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N. Lalitha
Amrita Ghatak

Gujarat Institute of Development Research

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Gujarat Institute of Development Research
Gota, Ahmedabad 380 060

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Abstract

Despite having laws and regulations to protect health of workers in industries in India, little has been effective in ensuring and protecting health and safety especially in case of small and medium firms in the informal sector including manufacturing, mining/ quarrying and construction. Using evidences from different secondary sources and NSS 60th round (Health and Morbidity) unit level dataset, this paper makes an attempt to: (1) estimate the number of workers suffering from any ailment in different informal sector industries by age group; (2) present government policies on Occupational Health and Safety; and (3) discuss private initiatives through corporate social responsibilities and voluntary standards that can have a positive impact on the workers' health in unorganized enterprises.

Although morbidity is found to be higher in the old working age-group (36 - 65 years) in case of manufacturing and construction sector, the percentage of ailing people is more among young workers (15 - 35 years). Overall, the illness reported is higher than the all India average in the case of manufacturing, electricity gas and construction sectors in the urban areas. Construction sector at all India level reports a relatively higher prevalence of all the classified ailments, while in the urban areas, manufacturing sector reports more ailments. At all India level, the prevalence of eye ailments is more in the mining and quarrying and construction sector, perhaps due to working without adequate personal protective gear. As expected, disabilities and accidents are more prevalent in the construction sector of all India as well as in the urban areas.

As far as location is concerned, Kerala and Uttar Pradesh have a relatively larger number of ailing persons in the construction sector. Industrialised states like Gujarat, Tamil Nadu and West Bengal report more ailing persons in the manufacturing sector than the construction sector. The results indicate that respondent's awareness about health and location matter in case of self reported health information. One of the main challenges with the health care facilities in India is the lack of sensitivity to this important issue of occupational health. The paper suggests that simple information regarding the person's occupation would help the health provider to link the disease with its root cause.

Keywords : Health, morbidity, workers, Occupational safety and health, India

JEL Classification : I10, I18, L78

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Contents

List of Tables / Figure / Appendix

Occupational Health among Workers in the Informal Sector in India

N. Lalitha
Amrita Ghatak

1. Introduction

Micro and small manufacturing enterprises have a sizeable share in their contribution to Gross Domestic Product in India. Majority of them are in the informal/unorganized sector, where they stand for innovation, entrepreneurship, incubating and nurturing new ideas and play an important role in the livelihoods of millions but also recognized as a sector where occupational health and safety is given little importance. With flexible registration policy adopted by the government, the labor laws and regulations also fail to reach these enterprises. While many jobs in the manufacturing sector pave way for both communicable and non-communicable diseases (NCDS), there has not been a systematic approach to bring out the relationship between work environment and NCDS which are rising globally and India is no exception to that. Globally, the Years of life lost (YLL) due to non-communicable diseases (NCDS) increased from 38 per cent in 2000 to 42 per cent in 2012. An individual suffering from NCDS is highly susceptible to infectious diseases as well. This is a case of concern, as some of the non-communicable diseases are linked to the working environment, like Asthma, cardiovascular diseases (CVD), chronic Obstructive Pulmonary Disease (COPD), congenital conditions, diabetes, diseases of the digestive system (e.g., peptic ulcers), eye conditions, genitourinary conditions (prostate disorders, nephritis), neuro-psychiatric conditions (mental disorders, epilepsy, Alzheimer's), skin and musculoskeletal conditions (e.g., arthritis), skin diseases, cardio vascular diseases, cancer, depression etc. However, though the links between these diseases and the working environment like COPD and those who are exposed to air pollution, dust and chemical fumes are known, lack of systematic studies establishing these links indicate the research gap in this important area. As ill health of a working person affects the productivity, livelihood and the national income, it is essential that the work related health risks are recognized and appropriate actions are taken to address this.

N. Lalitha (lalithanarayanan@gmail.com) is Professor and Amrita Ghatak (amritaeconomics@gmail.com; amrita@gidr.ac.in) is Assistant Professor at the Gujarat Institute of Development Research, Ahmedabad.

Based on the brief evidence found elsewhere regarding the occupational health risks, this paper focuses on: (1) estimating the number of workers suffering from any ailment in different informal sector industries by age group; (2) present government policies on OH; and (3) private initiatives through corporate social responsibilities and voluntary standards that can have a positive implication on the workers' health in unorganized enterprises.

1.1 Methodology and description of data

The paper relies on the methods of "description" and "understanding" in order to analyse the status of health among workers in the selected industries. While information from various secondary sources have been used for the purpose of this paper, the occupational health status at selected industries has been analysed using NSS 60th round (Health and Morbidity) unit level data.

In order to know the type of illness that workers suffer from, we have focused on the following: (a) population in the working age group of 15-65 years divided into two different groups, *viz.* 14-35 years and 36-65 years; (b) informal sector for the purpose of this paper includes the workers (i) in the household enterprise (self-employed or own account worker, (ii) worked as helper in HH enterprise as unpaid family worker, (iii) worked as casual wage labour in public works and (iv) in other types of work based on the usual activity status. We have also identified selected industries that include: manufacturing industries like textiles, paper and paper products, metal products, chemical products, machine tools, transport equipment; electricity and gas[1] and sectors that are prone to accidents and injuries like construction sector, other types of mining and quarrying. Industrial sectors, other than the ones mentioned above have been classified under 'other industries'. Six types of ailments that are normally associated with working environment, such as (a) diseases like gastro-intestinal (diarrhea/dysentery, gastritis/worm infestation, amoebiosis), (b) cardio vascular (heart disease, hypertension), (c) respiratory ailments (including ear/nose/throat ailments, tuberculosis and bronchial asthma), (d) eye ailments (including conjunctivitis, glaucoma and cataract), (e) skin diseases and (f) disabilities (including

[1] As per Table 6 of the report of the Working Group on Occupational Health and Safety, 2011, these 7 industries account for 76% of the total injuries and accidents that take place in the entire manufacturing sector.

locomotor, hearing, accidents/injuries/burns/fractures/poisoning have been considered in the analysis. The rest of the diseases have been grouped under "others". The data have been analysed using simple cross tabulations and percentages.

1.2 Limitations of data

There are no regular nation-wide surveys undertaken to estimate the prevalence of occupational health and risks among the workers. Though, the Directorate General of Factory Advisory Service and Labor Institutes (DGFASLI) provides technical support in framing rules, conducts training and also undertakes surveys to estimate hazards and accidents in factories. These are essentially with reference to the organized sector. Hence, in order to estimate the number of persons suffering from specific illness in different working environment, we have relied on the unit level data from National Sample Survey (NSS) data of 60th round (schedule no 25.0) on Health and Morbidity (NSS report no. 507), (cited as NSSO 2006 here). NSS data on morbidity is the only national level survey that can be used to discuss the ailments and the economic burden of health as well as the availability of amenities and to a limited extent about the occupation of an individual. However, the data do not allow us to directly attribute the illness of the person with the occupation of the individual, as the survey was carried out with reference to the general population and not with specific reference to ailments suffered by working population or with reference to any occupation. Though, NSS data provide information on illness within two reference period – one is related to hospitalization in last 365 days and another is related to self reported sickness including the cases of hospitalization in 15 days prior to the date of survey – we chose the latter for the purpose of discussion in this paper for two reasons: 1. Our idea was to understand the number of working population falling sick and their nature of occupation. Occupational health hazards are often chronic in nature, but may or may not call for hospitalization; 2. The sample size of population reported to have fallen sick before fifteen days (36462) relatively larger than the sample size of those who have fallen sick (29046). Hence for the purpose of analysis in this paper, we have focused on the responses provided by the respondents to the query 'whether ailing anytime during the last 15 days'.

The organization of the paper is as follows. The next section (2) following this introduction presents a brief idea about the size of informal economy

and the existing legal frame work governing workers and their health in the informal sector. The third section discusses the different health risks faced by workers evident in the literature. This section also presents an estimate of the number of workers suffering from ill-health in different informal manufacturing units. The fourth section presents the emerging voluntary standards governing workers and their health. The fifth section (6) presents the conclusion.

2. Size of Informal Economy in India and legal frame work governing workers

Before we discuss the health issues of workers in the informal sector, it is essential to understand the economies where informal sector is playing an important role, size of the informal sector therein, and the regulatory regime governing the workers' health particularly in the context of India. These form the crux of this section.

2.1 Size of Informal Economy

There are two diametrically opposite views on the contribution of informal sector, with one considering the informal sector to be exploitative, and perform poorly and the other considering it to be enhancing productivity and contributing to the national economy. While decline in agrarian productivity, increasing susceptibility to climatic variations and lack of employment opportunities in the rural areas are a few important reasons for withdrawal of workers from agricultural sector and seeking employment in the urban areas, in the days of globalization, outsourcing has become a norm of production and terms of employment are becoming flexible leading to more informal type of arrangement in South Asian countries.

In China, for instance, the economic reforms in 1980s and 1990s have resulted in labour migrating from rural to urban areas. This resulted in resource reuse and increase in wages. When state owned enterprises in China started reforming their labour laws, people were laid off, who started seeking jobs in informal sector resulting in informalisation of the urban labour market (Yang, 2013)[2].

[2] There is no nationally representative data at the micro level to measure the overall size of informal employment in the urban labour market of China.

Table 1 presents the size of the informal economy and the contribution to the gross value added (GVA) to the national economy. While the informal employment data are available for Latin America and the Caribbean, Eastern Europe and CIS countries, Middle East and North Africa, South East Asia and Sub-Saharan Africa, estimates on contribution to national economy (GVA) is available only for a few countries in Sub-Saharan Africa, Latin America, Asia (only India) and a few transition economies, due to the lack of data on taxes and other data.

Table 1: Informal Sector's Contribution to GDP, South Asian Countries (2014)

Countries	1999	2007
1. India	23	26
2. Pakistan	37	4
3. Bangladesh	35	37
4. Afghanistan	….	….
5. Nepal	36	38
6. Sri Lanka	44	47
7. Bhutan	29	31
8. Maldives	30	32
South Asia (weighted average)	26	29

Source: Compiled from Table 9, Urban Economy in Human Development in South Asia 2014, Urbanisation: Challenges and Opportunities, Mahbubul Haq Centre, Lahore, Pakistan.

India has the highest informal employment (83.6) as percentage of non-agricultural employment, followed by Mali (81.6) and Pakistan (78.4). For China, informal employment is estimated to be 32.6 percent[3]. One important difference observed in the informal employment of the few South Asian countries is that, the percentage of informal employment outside the informal sector is estimated to be only 8 per cent in the case of Pakistan, 16.8 per cent in India and 25 per cent in Viet Nam. (This segment particularly is the testimony of the rising casualization of jobs in the formal sector, where workers carry on without job security or any social security).

[3] The data were limited to the six urban areas, *viz.*, Fuzhou, Guangzhou, Shanghai, Shenyang, Wuhan and Xi-an (ILO, 2013).

2.2 Legal Statutes Governing Workers Health

The World Health Organisation (WHO) and the International Labour Organization (ILO) are the two important agencies working in the area of Occupational safety and health among the member nations. The WHO defines OHH as a multidisciplinary activity which involves: (1) Protection and promotion of the health of workers by preventing and controlling occupational diseases and accidents and by eliminating occupational factors and conditions, hazardous to health and safety at work; (2) the development and promotion of healthy and safe work, work environments and work organizations; (3) the enhancement of physical, mental and social well-being of workers and support for the development and maintenance of their working capacity as well as professional and social development at work; (4) enabling workers to conduct socially and economically productive lives and to contribute positively to sustainable development[4]. Thus, OHH includes besides the hazards at work, the other factors such as the place of living of the workers and the type of amenities that they have would also impact their health directly. These have been incorporated in the ILOs decent work concept, which integrates increased opportunities to work and increased rights at workplace, social protection and improved well-being and working conditions at work. Countries which adopt this framework would ensure that it is made statutory and enforced appropriately.

There are 13 ILO conventions regarding workers' health and occupational safety, out of which India has ratified only two so far (Table 2).

[4] http://www.who.int/occupational_health/regions/en/oehemhealthcareworkers.pdf, accessed on November 8, 2014.

Table 2: ILO Conventions Related to Workers' Health and Occupational Safety

	Name of conventions	Number	Status of ratification in India
1	Radiation Protection Convention, 1960	C115	**R**
2	Hygiene (Commerce and Offices) Convention, 1964	C120	NR
3	Occupational Cancer Convention, 1974	C139	NR
4	Working Environment (Air Pollution, Noise and Vibration) Convention, 1977	C148	NR
5	Occupational Safety and Health Convention, 1981	C 155	NR
6	Occupational Health Services Convention, 1985	C161	NR
7	Asbestos Convention, 1986	C162	NR
8	Safety and Health in Construction Convention, 1988	C167	NR
9	Chemicals Convention, 1990	C170	NR
10	Prevention of Major Industrial Accidents Convention, 1993	C174	**R**
11	Safety and Health in Mines Convention, 1995	C176	NR
12	Safety and Health in Agriculture Convention, 2001	C184	NR
13	Promotional Framework for Occupational Safety and Health Convention, 2006	C187	NR

Note: R: Ratified; NR: Not ratified

Source: www.ilo.org accessed on 10.11.2014

Ratification means that the member country commits to adopt and implement the convention and periodically report to ILO about the implementation. It is also possible that the number of units engaged in chemicals and asbestos production would also lobby against implementation of chemical and asbestos conventions, as it would affect such industries directly. It is also true that in some cases, the member country has its own national legal framework governing workers right and health. For instance in India, the Equal Remuneration Act and Abolition of Bonded Labour Act 1976 are applicable to all sections of unorganized sectors in India. Laws which are applicable to some sections of informal sector are (a) Minimum Wages Act, 1948, (b) Child Labour (Prohibition and Regulation) Act, 1986, (c). Dangerous Machines (Regulation) Act, 1983,

(d) The Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act, 1993, (e) Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979, (f) Motor Transport Workers Act, 1961, (g) Sales Promotion Employees (Conditions of Services) Act, 1976 (h) and Trade Unions Act, 1926. The Beedi and Cigar Conditions of Employment Act 1966 can be extended to unorganized sector as well (Government of India, 2007). Besides these, the Government has enacted legislations like the Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, which is implemented by the Chief Labor Commissioner. The Insecticides Act, 1968 has been framed to ensure the health and safety of unorganized sector workers engaged in agriculture activities.

The implementation of these legislations however is tardy (GOI, 2011) as except for a few state governments, others have failed to implement the act fully, particularly in the case of the Construction Workers Act.

GOI (2007) also points out the challenges in the implementation of laws in the unorganized sector due to insufficient number of manpower and infrastructure to monitor the widely scattered number of establishments and which is in charge of enforcement of more than 30 laws of the central and state governments. States like Gujarat and Maharashtra which house a significant number of chemical units, hardly have any chemical or hygiene inspectors (Table 3).

Table 3: Availability of OH Personnel (sanctioned and in position) in Select States of India, 2009

Particulars	Gujarat	Maharashtra	Tamil Nadu	Karnataka
Inspector of factories	124 (46)	131 (69)	132 (100)	46 (46)
Medical inspector	2 (0)	2 (0)	0(0)	1 (1)
Chemical inspector	1 (0)	0(0)	0(0)	0(0)
Hygiene inspector	0(0)	0(0)	0(0)	0(0)
Others	11 (6)	0(0)	0(0)	0(0)
Certifying surgeon	12 (4)	1 (1)	9(6)	0(0)

Note: Figures in parentheses indicate the actual number of personnel in position as against the sanctioned position.

Source: GOI (2011) Report of the Working Group on Occupational Health and Safety for the Twelfth Five Year Plan (2012-2017), Ministry of Labour and Employment, 121-126, August.

Also the increased emphasis on facilitating business environment policy adopted by the state governments did not encourage the active enforcement which was seen as 'discouraging the industrial climate' (GOI, 2007, p.167). Further the exclusive focus on the organized sector is also a reason for the lack of sensitivity towards the unorganized sector and implementation of the laws in unorganized sector.

In order to reduce the inspector Raj', states like Gujarat, Punjab and Rajasthan have introduced a self-certification scheme, which however has not really taken off, as only a limited number of units have registered themselves under the scheme.

In India, the Ministry of Health and Family Welfare looks after the medical education and health care, industrial safety and occupational health come under the purview of the Ministry of Labor. Thus, the National Health Policy of the Government of India which recognizes occupational health as one of the issues under the social and environmental factors that determine health, has been formulated by the Ministry of Health and Family Welfare, the OSH policy, which is known as National Policy on Safety, Health and Environment at the Workplace has been formulated and will be implemented by the Ministry of Labor and Employment. The specific objectives of this policy are to achieve (available at http://www.dgfasli.nic.in/info1.htm): a) continuous reduction in the incidence of work related injuries, fatalities, diseases, disasters and loss of national assets; b) improved coverage of work related injuries, fatalities and diseases and provide for a more comprehensive data base for facilitating better performance and monitoring; c) continuous enhancement of community awareness regarding safety, health and environment at workplace related areas; d) continuously increasing community expectation of workplace health and safety standards; and e) improving safety, health and environment at workplace by creation of "green jobs" contributing to sustainable enterprise development. Importantly, the policy proposes to enforce it through stepping up the inspection system across all economic activities, providing incentives, subsidies and loans for adoption. As a primary step, the policy suggests that data coverage would be extended to all occupations that were so far not covered and excluded, including self-employed people.

3. Evidences on OH in Literature

The fundamental principle to prevent occupational health risks in manufacturing set up is to ensure appropriate and safe use of resources, and use of low-energy, low –toxic emission, and low-waste technology that are safe to human health and environment. These fundamentals if adopted appropriately would ensure both occupational health and safety and sound environmental development as well. It is well known that many environmental hazards and burdens are derived from industry, agricultural practices, construction, transportation and other services. According to GOI 2011, 76 per cent of the injuries and accidents take place in the manufacturing of: (1) textiles, (2) paper and paper products (3) chemical and chemical products (4) non-metallic and mineral products (5) basic metal and alloys (6) machine tools (7) transport equipment (8) metal products and (9) electricity and gas. Presently, the existing Schedule 2 of the Factories Act 1948, that lists 29 diseases (available at http://dgfasli.nic.in/statutes1.htm) includes poisoning due to various chemicals, byssinosis, silicosis, asbestosis, toxic anemia and occupational cancer etc. Barring electricity and gas, the hazardous prone industrial groups and the diseases mentioned are applicable for workers in the unorganized sector as well.

While the organized sector can be booked for violations, the small and micro enterprises escape from punitive measures for the following reasons. Most micro enterprises occupy smaller space, work with limited labor and machinery, and the location of these units is often interspersed with the living spaces of individuals and often do not lend themselves to be applicable for industrial zoning or provision for any pollution control measures and present a zone of potential risk to workers health and environment.

Despite the known risks of certain occupations and their wide presence in the informal sector, the estimate/prevalence of OHH among the working populations in the developing economies is seriously lacking. None of the countries with sizeable informal sector like India, Pakistan and Sri Lanka have formal reporting system of the work related injuries and diseases. In India, though, the Labour Bureau of the Ministry of Labour, Government of India conducts surveys on working conditions among the different industries in the formal and informal sector, yet due to the methodological lacunae of these surveys, they serve limited purpose.

In India, after the Bhopal gas tragedy, the Factory Act of 1948 was amended. These amended sections relate to the location of the industries, responsibilities of the employer, setting up special enquiries, fixing standards and assuring the right of workers for information etc. But these provisions relate only to the organized sector. Hence the data on OH available in India are limited to the organized sector collected by the Directorate General of Factory Advisory Service and Labour Institutes (DGFASLI)[5]. Hence researchers depend on micro studies to bring out evidences. Here, we have tried to give the different diseases/hazards highlighted by a few researchers working in this area.

One of the root causes of the issues related to OH is the lack of awareness regarding the same among the workers, industrialists, government agencies, and health practitioners. But, often, despite knowing the health hazards, sometimes knowing that their lives are at stake, workers accept to work in the hazardous environment because of the extreme poverty (Owasim Akram, 2014). For instance, workers working in the mining industry both above the ground and under the ground are exposed to extreme kind of risks. Workers working in underground mines often face situations like flooding of the mines, falling of roof or caving in of side, fire, lack of oxygen, emission of lethal gasses, etc (NCII Report). The National commission on Labour in India observes that in the construction industry, safety norms are not adopted at all and contractors removing the injured and the sick workers from pay roll without compensation was also common. Workers in the glass industry of Firozabad, India are exposed to excessive heat, noise, burns, cuts and lacerations caused by broken glass (Barten F, 1990).

A cross sectional study among the roadside welders in Karachi, Pakistan reveals that, while 56 per cent of the workers (out of 340) mentioned that they did not use any protective devices like gloves or goggles despite the frequent burn injuries and foreign articles falling in their eyes, none of them felt the need for any enforcement of OH related regulations in their work. Based on the survey done by the Centre for the Improvement of Working Conditions and Environment in Lahore, Tariq (2001)[6] highlights the lack of

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[5] The Directorate General of Factory Advisory Service and Labor Institutes (DGFASLI) provides technical support in framing rules, conducts training and also undertakes surveys to estimate hazards and accidents.

[6] http://www.amrc.org.hk/alu_article/occupational_health_and_safety/occupational_health_and_safety_in_pakistan

basic facilities, exhaust fans, sanitation, fire prevention and emergency aid, hazardous warning signs in industries including mining sector of Pakistan. The author also highlights the exposure of working children to harmful fumes that could potentially cause cancer.

Lack of compliance with basic statutory requirements is evident from the Bangladesh's experience, where despite the repeated fire accidents in the ready-made garment (RMG) factories that attracted international attention, workers continue to be employed in the RMGs. The Asia Monitor Resource Centre (2012) point out that in the case of the November 2012 fire in the Bangladesh RMG factory of Tazreen fashion Ltd, there were no fire or emergency exits or stairways for people to escape from fire. In another study on workers in garment factory in Sri Lanka finds the contrary to Bangladesh's case, where the RMG in the free trade zone was studied, the authors find the factory to be visited by a medical doctor every week, the factory to be ventilated as the indoor environments are regularly monitored by the government authorities. The authors note that one of the reasons for this situation could be because, workers in these factories are not exposed to cotton dust, as they are engaged in the processed documents and also these factories supply to the large buyers in the US and Europe, who provide guidelines regarding workers safety (De Silva et al., 2013). In China, pneumoconiosis and common acute and chronic occupational poisoning are the most serious occupational diseases. Pneumoconiosis is common among the workers in coal mining, metallurgy, building materials, non-ferrous metals and mechanical manufacturing industry (Wang and Li Tao (2012). A survey cited in Barten (1990), found a high risk of elevated blood lead levels among subjects living in backyard battery repair shops, and found that the risk was not attributable to general environmental contamination of urban Kingston, Jamaica. It is known that exposure to lead results in neurological disorders and cognitive impairment among infants and children.

In the context of Thailand, Manothum and Rukijikanpanich (2010) demonstrate the participatory approach adopted by the stake holders with the workers of four different manufacturing units in the informal sector. This approach has resulted in understanding the work related issues better. And as the solutions were arrived at after interaction with the workers, workers' awareness regarding use of machinery and materials were better.

The Directorate General, Factory Advice Service and Labour Institutes of India, (DGFSALI) in its website (http://www.dgfasli.nic.in/info1.htm) provides alarming instances of occupational injuries that have caused debilitating injuries and loss of life. Particularly of those relating to the fireworks industry and in the case of Tamil Nadu and the improper installation of quenching tank, in the steel producing unit in Karnataka point out the lack of basic safety instructions to the workers handling the devices resulting in precious lives being lost, highlighting the extent of lack of awareness of industrial safety practices. Though the numbers of non-fatal injuries are higher than the fatal injuries, a number of them happen in the textile manufacturing industries.

In the case of ceramic industry, coal fired gasifiers without zero discharge technology could have health risks because of the pollution in the air. The health risks are more, if the coal is manually fed into the gasifiers[7].

Leather tanning and processing is another hazardous work, as the process involves the use of number of hazardous chemicals. Workers in the informal units work with their bare feet soaked in chemicals and inhale chemicals which could be fatal. They also often suffer from dermatitis, conjunctivitis, nervous disorder, itching of skin, throat, mucous membrane, chest pain, ulcer, breathing problem, asthma, bronchitis, frequent fever, headache, and stomach upset. Specific gynaecological problems faced by women workers include, menstrual disorders, premature deaths, still births, and prolapsed uterus (Nihila, 1999).

The micro evidences from different working environment mentioned here point towards the fact that, there has been a lack of (a) continuous surveillance programs by the enforcement authorities on statutory compliances, (b) technical services relating to OH, and (c) lack of awareness among workers regarding OH at the work place.

One major occupational health risk that is common to a few industries that is assumed to have a sizeable number of workers in the unorganized sector is silicosis. According to GOI 2011, every 161 workers per 1000 are affected by silicosis in India. Workers in all types of stone cutting units,

[7] http://timesofindia.indiatimes.com/city/ahmedabad/Stay-on-production-at-ceramic-units-lifted/articleshow/37108971.cms?cfmid=14000000

quartz mining, sand blasting units, ceramic manufacturing, construction, glass and mining are susceptible to silicosis as these units involve manufacturing process such as cutting, crushing, grinding etc. Silicosis is an incurable lung disease that affects the workers due to inhaling of fine particles of crystalline silica. The dust particles can be seen only with microscope. The other issue with silicosis is that as these dust particles remain air borne, it can affect persons who are residing near such manufacturing units. The National Human Rights Commission (NHRC) in its report on silicosis[8] observes that, only the Government of Rajasthan took positive measures towards the victims of silicosis by providing financial assistance and also created a fund for the welfare of workers in the unorganized sector. In 2014, Labour & Employment Ministry of Gujarat State passed and published resolution to pay Rs. 1 lakh towards relief to the families of Agate workers dying of Silicosis. The resolution is applicable from 2006.

As mentioned elsewhere, health and productivity are highly correlated. Quoting a study carried out between 1981 and 2004 on industries which are potential causes of silicosis, NHRC observes that the prevalence rate could range between 12 to 54 per cent. The average age of workers suffering from silicosis ranged from 27 to 43 with exposure duration of 5 to 19 years. The mean survival time after diagnosis for a silicosis patient as per different studies is 12.2 years. These statistics suggest that a number of young lives would be consumed by silicosis at their prime productive age, causing loss of livelihood to families and loss to national income.

3.1 Analysis based on NSS Health and Morbidity data

As mentioned in section 2, the analysis in this section is restricted to individuals reporting to be ailing in last fifteen days (referred as ailing persons in the paper) prior to the NSS 2004 survey. Here, we provide the number/ percent of ailing persons in different states, by age group, gender and broad industrial group (Tables 4 to 6), that provide the context to the discussion.

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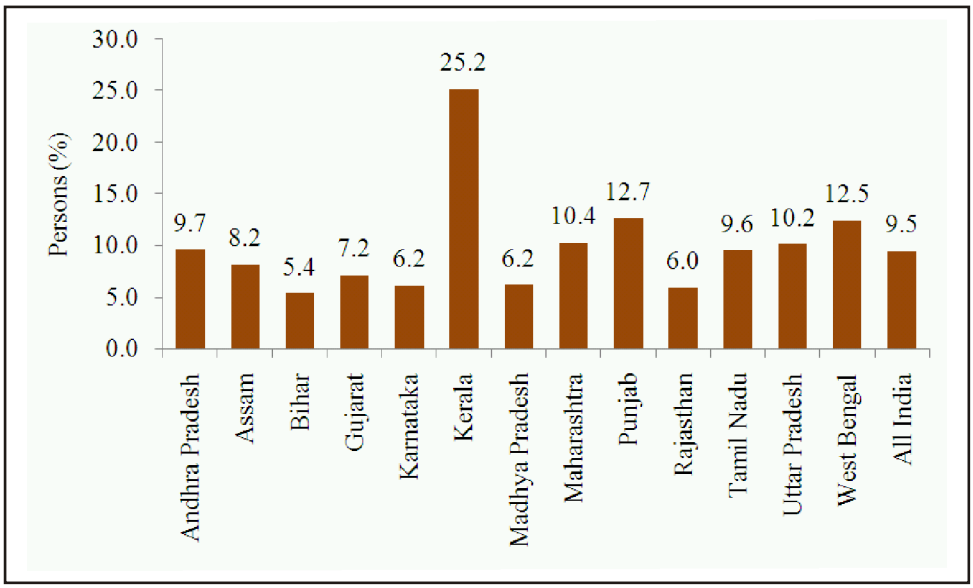
[7] http://nhrc.nic.in/Documents/Reports/Special%20Report%20To%20Parliament%20of%20India%20On%20Silicosis.pdf, accessed on July 10, 2015.

Figure 1: Percentage distribution of individuals suffering from any ailment by major states



Source: Calculated from the unit level data of NSS 2004.

It is evident from Figure 1 that the 13 states (that reported more than 1000 persons to be ailing) listed here share 81 per cent of the people suffering from any ailment (Appendix Table 1 provides the data for all the states of India). It is also found that 7 out of the 13 states have a higher percentage of people suffering from any ailment than the all India average of 9.51. Kerala reports a relatively higher percentage of people reporting to be ailing from some illness, which can be perhaps attributed to the health awareness among the population. Compared to other industrialized states of India, Gujarat records a relatively lower percentage of people reporting ailment.

Table 4 reports that while the percentage of ailing persons (PAP) is higher in the age group of 36-65 than the younger age group, the PAP of urban is higher than the all India average of 14.48 PAP.

Table 4: Percentage of ailing persons (PAP) by age and place of residence

Areas	Age group 14-35 years			Age group 36-65 years		
	Total	Male	Female	Total	Male	Female
Rural	5.22	4.40	6.15	13.87	11.80	14.20
Urban	5.00	4.73	6.16	15.54	12.72	16.90
Total	5.14	4.50	6.15	14.48	12.05	14.93

Source: Calculated from the unit level data of NSS 2004.

Further, the percentage of ailing persons is more among the females by all criteria considered in Table 5. It may be inferred that many illness manifest as a person is aging, we find the percentage of ailing persons to be more in the higher age group.

Table 5: Distribution of ailing persons by State and selected industrial groups

	Number of ailing persons	Mining & Quarrying	Manu-facturing	Electricity & Gas	Const-ruction
Andhra Pradesh	2766	17	97	8	147
Assam	1069	-	5	3	29
Bihar	1344	-	23	-	25
Gujarat	1237	5	89	6	48
Karnataka	1301	12	57	7	61
Kerala	3209	47	107	12	394
Madhya Pradesh	1403	2	40	6	65
Maharashtra	3107	3	199	8	167
Punjab	1054	3	77	20	85
Rajasthan	1439	17	65	8	106
Tamil Nadu	2355	8	233	12	156
Uttar Pradesh	6187	6	324	13	376
West Bengal	3171	2	249	19	165
Total	26009	122	1565	122	1824

Source: Calculated from the unit level data of NSS 2006.

The following points emerge from Table 5:

1. Of the total ailing persons 14 per cent belong to the different industrial groups belonging to informal sector.
2. Number of ailing persons is more in the construction sector than the manufacturing sector.

3. Mining and quarrying and Electricity and Gas sector report a relatively lower number of ailing persons compared to manufacturing and construction sector. While electricity and gas could be related more to the formal sector, yet a number of activities relating to semi precious stones, sand mining, glass manufacturing, and stone cutting happen in the informal sector. We are unable to explain this feature.

4. Kerala and Uttar Pradesh have a relatively larger number of ailing persons in the construction sector.

5. Industrialised states like Gujarat, Tamil Nadu and West Bengal report more ailing persons in the manufacturing sector than construction sector.

3.2 Ailments by occupation

Here the discussion is limited to the chosen informal industrial groups in urban areas, ailments by industry and age group (Table 6).

Table 6: Percentage Distribution of ailments by occupation in urban areas and all India

Industry/Area	Other ailments	Gastro-intestinal	Cardio-vascular	Respiratory	Eye	Skin	Disabilities and Accidents& injuries	Total
Other industries								
Urban	81.18	78.42	87.8	76.45	77.81	87.69	86.06	81.23
All India	87.03	83.19	90.39	81.71	68.05	87.84	88.23	86.98
Mining & Quarrying								
Urban	0.41	0.35	0.02	0.37	3.77	0.15	0.96	0.41
All India	0.56	0	0.16	0.09	10.69	0.93	2.67	0.57
Manufacturing								
Urban	8.77	10.76	7.3	11.79	11.11	9.15	5.4	8.79
All India	5.07	6.5	3.53	7.18	7.5	3.88	3.32	5.08
Electricity & Gas								
Urban	0.91	0.42	0.95	0.64	0.33	0.32	0.9	0.9
All India	0.43	0.18	0.09	0.2	0	0.05	0.26	0.42
Construction								
Urban	8.73	10.05	3.93	10.74	6.98	2.7	6.69	8.68
All India	6.91	10.13	5.83	10.82	13.76	7.29	5.53	6.94

Source: Calculated from the unit level data of NSS 2006.

Overall, Table 6 shows that:

1. The illness reported is higher than the all India average in the case of manufacturing, electricity gas and construction sector in the urban areas.

2. Construction sector at all India level reports a relatively higher prevalence of all the classified ailments, while in the urban areas, manufacturing sector reports more ailments.

3. At all India level, the prevalence of eye ailments is more in the mining and quarrying and construction sectors, perhaps due to working without adequate personal protective gear.

4. In the urban sector, gastro intestinal, respiratory and eye ailments figure prominently followed by skin diseases (skin diseases are more in urban manufacturing). As mentioned in section 3, these illnesses are more related to the working environment.

5. As expected, disabilities and accidents are more prevalent in the construction sector of all India as well as in the urban areas.

Table 7: Percentage distribution of ailing workers by industry and broad working age-groups in urban areas

Ailments /industries	Other industries	Mining &Quarrying	Manu-facturing	Electricity & Gas	Const-ruction
14-35 years					
Other ailments	80.84	0.39	9.3	0.88	8.59
Gastro-intestinal	73.22	0	11.58	0.21	14.99
Cardio-vascular	89.52	0.39	4.77	0.23	5.09
Respiratory	75.15	0.33	12.91	0.4	11.21
Eye	42.17	27.85	13.69	0	16.29
Skin	84.16	0	14.52	0.2	1.12
Disabilities and Accidents& injuries	87.92	0.25	7.11	0.32	4.4
Total	80.79	0.41	9.33	0.87	8.61
36-65 years					
Other ailments	82.34	0.31	8.45	1.09	7.8
Gastro-intestinal	84.77	0.36	9.89	0.08	4.91
Cardio-vascular	86.26	0	8.54	1.02	4.18
Respiratory	77.26	0	13.57	0.72	8.45
Eye	82.36	0	7.37	0.02	10.25
Skin	88.6	0	9.01	0	2.39
Disabilities and Accidents& injuries	86.51	0	3.46	2.07	7.96
Total	82.46	0.3	8.51	1.08	7.65

Source: Calculated from the unit level data of NSS 2006.

A few interesting points emerge from Table 7, as discussed below:

1. Overall, in the 14-35 age group, the percentage of ailing people is more in the manufacturing and construction than the 35-65 age group. These figures also indicate that younger population, entering the job market at a relatively young age group is reporting higher morbidity levels, which can affect their productivity and loss of livelihoods.

2. It is a matter of concern that the percentage of people suffering from eye ailments is more in the relatively younger age group, which can affect their livelihoods.

3. As expected, the prevalence of respiratory ailments is more in the manufacturing in both the age groups.

4. Disabilities due to accidents etc are more among the younger age group working in the manufacturing sector, whereas construction activities seem to cause more disabilities to the older age group.

4. Voluntary Standards

Since the early '90s, a number of private voluntary standards have sprung up, which emphasizes on adopting labor and product standards. Most of these standards have evolved in Europe by powerful non-state organisations, which emphasize on the details of process of production (like the type of labor used) rather than the price of the product. These are nevertheless voluntary and not meant to replace existing labour legislations. These codes of conduct have come up in the sectors like food and beverages, sports articles, textiles and garments where multiple stake holders are involved. As in most of these products, the brand image plays a significant role in influencing the consumers and thus the end product trader, using the trade linkages, enforces the standards down the supply chain. Standards like Fairtrade, Rainforest Alliance, and Better Cotton Initiative etc. imbibe the concept of decent work provided by the ILO. In India, presently, those producers who have strong linkages with the export market have adopted these standards. For instance in agriculture, these standards specify the code of practice with reference to (a) type of pesticides that are allowed to be used (b) safety protocol for storage of pesticides, (c) safety measures to be adopted while mixing and spraying which includes wearing of personal protective gear, (d) safe re-entry period after spray (e) not spraying near residences, school, roads, wildlife and forest and (f) safe disposal of pesticide containers. A few positive impacts of these voluntary standards, among the select tea plantations in Tamil Nadu for instance are the strict adherence to (a) minimum wages, (b) sanitation facilities at work (c) safety measures with reference to handling of pesticides and spraying and disposal of empty containers (d) total ban on pesticides that are harmful to human health and environment (Lalitha *et al*, 2013). As these standards are adopted over and above the existing national standards, another positive impact had been the amendment to the Plantation Labor Act 1961, in 2010, which now mandates provision of appropriate personal protective gear to the pesticide sprayers and safe handling of pesticides.

4.1 Voluntary standards governing health

The most common certifiable standards that corporate sector use for environment and occupational health & safety are: OHSAS 18001:2007 and ISO 14001:2004. Occupational Health and Safety Advisory Service (OHSAS) is an international occupational health and safety management system. This has been created by a number of leading standards and certification bodies and specialist consultancies. These standards have a set of codes of practices which need to be clearly followed by adopters to minimize health risks to employees.

ISO 14001:2004 is the Indian Standards Organisation's standard regarding Environmental Management System. Though it directly does not talk about workers safety and health, in prioritizing the aspects that need to be considered by an organization, it touches upon the areas that impact workers' health. These relate to emission to air, releases to water and land, use of natural resources, energy use, energy emitted, waste and by-products. Besides aspects like manufacturing process, waste management, wild life and biodiversity also need to be addressed by an organization complying with the environmental management system.

Apart from these, there are safety standards and awards used/applied for by companies such as: Du Pont safety standards (provides consultancy services that ranges from risk assessment to program implementation and help prevent incidents and reduce operational risks), British Safety Council Sword of Honour (represents the achievement in health and safety management), National Safety Council awards etc. Most big Indian and MNCs have their own HSE or EHS (Health, Safety & Environment) standards. There are specific standards like those for noise, ergonomics, toxic risk management etc. Private corporate houses linked to external market adopt these standards as part of their corporate social responsibility and also because these are demanded by the importers. Some of the measures adopted include: provision and enforcement of personal protective gear to workers engaged in hazardous jobs, safety training workshops, better ventilated and lighted workspaces, provision of first aid and health providers etc. Though these are adopted in the organized sector, as part of the CSR, some corporate houses extend health care to areas where their manufacturing facility is set up to serve the entire community in the locality. Besides these standards for the

manufacturers, standards like SA8000:2014 (Social Accountability standard), BSCI (Business Social Compliance Initiative) and SMETA (Sedex Members Ethical Trade Audit) include health and safety (apart from fair and ethical practices) and are applicable to suppliers and sub-suppliers, besides the enterprises. Particularly in the days of globalization, where jobs are outsourced to a number of stakeholders in the value chain, standards such as these ensure that all the stake holders irrespective of their size of enterprise are held responsible for the health of the workers in their units.

Fitzgerald (2001) points out that small firms, which provide the bulk of employment in developing countries would find international standards too expensive and be forced to close down. Given the highly competitive export market and the tight margins under which most small and medium sized suppliers operate, it is usually not viable for them to undertake to improve labour conditions without external financial support. A possible consequence of promoting labour standards throughout the supply chain is that smaller suppliers may be dropped due to their inability to bear the costs of compliance and production contracts may switch to larger, national chains. However, as outsourcing of variety of manufacturing activities take place in the days of globalization, one possible way of implementing the OSH is that the corporate or big brands which sell the final product should link the adherence to health standards by everyone in the downstream value chain and also assist such stake holders in compliance, through providing resources and sharing part of the returns/ premium.

4.2 Initiatives Taken and Challenges

The central government has announced funds to the tune of Rs. 25 and 20 crores for identification, elimination and control of silicosis and asbestosis, respectively, in India, during the 12th Five Year Plan. Besides, Rs. 25 crores has also been set aside under centrally sponsored scheme for strengthening of Enforcement Systems in Factories - Establishment of Industrial Safety, Occupational Health and Work Environment Centre in the State Factory Directorate.

One of the main challenges with the health care facilities in India is the lack of sensitivity to this important issue of occupational health.

A simple question regarding the person's occupation would help the health provider to link the disease and the root cause of the disease. For instance, silicosis renders the lungs vulnerable for bacterial infections leading to its diagnosis as TB or other bacterial infections in the respiratory system. This is why perhaps, the morbidity rates under acute respiratory infections are very high and both the incidence and mortality rates under tuberculosis vary in India (http://cbhidghs.nic.in). As the working group (GOI 2011, p.112)) notes "there is lack of infrastructure facilities for diagnosis of silicosis and Silico-tuberculosis at district level and PHC level health care centres. Even the awareness of Silicosis disease among medical practitioners posted at District Tuberculosis Control centres is deficient".

The Ministry of Micro, Small and Medium Enterprises (MSME) provide various incentives for adopting quality standards. These incentives if extended to adopting industrial safety measures, could have positive impacts on workers' health working in MSME sector

5. Conclusion

Although occupational safety and health (OSH) is of local, national and global concern, and there are set of laws and regulations present in national and global platforms it is found that the role of informal sector is ambiguous in determining the compliance behavior of firms. Small and medium firms in the informal sector often find the labour standards, difficult to comply with. Therefore, one possible way of implementing the OSH is that the corporate or big brands which sell the final product should link the adherence to health standards by everyone in the downstream value chain and also assist such stake holders in compliance, through providing resources and sharing part of the returns/premium.

The findings in this paper indicate that although morbidity is higher in the old working age-group (36 - 65 years) in case of manufacturing and construction sectors the percentage of ailing people is more among young workers (15 - 35 years), which has direct implication on their productivity, earning capacity and ultimately on the national income. It is also a matter of concern that the percentage of people suffering from eye ailments is more in the relatively younger age group, which can affect their livelihoods. As expected, the prevalence of respiratory ailments is more in the manufacturing in both the age groups. Disabilities due to

accidents etc are more among the younger age group working in the manufacturing sector, whereas construction activities seem to cause more disabilities to the older age group.

Overall, the illness reported is higher than the all India average in the case of manufacturing, electricity gas and construction sector in the urban areas. Construction sector at all India level reports a relatively higher prevalence of all the classified ailments, while in the urban areas, manufacturing sector reports more ailments. At all India level, the prevalence of eye ailments is more in the mining and quarrying and construction sector, perhaps due to working without adequate personal protective gear. In the urban areas, gastro intestinal, respiratory and eye ailments figure prominently followed by skin diseases (skin diseases are more in urban manufacturing). As expected, disabilities and accidents are more prevalent in the construction sector of all India as well as in the urban areas. However, more disaggregated analysis by sex and place of residence may bring further insights in understanding the OSH issues in India.

The results indicate that respondent's awareness about health and location matter in case of self reported health information. One of the main challenges with the health care facilities in India is the lack of sensitivity to this important issue of occupational health. The paper suggests that a simple question regarding the person's occupation would help the health provider to link the disease and the root cause of the disease. This would pave way for better estimates of OSH and targeted efforts to address workers' safety at workplace.

Appendix 1: Proportion of ailing persons by States and Union Territories

No.	States	(%) of ailing persons to total population
1	Jammu & Kashmir	7.13
2	Himachal Pradesh	8.45
3	Punjab	12.69
4	Chandigarh	6.86
5	Uttaranchal	5.48
6	Haryana	9.36
7	Delhi	1.4
8	Rajasthan	5.99
9	Uttar Pradesh	10.19
10	Bihar	5.42
11	Sikkim	4.95
12	Arunachal Pradesh	6.02
13	Nagaland	5.87
14	Manipur	2.81
15	Mizoram	1.92
16	Tripura	12.24
17	Meghalaya	5.13
18	Assam	8.23
19	West Bengal	12.47
20	Jharkhand	3.57
21	Odisha	7.49
22	Chhattisgarh	6.99
23	Madhya Pradesh	6.23
24	Gujarat	7.22
25	Daman & Diu	2.31
26	Dadra & Nagar Haveli	1.63
27	Maharashtra	10.35
28	Andhra Pradesh	9.67
29	Karnataka	6.19
30	Goa	12.39
31	Lakshadweep	12.81
32	Kerala	25.15
33	Tamil Nadu	9.55
34	Pondicherry	17.34
35	A & N Islands	5.4
	All India	9.51

Source: Calculated from the NSS 60th round unit level data

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Phone : +91-02717-242366, 242367, 242368
Fax : +91-02717-242365
Email : gidr@gidr.ac.in
Website : www.gidr.ac.in
Gota, Ahmedabad 380 060, Gujarat, India.