0		41	100.0		41
Technical education							
Not getting	33	17.4	<0.01	158	83.2	<0.01	190
Engineering	26	100.0		26	100.0		26
Diploma	54	96.4		56	100.0		56
Industrial Training Institute ITI	103	88.0		117	100.0		117
Certificate course	35	97.2	36	100.0	36		
Occupation							
Skilled	100	100.0	p<0.01	100	100.0	<0.01	100
Semi-skilled	107	93.0		115	100.0		115
Unskilled	44	21.0		178	84.8		210
Type of work							
General	99	52.1	<0.01	179	94.2	<0.01	190
Shift work	137	90.1		148	97.4		152
Over time	15	18.1		66	79.5		83
Numbers of working hours							
8 hours	170	91.4	<0.01	184	98.9	<0.01	186
12 hours	68	39.1		154	88.5		174
14 hours	13	20.0		55	84.6		65
Total	251	59.1		393	92.5		425

[Table/Fig-2]: Special protection covered for the occupational hazards as per respondent's characteristics.

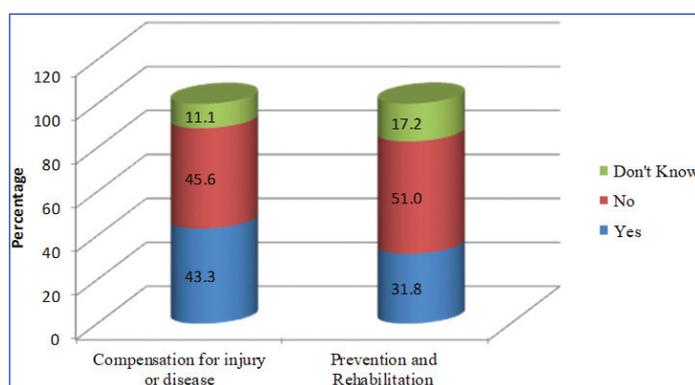
Significance level of chi-square test: p<0.01; p<0.05

respondents reported they got night rest, and 332 (84.5%) got meals to break during work. More than 234 (59.5%) of respondents got short breaks during work, and 208 (52.9%) got weekly breaks/rest. Only 63 (16%) respondents got the rest/break during shift work, and 126 (32.1%) got the break when the workload was extended for extra time.

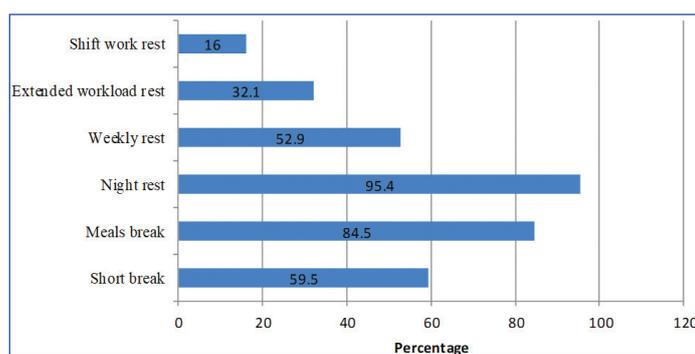
[Table/Fig-6] distributed the percentage of various provisions provided by employment contract as per the national labour laws. Out of 251, a vast majority 247 (98.4%) of respondents were covered by Employee State Insurance Schemes (ESIS). More than 205 (81.7%) of respondents were getting Workmen Compensation (WC) from

Household characteristic	Special provisions provided for occupational infection						Total n
	Employment contract			Provision of rest			
	Number (n)	Percentage (%)	p-value	Number (n)	Percentage (%)	p-value	
Current place							
Urban	67	59.8	0.848	98	87.5	0.020	112
Rural	184	58.8		295	94.2		313
Housing							
Own	142	58.9	<0.01	229	95.0	0.002	241
Rental	78	84.8		87	94.6		92
Labour camp	18	31.6		46	80.7		57
Housing colony	13	37.1		31	88.6		35
Infrastructure							
Kachcha	17	29.8	<0.01	41	71.9	<0.01	57
Semi-pacca	40	28.0		133	93.0		143
Pacca	194	86.2		219	97.3		225
Household income							
Low level	98	38.0	<0.01	226	87.6	<0.01	258
Average level	124	89.9		138	100.0		138
High level	29	100.0		29	100.0		29
Type of family							
Joint	91	57.6	0.637	152	96.2	.0325	158
Nuclear	160	59.9		241	90.3		267
Distance from health institution							
5 km	70	75.3	<0.01	91	97.8	0.002	93
6-10 km	128	63.1		191	94.1		203
11 km and above	53	41.1		111	86.0		129
Total	251	59.1		393	92.5		425

[Table/Fig-3]: Special protection covered for the occupational hazards as per respondent's Household characteristics. Significance level of Chi-square test: p<0.01, p<0.05

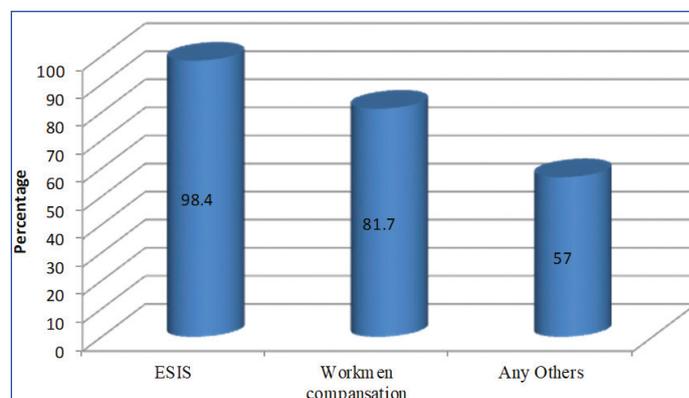


[Table/Fig-4]: Special benefit for occupational injury and disease (N=425).



[Table/Fig-5]: Provision of rest during work (n=393).

the respected industries. Nearly 143 (57%) of respondents were getting any other provisions as per the labour laws come under an employment contract.



[Table/Fig-6]: Employment contract provided by national laws for occupational health (n=251). Any Others (Health Assistant, Medical expenses, Medicines and Financial aid)

DISCUSSION

Special protection and provision of rest at the workplace are potential factors to access occupational health services. Special protection during workplace hazards is a global concern in the current scenario. ILO convention and WHO, 2018 focuses on protecting workers' health at the workplace [21]. Many developing countries have not achieved a decent workplace environment covered with special protection during occupational health hazards in the industrial premises [22]. A study by Mrema EJ et al., found that up to 50% of the working population has access to adequate occupational health services, including special protection and rest in developed countries [23] while only 5-10% achieved this in developing countries including India [24].

A study by Park S et al., found provision of rest as the special protection for the working population to increase productivity. Workplace rest and short breaks are reported to reduce fatigue and occupational stress [9]. The current study found that only 63 (16%) respondents got rest during their shift work and 126 (32.1%) got rest during extended workload. The work nature, such as the long duration of work and non standard irregular shift leads to occupational health hazards [25]. It has been found lack of rest in work shift results in loss of concentration during work [26]. A huge majority 375 (95.4%) of respondents reported about the night rest for adequate sleep. A large number of studies provided evidence that inadequate sleep influences health [27], cognitive performance [28], emotions [29], physical performance [30-32] at the workplace.

Legal provisions and employment contracts safeguard workers' health from occupational health hazards [33]. This study found that many (98.4%) respondents were covered under ESIS, and 81.7% got workmen's compensation for occupational hazards. In the USA, studies estimated that around 90% of workers come under the worker's compensation system [34,35]. The worker's compensation provision provides special protection such as workplace injuries, work-related medical expenses, disabilities allowances, and re-employment benefits to the working population [6,36].

Limitation(s)

The study focused only on special protection and provision of rest to enhance the workers' occupational health. The other provisions mentioned in labour legislation for occupational health hazards can be considered in more detail. The study was limited to an industry in Angul district. The data can be collected from various industries in Odisha for comparative analysis.

CONCLUSION(S)

The study considered the special protection and provision of rest as key factors in reducing occupational health hazards at the workplace. This is confirmed by the provision of employment contracts, WC, and ESI scheme facilities provided to the workers. Compensation during injuries and occupational diseases was found

insufficient. Prevention and rehabilitation from occupational diseases is a major challenge for industry workers. The study confirms that night rest and meal break rest were sufficiently provided to most workers. The provision of rest concludes that shift work rest and extended workload rest were not provided adequately. Provisions of special protection are expected to strengthen occupational health and protect workers from medical expenses. Provision of rest can encourage the employee to be more productive and help them in maintaining good health and wellbeing.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]

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- Financial or Other Competing Interests: None
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- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

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ANNEXURE -1

Interview schedule for Industry workers
Section-A (Socio-demographic profile)

S. No.	Variables	Coding category	Skip to
1	Name of the respondent		
2	Age (In complete year)		
3	Gender	Male Female Transgender	
4	Religion		
5	Caste	1. SC 2. ST 3. OBC 4. General 98. Don't know	
6	Marital status	Single/Unmarried Married Widowed Divorced Separated 98. Any other	
7	Years of marriage		
8	Age at the time of marriage		
9	Age of spouse at the time of marriage		
10	Education	1. Yours Education..... 2. Wife's Education.....	
11	Native place (Birth Place)		
12	Type of housing	1. Own house 2. Rental 3. Labourer camp 4. Housing colony 98. Any others	
13	Type of dwelling where household is living? (Infrastructure based on observation)	1. Kachcha 2. Semi-pucca 3. Pucca 98. Any other	
14	Total numbers of room in household (Excluding kitchen, toilet and bath room)		
15	What kind of toilet facility do you use?	1. Own toilet 2. Public toilet 3. Open space/Field 4. Any other (specify)	
16	What is the main source of lighting of your household?	1. Electricity 2. Kerosene 3. Solar system 98. Any other	
17	What type of fuel does your household mainly use for cooking?	1. Wood 2. Cow dung 3. Coal 4. Kerosene 5. Electricity 6. LPG 7. Bio-gas 98. Any other (specific)	
18	What is the main source of drinking water?	1. Pipe water 2. Tanker 3. Hand pump 4. Covered well 5. Open well 6. Tube well 7. River and pond 98. Any other (specify)	
19	How far is your household from the health institutions? (In Kilometer)		
20	What is your occupation?		
21	Name of working/contract site		
22	Number of working hours per day		
23	What is the type/nature of work?	1. Regular/General 2. Shift work 3. Over time 4. Night shift 5. Part time 98. Any other	
24	Monthly income of respondent (In Indian Rupees)		
25	What is your wife's occupation?	1. Working lady 2. House wife 98. Any Other	
26	If she is a working lady, what is her monthly income? (In Indian Rupees)		
27	Total monthly income of household (In Indian Rupees)		
28	Habit on substances	Alcohol Smoking Tobacco chewing 98. Any others (specify)	
29	Does your household have:	Yes	No
	Fan		
	Radio		
	Sewing machines		
	Televisions		
	Telephones/Mobile		
	Bicycles		
	Motor Cycle/Scooter Car/Jeep		
	Tractors		
	Water pump		
Animal drawn cart			
Any others list it			
30	Total number of household members?	1. Number of male: 2. Number of female :	
31	Number of living children	1. Number of boys: 2. Number of girls:	
32	Nature of family arrangement	1. Joint 2. Nuclear	
33	How long have you been living (continuously) in current place of residence?	Years Months	
34	Just before you moved here, where did you live?	1. City 2. Town 3. Village 4. Slum 98. Any other	
35	Do you have any health insurance from Govt./Company/Contractors?	1. Yes 2. No	
36	If yes kindly explain what are the benefits that you get from it?		

Section-B
(Special protection)

S. No.	Variables	Coding Category	Skip to
1	Are you covered by an employment contract as per as National Law and regulation?	Yes No → 98. Don't know	Qn. 3
2	If, yes what are the provision you are getting for occupational health related issues?	----- ----- ----- -----	
3	Do you get adequate workers' compensation in the event of an occupational injury or disease?	Yes No 98. Don't know	
4	Have you accessed to appropriate services for preventive measure and rehabilitation and return to work?	Yes No 98. Don't know	
5	Does your employer provide adequate periods of rest which, as prescribed by national laws and regulations or approved by labour inspectorates or collective agreements?	Yes	No
	Short breaks during working hours, especially when the work is strenuous, dangerous or monotonous, to enable workers to recover their vigilance and physical fitness		
	Sufficient breaks for meals		
	Daily or nightly rest		
	Weekly rest		
	The nature of the work and the workload permit to do extra working hours during extended work		
6	Does the employer deals with Alcohol- and drug-related problems as much as health problem at work.	Yes No 98. Don't know	Qn. 8
7	If yes, do you cooperate in developing such programmes for prevention, reduction and management of alcohol- and drug-related problems?	Yes No 98. Don't know	
8	Does your workplace adopting Smoke-free workplace policies? (These policies should also specify where smoking may be permitted during agreed rest breaks without creating hazards for other workers or additional hazards in the external areas of the facility)	Yes No 98. Don't know	